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Abstract	As smartphone and location-based service are becoming widely available due to synergy effect of two, the indoor location-related technology are gaining more interest as the next-generation location-based service. This paper introduces and a genuine framework of Indoor Venue Search/Recommendation System that may be applied for indoor shopping areas with indoor positioning technologies. By using QR-codes as basis of use location detection, the experiment was performed in a shopping area with +400 customers to analyze their search behaviors of searching shops through Indoor Venue Search System. As any mobile Location-based Service (mLBS), the key to successfully capture users is toshorten the usage time (due to mobility of the user). However, users are likely to get confused to find the venue of their choice without simple and clean categorization of venues in shopping mall or any type of indoor plaza. By researching optimal venue search result number on a limited area of smartphone screen, this research may benefit the service developers to categorize venues according to the result and number of venues in a category and simultaneously benefit the users by increasing the search efficiency. In a broader spectrum, this research aims better recommendation for mobile location-based venue search system since time is a good indicator of good recommendation. The research conducts real-world experiments to see how user-interface of Indoor Venue Search System affects customers to make a faster decision. The goal is to find a correlation between number venue search results on a smartphone screen vs. user decision time. The experiment prototype of Indoor Venue Search System is designed using open smartphone-friendly platform such as HTML5, MSSQL, QR-code, and JQuery. Also, to be applicable for most of indoor positioning technologies for future use, QR-code was used to mock user detection unction.
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Master's Dissertation 2011

Indoor Venue Search and Recommendation System using Smartphones

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SUMMARY OF MASTER'S DISSERTATION

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Indoor Venue Search and Recommendation System using Smartphones

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Key Word(5 words)

Location-based ,Search, Recommendation, Smartphone, Indoor-positioning,

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I. Introduction

As GPS embedded smart phones are becoming increasingly available, many location-based services are penetrating the market. Furthermore, the ubiquitous nature location-based venue recommendations are transforming the way we make decisions. The combination of smartphone and location-based service is becoming the new killer business that combines both physical and virtual spaces in a real-time user environment [1][2]. The concept and motivation of the research came from the idea of Indoor Location Analytics (ILA), which transformed the concept existing web analytics to an indoor environment. This derived an idea of applying Web Search Engine to Indoor Venue Search System.

This paper dive into this field to identify how a smartphone venue search system based on an indoor positioning technology could work in this field, and furthermore, endows novelty by establishes a prototype for experiment that is deployed in the real world shopping mall. The data collected and analysis may benefit smartphone indoor venue search system developer's particular in designing the user interface.

The indoor positioning system is a fairly new concept in the smartphone division at this stage.[3] However, the value of accurate indoor positioning technology lies not just in the extension of existing services to an indoor environment, but it also allows one to attain more detailed locational information, such as distance to the venue, by utilizing position of user. Just like any other smartphone location based service, or in other words, mobile location-based service (mLBS), the most important factor is efficient user experience. While researching usability of Indoor Venue Search System, the research deeply investigates how amount of venue search results affects users from making decisions.

I.1Current Situation / Problem Statement

Market share of smartphones is increasing at a fast pace and is expected to grow 55% solely in 2011, shipping nearly 472 million smartphones just in 2011. [1] As a supporting data, countries such as America reached market share of 38% in Q2 of 2011.[2] With this on-going phenomenal, new types of smartphone-specific services has been developed in last few years. One of the most prospective new services is mobile location-based service (mLBS). . Expected to grow up to $10.3 billion in 2015, from existing $2.8 billion in 2010, the LBS market share reflects possibility of other services in the field to grow up. Many IT related companies such as Google, Facebook, and Foursquare are participating in this field by launching and services such as Google Maps, Google Places, Facebook Places, and FourSquare. Those services take benefit of GPS, 3G, Wi-Fi and even camera function of smartphone to detect the users location. and allows the user to find, recommend places or even share any type of data user wishes to such as simple text message.

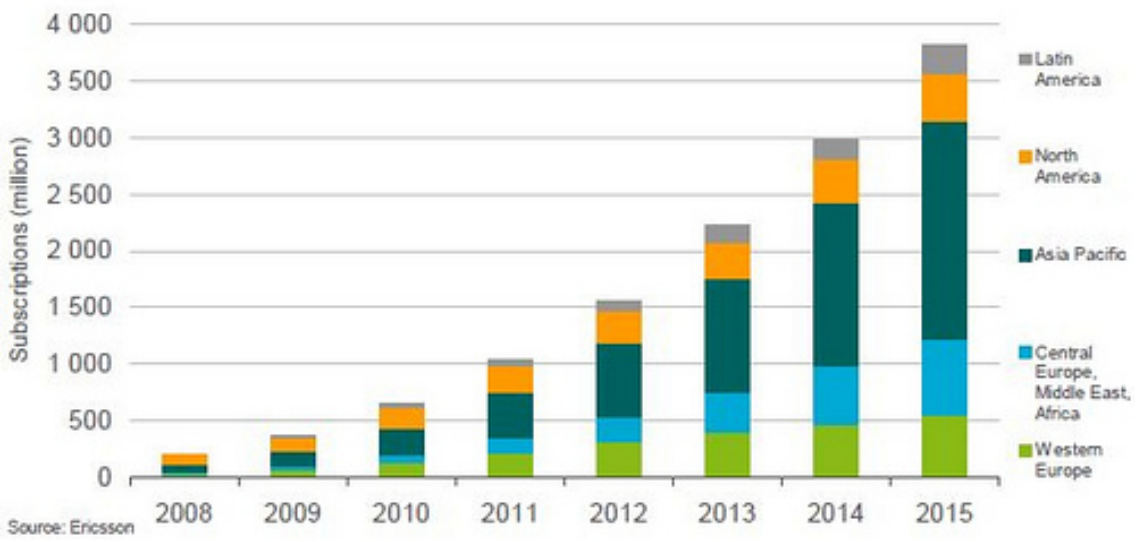


Figure 1:GROWTH OF WORLDWIDE SUBSCRIPTIONS OF SMARTPHONES
Source: Ericsson [31]

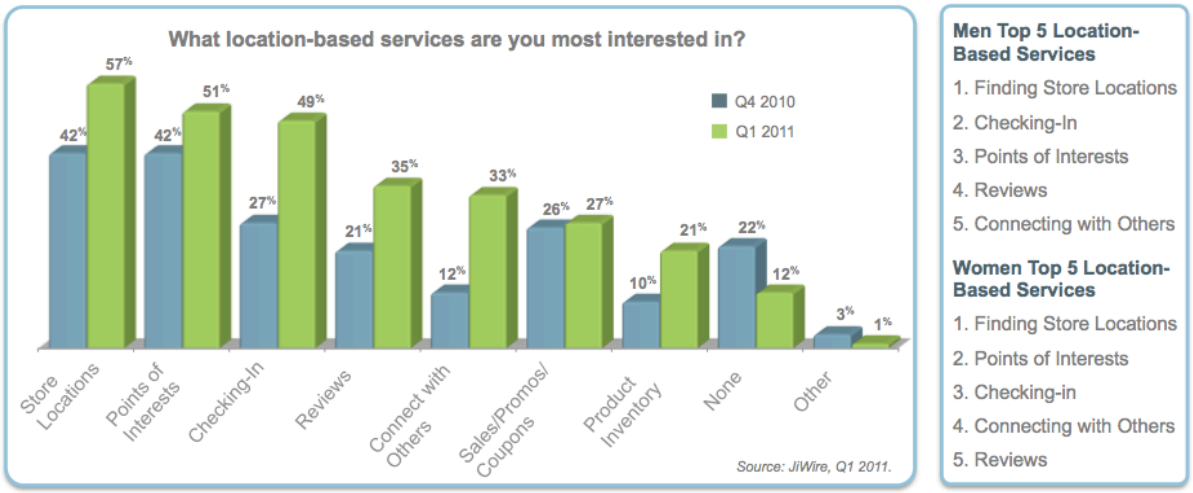


Figure 2 : SURVEY OF MOST INTERESTED LOCTAION-BASED SERVICES
Source: JiWire [7]

A survey of users shows that store finding is the most interested service, however, standard GPS receivers embedded in smartphones are less likely to receive signals indoor. Despite the recent progression of mLBS, the service is in desperate need of practicable indoor positioning in order to continue its growth since most of the venues are located indoors. Major manufacturers and smartphone OS developers are seeking to solve this problem by mixing 3G or Wi-Fi signal strength to the location detection algorithm, but none of them are accurate enough to meet the standard. While smartphone OS developers are working on this issue, many other indoor detection technologies are rising up the horizon. Technologies such as A-GPS, Indoor Messaging System (IMES), RFID, and Visible Light are capable of detecting indoor positions. [3] Some of these technologies has advantages of integrating easily on smartphones. For example, A-GPS and IMES technology uses same frequency with existing GPS. In other words, with simple firmware (software) update, the existing GPS receiver will have indoor positioning capability.

As for the indoor positioning technology companies, one of the most common problems is to have a viable business model. The previous study shows that these indoor

positioning technologies suits best for B2B-type of shopping mall integration at the starting phase. [3]

Combining these problems of current situation and trend, indoor detection capable venue search system will become the next prospective service in the mLBS field. In fact, there are already glimpse of smartphone venue search service in some malls. Coex Mall, located in Samseong-dong, South Korea, has developed an iPhone and Android application in 2011 that allows customers to search and find venues within their mall.[4] The system allows entrance of the customer through Near Field Communication(NFC) and Quick Response Code (QR-code) and links the customer's smartphone to app-download page. However, the inconvenience of installation and lack of method of search result ordering (mostly caused by inefficient categorization of venues) proves that the service is still in infancy.

From the service provider/shopping mall side, categorizing venues is a problem because mall or buildings has different purpose that leads to possession of different types of venues. For example, consider a mall that restaurants dominate the venue share. The last thing a customer wants to see is hundred shops listed on their smartphone as a search result – especially when they are in mobile position which they cannot stay a longtime searching results. On the other side, the building owner (service provider) must give venues fair chances of appearing on the result in order to avoid complaints from venues. Having static arrangement will likely give disadvantage to the venues, which are listed on the bottom side of the list.

I.2 Goal

This research will establish smartphone-based indoor venue search system development framework using up-to-date smartphone-friendly SDKs and APIs, such as

HTML5, JQuery, and QR-codes and evaluate usability (number of users, average usage time, search depth, and etc.) in the real-world shopping mall and its customers. Moreover, the research will evaluate effect of user-position data in search result ordering (recommendation algorithm) and search efficiency by analyzing relationship between number of venue search results on the screen and usage time. Unlike regular non-mobile venue/product search system (e.g. desktop version of Google Maps or book finder in library), using distance from user's position to destination is the factor that differs in mLBS. Therefore, distance information is used as recommendation algorithm for IVSS; order by shortest distanced venue from top of the screen.

Below is the summary of research questions that are targeted in this research. An assumption is made that the question applies to indoor shopping areas (e.g. malls and department store) and system on smartphone platform (e.g. smartphone application and HTML5). As a summary, the following usability-related questions will be researched.

- Test how indoor positioning capability may affect smartphone indoor venue system (if exists) by identifying

  Usage time difference

  Search result accuracy (% of customer who made selection and benefit from the result)

  Overall system accuracy (% of all customers who entered the system and made benefit from the result)

- Simultaneously achieve usability of the system and venue categorization problem through identifying relationship between

$$t_d \text{ vs. } N_r$$

(t_d : Decision time of the customer N_r: Number of search results)

The reason for selecting time is because time is used as a reference for recommendation in most of the web-based service, which has listing form of top-k recommendation. [24] Also, on the mobile environment, users will access strictly when the information is necessary due to having another priority such as shopping.[25] As stated by Sun(2003) in Information Requirement Elicitation, low input and output capability of mobile device makes searches for venues inconvenient [29] Moreover, The research experiment prototype is based on smartphone 3G data signals (or any other internet data packet transfer technology), which complies with the concept of Indoor Venue Search System and even other mLBS. Therefore, by indicating the importance of time decrement (or increment depending on the result) will give a significance reference to the future recommendation algorithm developers for most of the mLBS field.

II. Background Studies

II.1 Transforming Seamless Positioning Technology into a Business using a Systems Design Approach—Scenario-based Amorphous Design [3]

II.1.1 Scenario-based Design for Amorphous Systems

The research aims to systematically approach viable business model for seamless positioning system (SPS) such as Indoor Messaging System(IMES) developed by JAXA. SPS refers to a positioning system, such as GPS, that seamlessly changes mode between outdoor detection to indoor detection. For example, IMES technology uses same frequency with GPS therefore allows capability to receive both signals with same hardware. However, software(firmware) update will be necessary.[9][10] [11]Scenario-based design for amorphous system, which has been used in the research, rigorously identifies system usage scenario by declaring and linking who, where, what, and when (4Ws) the system will be used as shown in Figure 3.

II.1.2 Scenario Graph [12]

Multiple scenarios has been concerned by selecting numerous elements for each Ws. As seen in Figure 4, the links converges to the core function or the core competency that is ‘Communicate Location Info’. From this theme, applicable ‘where’ and ‘when’ is identified. After this iteration, ‘where’ branches out to sort of feasible

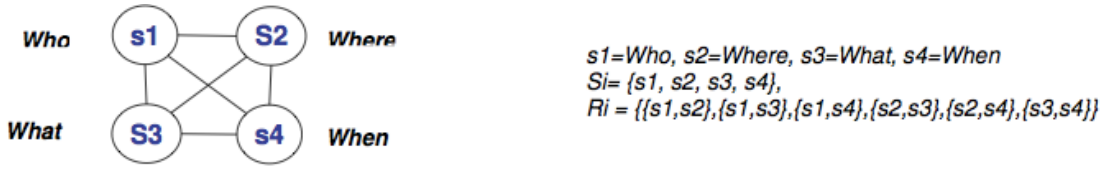


Figure 3 : 4W'S MAKE A SCENARIO (KIM,2007)

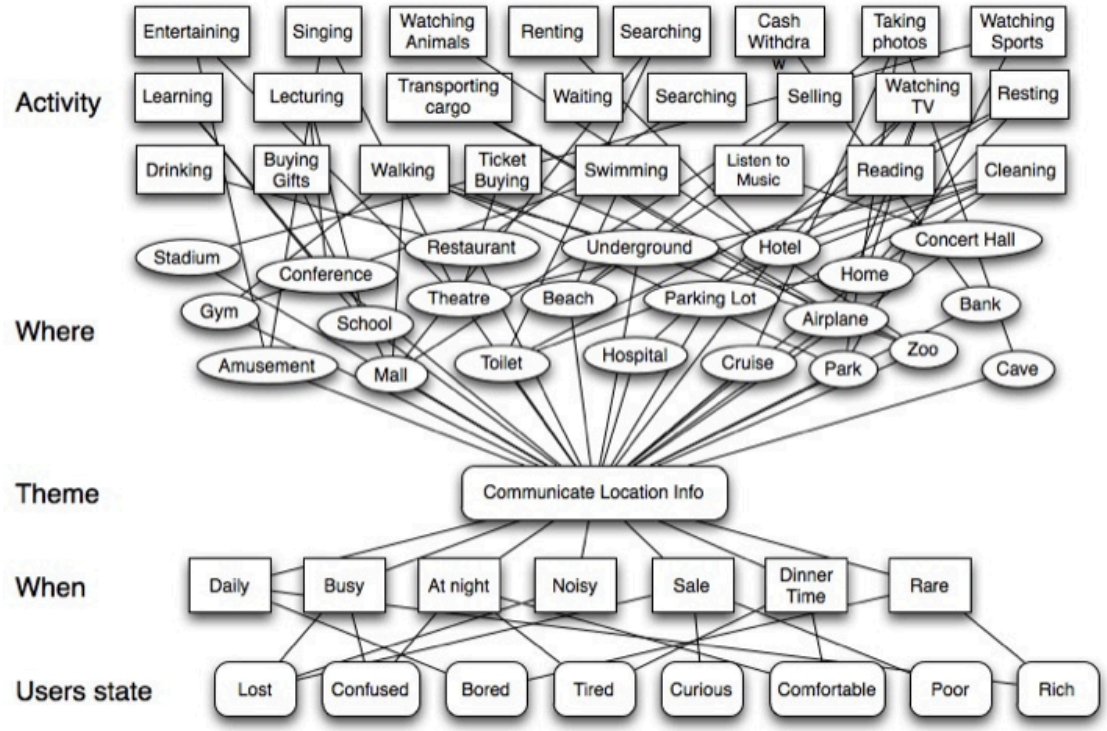


Figure 4 : SCENARIO GRAPH FOR IMES TECHNOLOGY

activities and ‘when’ branches out to feasible ‘user state’, also known as ‘who’.

After finding plausible links, next iteration is to use ‘Pugh Selection’ and find the best scenario available.

II.1.3 Pugh Selection [13]

Pugh (Pugh, 1991) Selection is a rapid decision-making technique by comparing candidates with certain criteria. The comparison criteria are listed on the first left column of the table and candidates are listed on the first row of the table. The datum (standard for comparison) is randomly set on the first iteration. Each candidates mark ‘+’ if the criteria is superior, or ‘-‘ if the criteria is inferior, or ‘0’ if it is the same to the datum. After performing two iterations. Mall became the top choice among the candidate scenarios as shown in Figure 5.

	Mall	Airport	Amusement Park	Museum	Station
Market Size	-	-	-	-	D
Degree of					A
Regulation	+	-	+	-	T
Our	+	-	-	-	U
Barrier of	+	-	+	+	M
Competition	+	-	-	-	/
Stakeholder	+	-	-	+	/

	Mall	Office building	Factory	Child Care
Market Size	D	-	+	-
Degree of	A	-	-	-
Regulation	T	+	-	-
Our	U	-	-	-
Barrier of	M	+	-	-
Competition	/	-	-	+
Stakeholder	/	+	-	-

Figure 5 : RESULT TWO INTERATIONS OF PUGH SELECTION FOR IMES

II.1.4 Stakeholders Analysis of the Mall Scenario [14]

When SPS is deployed in a shopping mall, stakeholder's needs to be concerned since they will be taking part of the value chain flow. The value may represent any physical value, such as currency, to non-physical value, such as information. Since the last stage of Scenario-based Amorphous Design is validating through financial simulations such as NPV, analyzing stakeholders is necessary due to the fact that analysis provides profit data that will participate in the financial analysis. In the case of IMES, two axis were set for stakeholder analysis; 1) Outside-Inside axis 2) Profit-Cost axis. Outside-Inside axis indicates whether the stakeholder is located in indoors or outdoors. Profit-Cost axis indicates whether the stakeholder generates money, or consumes money. As shown in Figure 6, the top right corner indicates the best stakeholder to target in indoor environment – shops. By having participation from shops, shops may benefit from absorbing re-routed customers through the system. Therefore,

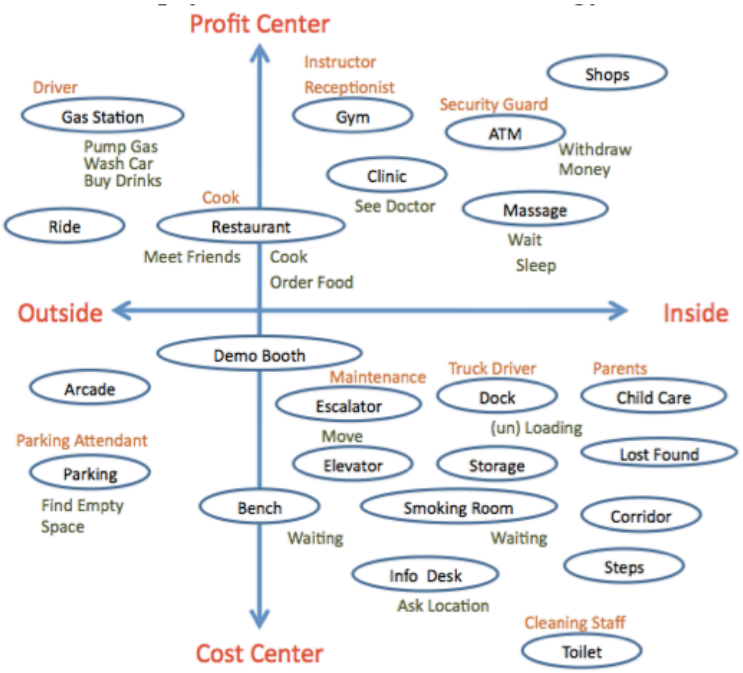


Figure 6 : STAKEHOLDERS ANALYSIS OF MALL SCENARIO

shops will have direct impact on their income when the system is deployed.

II.2 Web Analytics / Indoor Location Analytics [8]

II.2.1 The Analogy of a building to a website

In terms of structure, an indoor structure or a building can be compared to a website. As the visual comparison shown on Figure 7, a typical building structure consists of multiple floors. In a floor, there are many rooms. Similarly, a website consists of multiple web pages. Each web page has numerous clickable icons in most cases.

If a person chooses to enter a building, this behavior is analogous to a person entering a website either by typing in the URL address or clicking on search results or a link. A webpage corresponds to a floor of the building. Just as a website consists of many sub pages, a building also consists of multiple floors. If a person views a page,

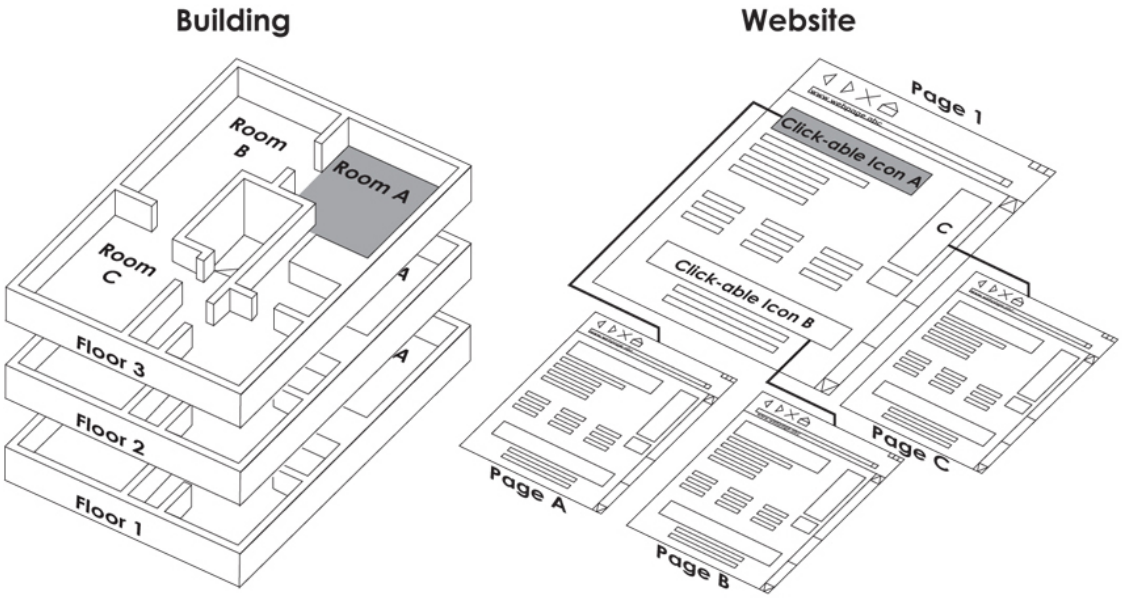


Figure 7 : COMPARISON OF BUILDING vs. WEBSITE IN HIERARCHIAL STRUCTURE

then he or she is observing information on the page and is in the process of deciding the next step for a click. Finally a room corresponds to a clickable icon. Simplified table view of this concept is shown in Table 1.

II.2.2 Review of Web Analytics

Web analytics is a common tool used for collecting web user's data on Internet websites. The primary method of gathering data is by tracking and recording the users' actions. This data is later used for optimizing the performance of a website [15]. Recently, the trend of usage of web analytics has spread to generating profit through managing

Table 1 : TRANSLATION OF WEB ANALYTICS TO INDOOR LOCATION ANALYTICS IN METRICS, DIMENSIONS, AND FEATURES

Indoor Location Analytics	Web Analytics
Building	Website
Floor	Page
Room	Click-able icon

advertisements [5]. Major information technology companies such as Google and Yahoo are servicing web analytics to web page owners. Owners are able to select various types of analytics depending on the kind of service they are providing.

There are mainly two methods of collecting data – logfile analysis and page tagging. Logfile analysis method records visitor's status and movement between pages on the web server. The web server will count the number of requests of particular page and log them into a file. In the early days of Internet, page views and visits were introduced as measurements in the logfile [6]. As the Internet services grew, technologies such as web proxies, dynamic IP addresses, cache, etc. became available and made the Logfile obsolete due to technical complexity in tracking unique visitors.

Page tagging method is a more advanced technology compared to the logfile analysis. Instead of web server carrying out the logging, each page has a distinct tag that counts the number of time the page has been opened then sent it to the server through JavaScript [6]. The process is more accurate since the counter is page-oriented rather than server-oriented. Every movement between pages conducted by the visitor is temporarily stored in the visitor's computer. As a result, the number of page views and movement path of unique visitors are significantly more accurate than would be by using logfile analysis.

Another highlight of page tagging is the usage of cookies. Cookies are assigned to unique visitor to keep track of their status. For example, when a visitor performs an online shopping, the shopper puts potential purchase items into a virtual shopping cart. Cookies will record the items so the next time when the same visitor re-visits the page, the items would still be in the cart. Since, cookie provides both ease of use to users and more accurate unique user-tracking to the website owners, many websites have already

adopted this technology.

II.2.3 Re-defining Elements of Web Analytics for Indoor Location Analytics

By applying analogous principles, elements, and dimensions of web analytics to the physical domains, Indoor Location Analytics service can benefit building owners, storeowners and shoppers by providing location information. Table 2 shows how some metrics and dimensions of web analytics [17] would translate into those of Indoor

Table 2 : CORRESPONDING ELEMENTS BETWEEN INDOOR LOCATION ANALYTICS AND WEB ANALYTICS

Elements	**Definition in Web Analytics**	**Definition in Indoor Location Analytics**
Bounces	Counts single-page visit to the website.	Indicates a customer who enters an area, but leaves in a short period of time.
Entrance (visits)	Counts entrances (visits) to the website. An entrance consists of a single-user session.	Indicates number of enters that are made to the area. This data can be used for calculating customer flow rate, capacity fill rate of the area, distribution of customers etc.
Exit	Counts exits from the website.	Indicates number of customers who leave the area. This data can be used for calculating customer flow rate, capacity fill rate of the area, distribution of customers etc.
New Visit	Counts first-time visits to the website.	Indicates the customer who came in the area for the first time. This data can be used as direct measurement of the growth of the business and effectiveness of the advertisement.
Time on Page	Records how long a visitor spent on a page.	Time on Area indicates the customer's total time spent inside a selected area. This can be used to control customer density in the area.
Visitors	Counts the total number of visitors to the website.	Indicate the total number of customers in the area. A single customer is eligible to make multiple entrances or exits. This data can be used for calculating area's optimal usage, and profit per customer.

Location Analytics. Naturally, not all metrics and dimensions can be translated into the physical location domain but this section describes a few of the common ones.

The first column lists the metrics, dimensions and features that Indoor Location Analytics can borrow from web analytics. The second column and the third column show the difference between the definitions of the corresponding metrics.

In web analytics, bounce is a counter for single-page visits to the website. In Indoor Location Analytics, bounce indicates a customer who enters an area, but leaves in a short period of time. A bounced visitor may have been curious initially but soon lost interest and was not led to goals such as transactions. Another possibility is that the visitor came to the place unintentionally. Reducing bounce can make efficient traffic flow among customers that will lead to transactions and can indicate the efficacy of advertisement.

An entrance, in web analytics, is a counter for the number of visits to the website. Similarly, in Indoor Location Analytics, entrance indicates the number of visits to a certain area. This data can be used for calculating customer flow rate, capacity fill rate of the area, distribution of customers, etc. This metric is useful when combined with other dimensions to determine which area served as an entrance to the building or a store.

Exit in web analytics is the number of exits from a website. In Indoor Location Analytics, exit indicates the number of customers who leave an area. This data can also be used for calculating customer flow rate, capacity fill rate of the area, distribution of customers etc. in conjunction with the metric, entrance.

New visit, in web analytics, is a counter for the number of first-time visits to the website. In Indoor Location Analytics, new visit also refers to the number of customers

who came into the area for the first time. This data can be used as direct measurement of the growth of the business and effectiveness of the advertisement, if location information is linked with transaction information.

Time on page, in web analytics, records how long a visitor spends on a web page. The corresponding metric in Indoor Location Analytics is Time on Site, which indicates the customer's total time spent inside the selected dimensions of an area. This data can be used to control customer density in the area.

Visitors, in web analytics, is the total number of visitors to the website. Similarly in Indoor Location Analytics, visitor is the total number of customers to the area. Since a single customer may make multiple entrances or exits, there are various algorithms to calculate this metric. This metric is used to calculate the optimal usage of an area and profit per customer.

III Experiment

III.1 Overview

The experiment was held in a Central City, which is located in Seoul Korea from June 25th to July 23th with total of 387 customers participating in the Central City.

The experiment is divided in to two sections. The first section collects data, to find

- Total usage time difference between Indoor Venue Search System w/ user position data and one w/o position data
- Satisfaction level
- Overall accuracy (recommended result accuracy)

Using the indoor positioning system, the venue search system differs from other similar smartphone indoor venue search application by acquiring user position data. In fact, study shows that the most crucial information for mLBS recommendation system is the user position. [18] To utilize and test the impact of the position data, the recommendation algorithm, which is also known as search result ordering method, is in ascending order of the distance between user and the destination venue.

With this fact, the experiment was designed to inform customers to acknowledge the distance from the search result list as shown in Figure 8. To give a fair comparison of customer's behavior difference between the distance information embedded Indoor Venue Search System and one with out distance information, the one without the distance information needs to have no ordering algorithm. Therefore the search result

Figure 8 : SEARCH RESULT LIST SCREEN WITH AND WITHOUT DISTANCE INFORMATION

ordering is set to random. This means when a customer uses the Indoor Venue Search System the search result will appear in random order but with the same parameter of results. On the other hand, second phase of the first experiment uses distance form the user to the venue as the ordering method. (Ascend) Then the usage time will be measured (per unique customer) by Google Analytics and be compared. The validation of the process will be explained later in the section.

Second experiment uses the categorization structure of the prototype. The results are set to have 2 to 17 results per screen as shown in Table 4. Since the prototype is designed to show 7 search result on the initial screen, most of the search result are focused to have 7 search results to test out the decision time between search result screen with scrolling and no scrolling.

III.1.1 Prototype – User Requirements

The prototype is designed to follow researches that have previously done about adopting 3G value added services. [26][27] From the researches, it is evident that ease of use and perception of usefulness is the starting path of using the service with

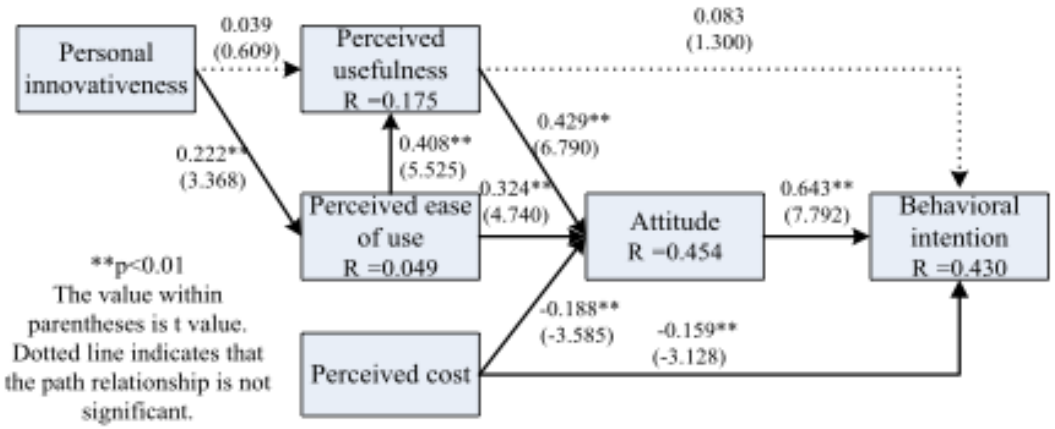


Figure 9 : BEHAVIOR INTENTION TO USE 3G ENABLED MOBILE VALUE-ADDED SERVICE – (solid line supports hypothesis)
(Copyright by Elsevier, Ying-Feng Kuo, Shieh-Neng Yen)

behavioral intentions as shown in Figure 9. Also, to avoid one of the common the problems of mobile devices, which is having low input and output that cause searches inconvenient. Since users are likely to use mobile device and service only for the time that they are strictly needed,[25]

The final look of the prototype is shown in Appendix 2. From Figure 9, to achieve 'Personal innovativeness', which means trigger interest, a poster with QR code was set. Since, smartphone is already popular in Korea (1 out of 3 mobile subscribers has smartphone), the QR code will give the customers perception that this is 3G/WiFi services. For the 'Perceived Ease of Use', HTML5 combined with JQuery was used to emulate the smooth UI of the native app. Moreover, developers will be more accessible to HTML5 platform since it is an open source and free, unlike other native application publishing method. The biggest advantage is that users dose not needs to download any software to use this service. [28] Also, particularity for this prototype, the category buttons are designed to be simple and large (4 per screen) so any users will be able to understand the operation process easily.

III.1.2 Prototype – Developer Requirements

Developers have many opinions about smartphone application development in choosing platform. One of the recent trends is the rise of Web application - an application in which all or some parts of the software are downloaded form the Web each time it is run and can usually be accessed from all web-capable mobile devices. [30] The advantages/disadvantage of platform-related survey was taken by Global Intelligence Alliance from 87 developers, service providers, and design agencies and analyzed in this research to suit their request in developing smartphone application. As a result, following conclusion was made in Table 3.

Table 3 : ANALYSIS OF NATIVE APP VS. WEB APP DEVELOPMENT
COPYRIGHT BY GLOBAL INTELLIGENCE ALLIANCE –Native or Web Application?

User Experience Design	native apps are traditionally superior in terms of performance and the only means to access device attributes such as geo-location API, camera, address book, and accelerometer.
Billing	web apps or mobile-optimized web sites typically offer greater billing options and allow for open distribution, independent of third-party vendors such as carriers or OEM app stores.
Reach	while mobile app stores attract more active users overall, web apps allow publishers and service providers to serve all smartphone audiences without the compatibility issues facing native app distribution.
ROI	the costs of development and updates are generally higher for native apps, but native app stores are said to generate higher returns thanks to the benefits of larger consumer bases and integrated billing, for example.
Go-To-market	web apps are often quicker to deploy particularly since they are not subjected to distributor approval e.g. Apple App Store, which can take from weeks to months of evaluation and quality assurance.
Discoverability	with an influx of new applications into proprietary app stores (over 180,000 apps on Apple App Store alone*) it is increasingly hard to generalize whether visibility is higher over the web or native interfaces.
User analytics	web apps or web sites generally offer more direct, unfiltered access to user behavior data, which in turn enables product cross-selling opportunities and helps build customer loyalty.

Since Indoor Venue Search System doesn't require mobile payment and it is more of a mobile advertisement platform, the billing issues are rather neglected. From the advantage of reach issue, discoverability, and user analytics Web application with HTML5, CSS3, and JQuery (JavaScript API) was used to aid other developers.

Following the Information Requirement Elicitation (IRE), the UI is designed in a simple input format with multiple categories, which is shown in Table 4. The Shop Category in Table 4 indicates last-child category of the system. In other words, those last-child categories are selected search keywords and will show results that are relevant to the keywords. As shown in Table 4, Food is mother category of Restaurant, Fast Food, Café, and Sweets/Dessert and Restaurant is a mother category of Korean, Western, Japanese, Chinese restaurant category. Since categorization of venue is a issue of developing Indoor Venue Search System, the number of results per category is set to be evenly distributed ranging from small as 2 to large as 17. More elaboration of UI design is explained in the later section.

Table 4 : VENUE CATAGORY AND CORRESPONDING NUMBER OF VENUES

Shop Category	2nd Level Category	3rd Level Category	SQL variable	Number of Shops
Cloth	Shopping		cloth	7
Accessory	Shopping		accessory	7
Book	Shopping		book	4
Others (Shopping)	Shopping		shopping_etc	8
Korean Restaurant	Restaurant	Food	korean_rest	17
Western Restaurant	Restaurant	Food	western_rest	9
Japanese Restaurant	Restaurant	Food	japanese_rest	4
Chinese Restaurant	Restaurant	Food	chinese_rest	2
Fast Food	Food		fastfood	10
Café	Food		cafe	7
Sweets/Dessert	Food		dessert	17
Entertainment			entertainment	10
Salon / Cosmetics	Service		beauty	10
Medic / Pharmacy	Service		med	14
Others (Service)	Service		service_etc	12

III.2 Assumption

Following assumptions were made on this experiment.

- Range between customer and QR code is neglected. (When customer enters the site using QR, the location of QR is location of customer)
- Customer does not move while they use the indoor venue search system.
- Viewing the ‘map’ page of the shops indicated the customer has more interest in the shop and is willing to visit the shop.

III.3 Experiment Scenario

In the real world shopping mall, random samples of users are participating in experiment with out notifying that this is an experiment. However, privacy is concerned since the data is collected as anonymous. No privacy sensitive data such as name, sex, age is collected through this experiment.

Figure 10 : EXPERIMENT SCENE

III.4 Field of Experiment

Central City landed on top among the research field candidates due to following reasons. South Korea tops over other countries for smartphone distribution. As of July 14, 2011, 1 out of 3.3 mobile phone users use smartphone. This rate is the highest among any countries in the world – Nielson Research reported Italy was the highest scoring 28% of smartphone penetration rate. (2011 data is not yet published). Also a statistic from 2011 KISA (Korean Internet Security Agency), reports average smartphone usage time of users are 75 minutes per day. Location-wise, Central City consists of 7 areas with different floors. (see Appendix 1) The structure is complicated enough to move from one area to another since there are less than three connecting path as shown in Table 5 Moreover, the some areas are in same floor making more complicated for the customers to find places. There are total of 139 shops almost randomly distributed among each floor, which makes the customer confusing to find the perfect venue for their choice. Another key factor is that Central City is connected to bus terminal, which allows flowing in of customers who are not used to the area.

Table 5 : FLOOR DATA OF CENTRAL CITY

Floor Name	Number of Shops	Connecting Floor
Young Plaza B1F	50	Central Park 1F Pamiers Park 1F
Central Park 1F	39	Central Park M1F Pamiers Park 1F
Central Park 1MF	14	Central Park 1F
Pamiers Park 1F	18	Central Park 1F Young Plaza B1F Pamiers Park 2F
Pamiers Park 2F	6	Pamiers Park 1F
Pamiers Park 3F	3	Pamiers Park 2F
Pamiers Garden 1F	9	Pamiers Park 3F
Total Number of Shops	139	

At the time of experiment, QR code posters are posted on 42 different locations among each floors as shown is Table 6. The locations are selected on passages in order to preserve random sample of customers. In other words, avoiding participants with similar entity due to locational characteristic is necessary. For example, if the poster is

Table 6 : QR CODE POSTER DISTRIBUTION

Floor Name	Number of Venues
Young Plaza B1F	50
Central Park 1F	39
Central Park 1MF	14
Pamiers Park 1F	18
Pamiers Park 2F	6
Pamiers Park 3F	3
Pamiers Garden 1F	9
Total Number of Venues	139

Figure 11 : LOCATIONS OF QR CODE POSTERS IN CENTAL PLAZA 1F

posted in a coffee shop, the participating customer will be less likely to search another coffee shop.

III.5 Method of Detection /Logging

The locational detection of customers is done through recording location of QR codes (X, Y) which is transferred to the server by URL query and web analytics.

There are two ways of logging that has been done in this experiment. One is through Google Web Analytics and other is to store count data in the MSSQL database using VBScript on Active Server Page (ASP) file. Google Web Analytics uses JavaScript on each HTML page to send recorded data to Google server. It is capable of recording multiple dimensions and metrics such as 'time of usage'. More information is provided in 'Review of Web Analytics' on above section. While, Google Web Analytics has better range of information, ASP and MSSQL does better job on filtering out data. MSSQL is capable of running database query language to quickly count the number of visitors from certain area.

III.5.1 QR-codes

There are total 42 QR code posters (shown in Appendix 1) that have been deployed on Central City. Although many studies have used GPS, active badges [19][20], and even exploiting wireless networking medium radio propagation properties, [21][22][23] using this technologies will ultimately fail in the this experiment because no participant's smartphone will have capability to read the signals. Therefore, using the QR code decoding applications, which is standard in Android system (Google Goggles),

and the nature of participants who downloaded any other type of QR code decoding app, the experiment was able to keep the novelty. Another reason for the QR code to be validated is because even though there is any type of indoor positioning technology deployed, the customers needs to get notified. To notify the customers for such a service, poster is one of the commonly used methods. As a result, the poster was designed professionally like a typical advertisement for venue search service. The poster title is written “Shop Finder for Central City” on the title. The QR code has a URL string as following

www.smap.co.kr/?qr=x

In the URL, the x refers to the integer range of [1,42]. After ‘?’ mark is URL query that declares instant variable (‘qr’) and stores the value (x). All 42 posters has unique QR codes printed with different value of x.

Figure 12 : QR CODE POSTER DESIGN

III.5.2 Data structure

Six tables structure the database. The six tables are “ShopMaster”, “Distance”, “QRMaster”, “Log”, and “ShopListing” as shown in Figure 13. ‘ShopMaster’ table has information about shop name (ShopName), shop detail (ShopDetail), floor name of the shops position (ShopLocation), x coordinate of shop location (Shop_x), y coordinate of shop location (Shop_y), mother category of the shop (ShopCatagory_1), first child category of the shop (ShopCatagory_2), second child category of the shop (ShopCatagory_3). Other tables, such as Phone, ShopPics, and priority stores phone number of the shop, URL link of the shop picture, and randomly generated number that is used for ordering search result randomly. Shop name is a string form database that stores shop name in Korean EUC-KR encoding. Shop detail is a string form database that indicates what the shop provides to the customer. (e.g. Japanese food, hair cut, etc), Floor name is string database that has one of seven floors name, which are indicated in above section, with the exact floor number. The format is ‘floorname xF’, where floorname indicated the Korean name of the floor and x as the number of the floor. (e.g.

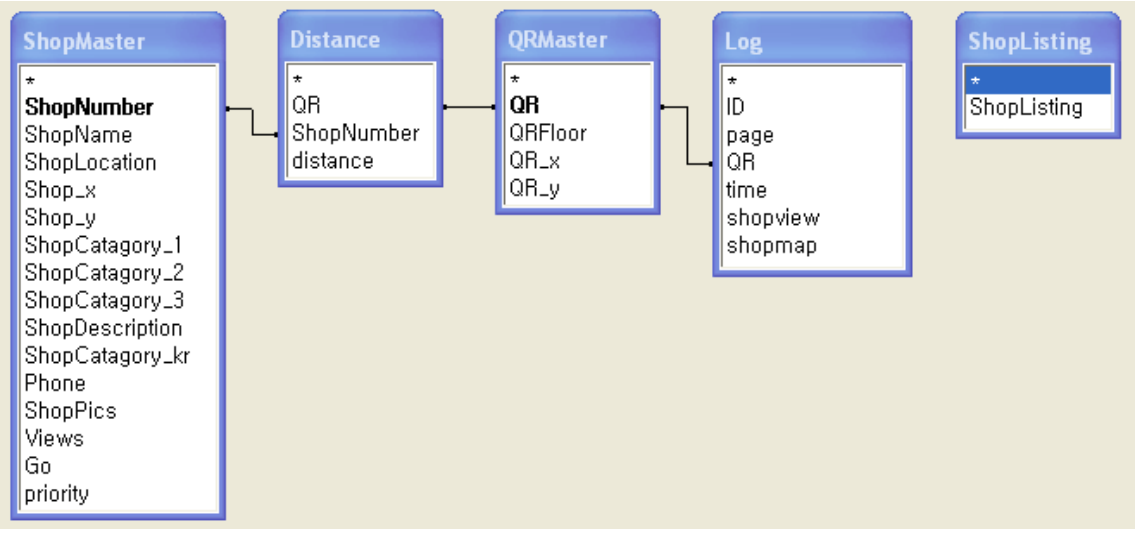
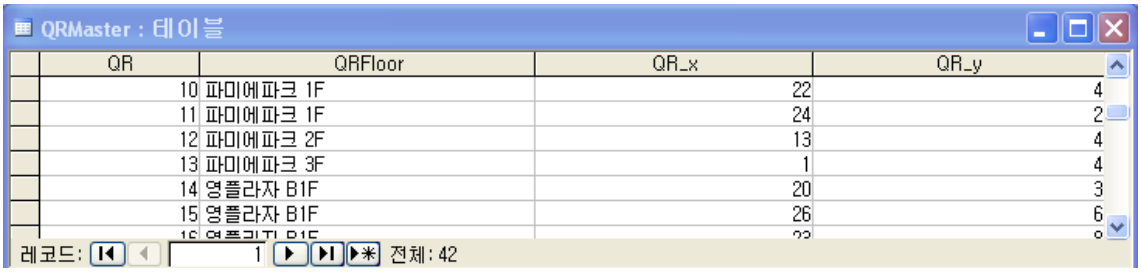


Figure 13 : DATABASE STRUCTURE OF EXPERIMENT

파미에파크 1 F) x and y coordinate of the floor is an positive integer number of x position of y position of each floor on a grid that has been divided every 8 meter of the floor map. For more detail, read section ‘distance calculation’. Mother category (ShopCatagory_1) of the shops is a string database that is one of the four categories of shops which is shown on the main screen of the system. (Shopping, Food, Entertainment, and Service). First child (ShopCatagory_2) category is a string database that is a sub-category of mother category. All mother categories has first child except Entertainment. Second child (ShopCatagory_3) is also a string database that is a sub-category of first child category. Only Restaurant (first child) has second child.

‘QRMaster’ table, shown in Figure 14, includes identification number of QR codes (QR), floor location of where the QR code poster is posted (QRfloor), and x (QR_x), y(QR_y) coordinates of that floor. Identification number of QR codes is non-redundant integer number ranging from 1 to 42, which is equivalent to number of QR code posters. Floor location of posted QR codes has exact syntax with floor location of the shops. (ShopLocation)

‘Distance’ table, shown in Figure 15, includes QR code poster (QR) identification number and shop number (ShopNumber). Using this two identification number data, the distance (meters) between shop and QR code poster is calculated using SQL string and stored in a form of integer.


QRMaster : 테이블

QR	QRFloor	QR_x	QR_y
10	파미에파크 1F	22	4
11	파미에파크 1F	24	2
12	파미에파크 2F	13	4
13	파미에파크 3F	1	4
14	영플라자 B1F	20	3
15	영플라자 B1F	26	6

레코드: 1 전체: 42

Figure 14 : 'QRMASTER' DATABASE TABLE

Figure 15 : 'DISTANCE' DATABASE TABLE

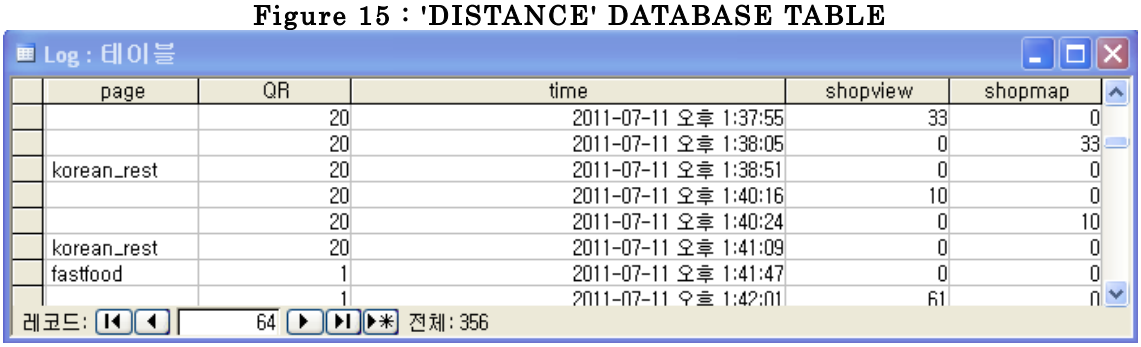


Figure 16 : 'LOG' DATABASE TABLE

The ‘Log’ table, shown in Figure 16, is used for recording customer’s behavior. ‘page’ data is a string that shows which search result page the user is visiting - the search result page is listing format. ‘QR’ data is an integer data which indicates which QR poster the customer used to land on the site. ‘time’ indicates the time when user entered specific search result page, clicked on a shop detail or, clicked on shop map information. ‘shopview’ and ‘shopmap’ data is a integer data of shop identification number which customer clicked. ‘shopview’ is recorded when the customer clicks Shop Detail page (see next section for more information), and ‘shopmap’ is recorded when customer clicked on the Map page.

‘shoplisting’ data is a string data that stores SQL variable mentioned in Figure 13. This data is a list of search keywords that shows the final search result screen.

Figure 17 : USER-INTERFACE OF INDOOR VENUE SEARCH SYSTEM

III.5.3 User Interface

The user interface (UI) structure is designed through HTML 5 as web coding, CSS3 as design language, and JQuery and VBscript for processing language. JQuery enables the webpage to have smoother transition, which emulates smartphone native applications.

The screens consist of four main parts – shop category screen, shop list screen, shop detail screen, and map screen. Shop category screen has four main buttons. Each buttons display mother, first child, or second child category of shops. The four buttons are designed to improve click accuracy by enlarging the size and arranging in 2x2 format and narrowing down the search keyword by categorizing shops. After reaching the final categorization of shops for each sections (shopping, food, and etc.), the shop list screen appears. In other words, this screen is a search result of the requested shops. The layout was referenced from Google search result screen. However, few modifications were made due to small screen of smartphones. Some modification that was made is large size font of the names of shops, height of each shop row, and addition

of shop pictures on the left side of the screen. As a result, total of seven search result may viewed in the first screen, and maximum of eight search result may shown when scrolled down. This fact is very important to test out the advantage of being on the top page of the search result in smartphones.

III.5.4 Random Calculation

First stage of the experiment requires random search result ordering. This means each customer who enters the system will have different ordering of results within the same pool of results. The random number generation is done every time user triggers ‘start.asp’ file. ‘start.asp’ file loads the database file so the other webpage files will be able to access the database. After loading the database, following random generation code is shown in Figure 18.

The first process opens the database table ‘ShopMaster’. Then using DO UNTIL loop to access each rows of database. While accessing each row, random number between 0-1000 is inserted in ‘Priority’ column. Then each row will be ordered by ascending order every time the search result page calls the ‘ShopMaster’ table.

```
sql = "SELECT * FROM ShopMaster"
Set rs = db.Execute(sql)
    do until rs.eof
        Randomize
        sql = "UPDATE ShopMaster SET "
        sql = sql & " Priority=" & CInt(1000 * Rnd) + 1
        sql = sql & " where ShopNumber=" & rs("ShopNumber")
        db.Execute(sql)
    rs.movenext
    loop
rs.close
set rs=nothing
```

Figure 18 : RANDOM GENERATION CODE FOR ORDERING SEARCH RESULTS

III.5.5 Distance Calculation

Each floor is divided to square grids. Each grid represents 8m^2 area. Using the closest overlap square of the shop and location of QR code posters, Pythagorean Theorem is used for estimation of distance. This results in giving properties of X and Y coordinates to each shops and QR code posters, which are shown in Figure 19.

For the shops located in different floor from QR code posters, the nearest escalator to the floor has been selected. Referencing Figure 19, when a customer selects a shop in 'Young Plaza B1F' from 'Central Park 1F', the system selects one of the escalator (marked in green in Figure 19) that is nearest to the customer. Then the distance between the escalator and the customer is added to distance from the escalator in 'Young Plaza' to the shop. When a customer selects a shop that is not in direct connection (e.g. Pamier Park 1F to Pamier Park 3F) shortest path between escalators in the connecting floor is added to the distance (e.g. distance between connecting escalators in Paimer Park 2F). An assumption is made that height of each floor is neglected in distance calculation.

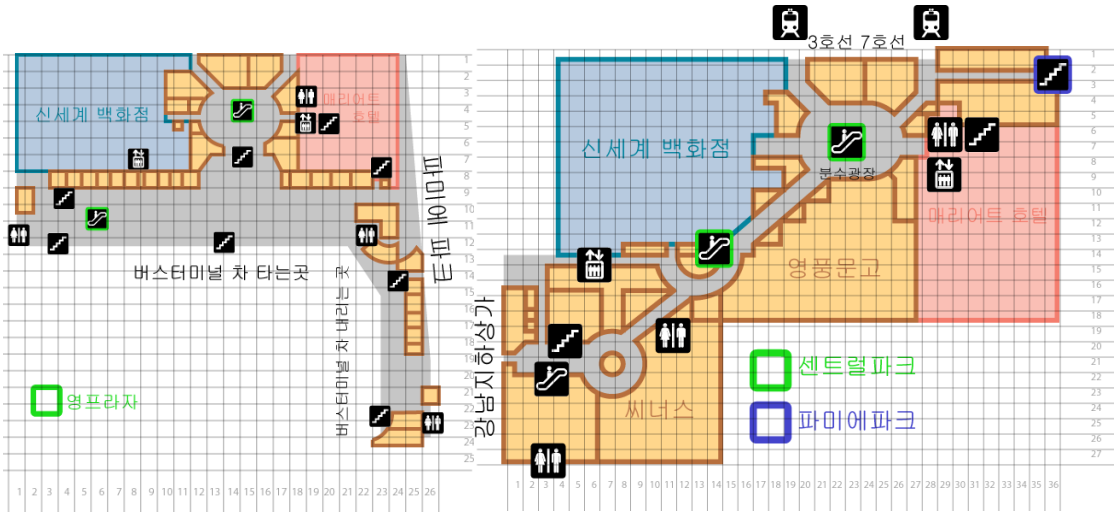


Figure 19 : GRID DIVISION PROCESS FOR DISTANCE CALCULATIONS

IV. Data Analysis

IV.1 Distance-based Recommendation Experiment (Usability Test)

IV.1.1 Extreme Outlier Identification

The first step before analyzing data for 'Number of Results vs. User Decision Time' and 'distance-based result ordering vs. random result ordering' is to understand Google Web Analytics' terminology of "Time on Page". By Google's definition "Time on Page" states as in Figure 20.

The reason to understand the definition is to eliminate outliers of the data that might heavily affect the result. Using the definition provided, an Average Time on Page can be expressed as following equation.

$$Time\ on\ Page = t_d \cdot (U_d - U_{d \cdot exit}) \qquad (1)$$

$$Average\ Time\ on\ Page = \frac{\sum_d^D t_d \cdot (U_d - U_{d \cdot exit})}{\sum_d^D (U_d - U_{d \cdot exit})} \qquad (2)$$

d represents the day of the experiment and D represents total days of experiment

> In order to calculate time on page, Google Analytics subtracts the difference between the timestamps for two pages. For example, if a visitor visits Page A at 10:00 a.m. and then Page B at 10:05 a.m., the time on page for Page A will be 5 minutes.
>
> In order to get an average time on page for a specific page, the total time spent on a page for the selected date range is divided by the number of **unique visits** to that page. The value is shown in minutes.
>
> When a page is the **last page in a session**, there is no way to calculate the time spent on it because there is no subsequent pageview. For this reason, when Page A is the last page in the visitor's session, its time calculation **is not counted** for that view. In addition, when that page is the only page viewed in the session, no time on page is calculated.

Figure 20 : DIFFERENCE VISITORS AND UNIQUE VISITORS

performed. U_d represents Unique Visitor (on selected page) at day d and $U_{d \cdot exit}$ represents Unique Visitor who exited from the page at day d. In order to select $U_d - U_{d \cdot exit}$ from the data, a segment must be setup. Figure 21 shows a sample segment setup for 'fastfood' search result page.

As shown in Figure 21, the raw data is filtered by including visitors (not unique) who visited page 'fastfood' (/#fastfood is the page name written in URL) and excluding the ones who exited the page from 'fastfood'. After the segment is finished declaring, date parameter and target page is set. The sample result graph for 'fastfood' is shown below in Figure 22. After the segmentation is completed, each data (Unique Visitor who didn't exit the page and Avg. Time on Page) is shown day by day on the graph. Figure 22 shows the daily data when the mouse cursor clicked on particular day.

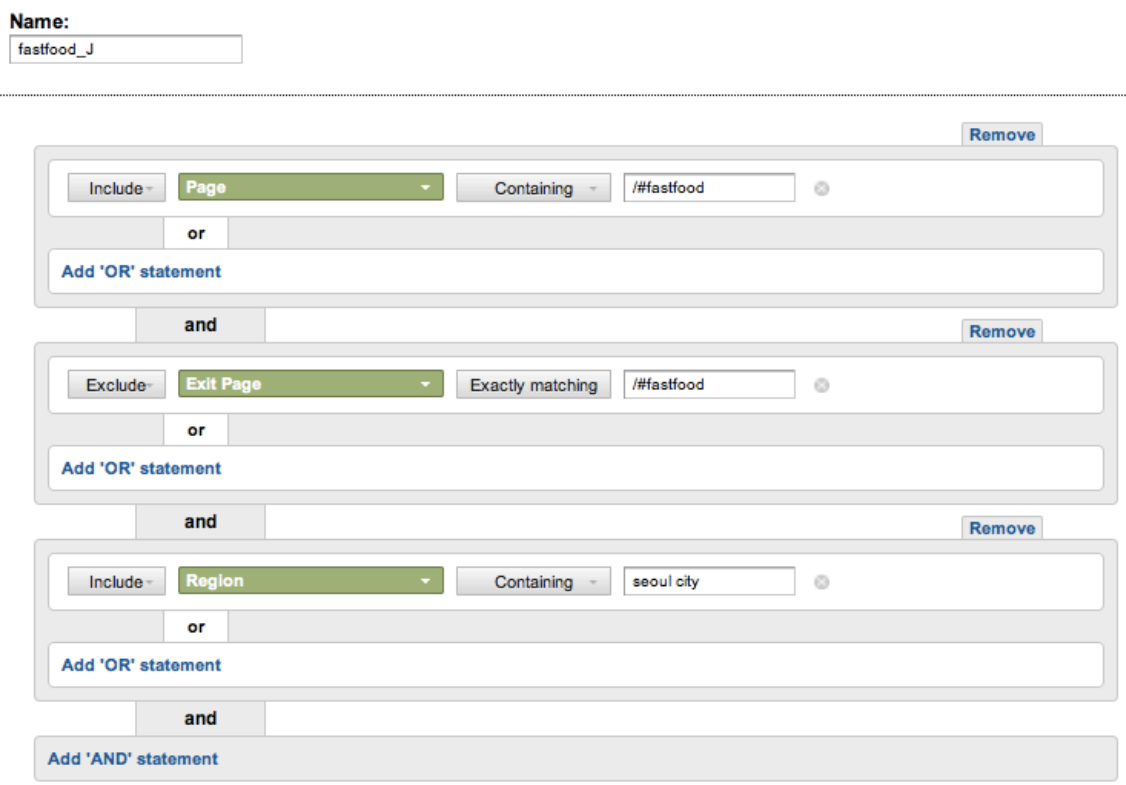


Figure 21 : FILTERING OUT EXITED VISITERS IN '/#FASFOOD' PAGE

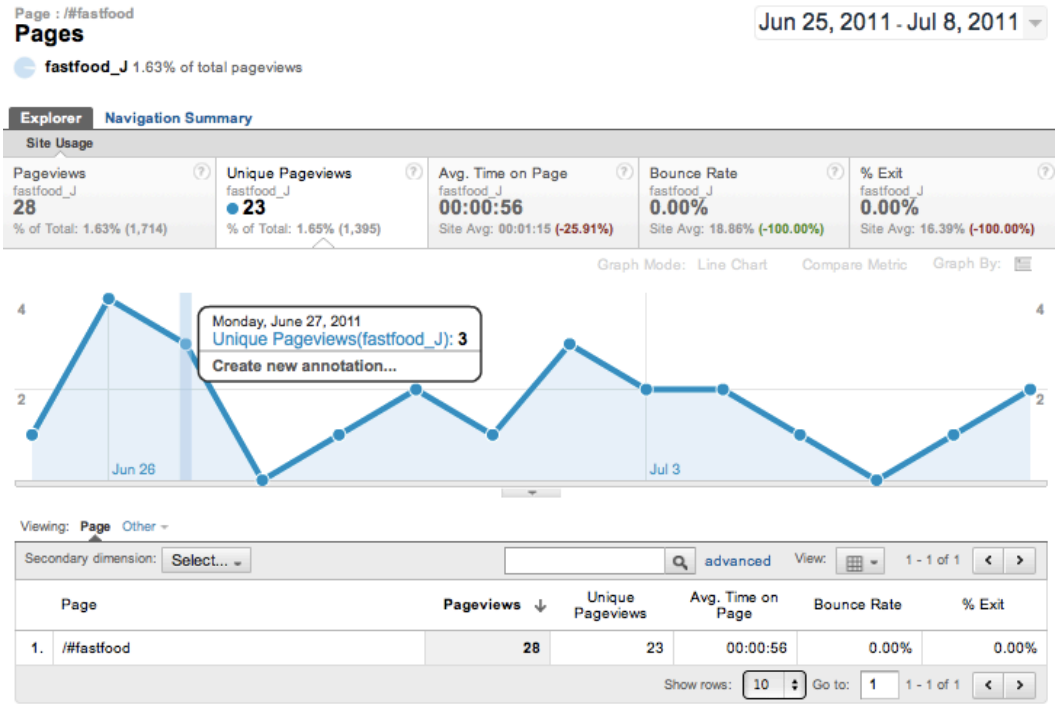


Figure 22 : RESULT GRAPH OF FILTERED UNIQUE PAGE VIEWS IN FASTFOOD PAGE

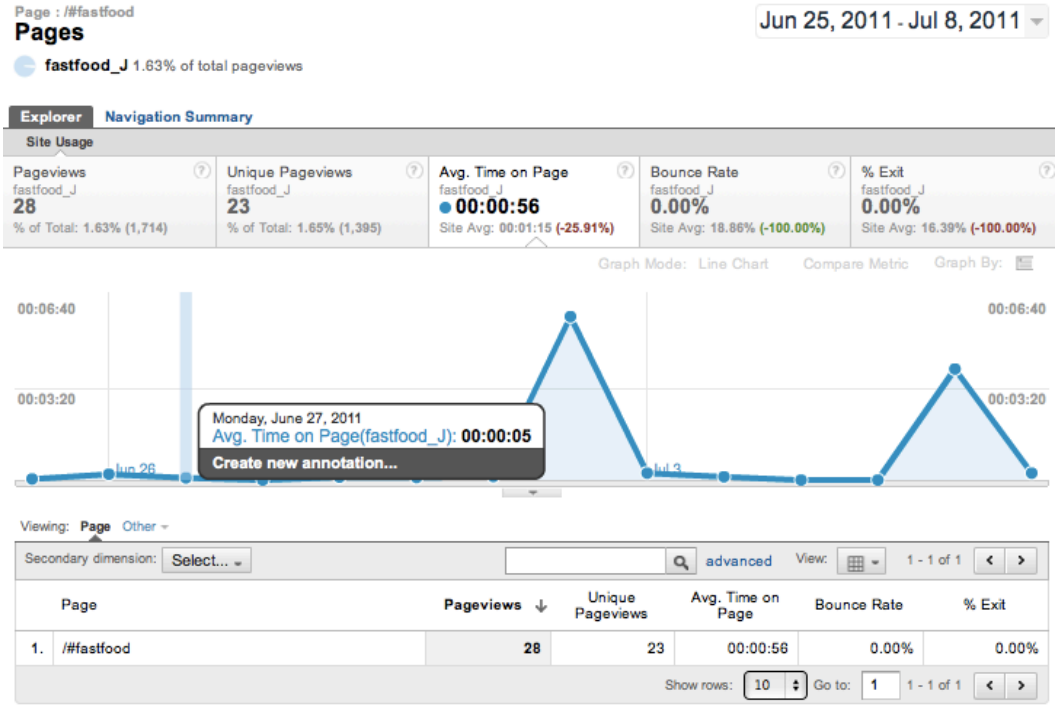


Figure 23 : RESULT GRAPH OF FILTERED AVERAGE TIME ON PAGE IN 'FASTFOOD' PAGE

After the segmentation is completed, each data (Unique Visitor who didn't exit the page and Avg. Time on Page) is shown day by day on the graph. Figure 23 shows the daily data when the mouse cursor clicked on particular day.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Average time on search results (sec)																
2																	
3			25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total Time
7		/#fastfood	2	13	5	0	6	6	8	359	15	8	0	0	244	15	48.6428571
21	Unique Page Views																
22			25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV
26		/#fastfood	1	4	3	0	1	2	1	3	2	2	1	0	1	7	28
38	Ave. time on search result * Unique Page Views																
39		/#fastfood	2	52	15	0	6	12	8	1077	30	16	0	0	244	105	1567
40																	
41							SUM(Ave. time on search result * Unique Page Views) / SUM (Unique Page Views)=										55.9642857

Figure 24 : AVERAGE TIME ON PAGE / UNIQUE PAGE VIEWS OUTLIER IN FAST FOOD PAGE

In Figure 24, there are two noticeable outliners. (One near the center and one on the far right.) These data might be caused by users who accidently didn't turn off their phone on the current page and later resumed the search process. However, since these data affects the quality of the result, they must be removed. Also, the average time on 'fastfood' page during the whole experiment date parameter (55.9643 in Figure 24) is equivalent to the 'Ave. Time on Page' value in Figure 23 proves that equation (2) is valid.

For the method of removing the outliers, first using boxplots, interquartile range (IQR) has been used; middle 50% of the data is used to obtain median and any sample above 1.5 IQR of third quartile and below 1.5 IQR of first quartile is considered extreme outlier.

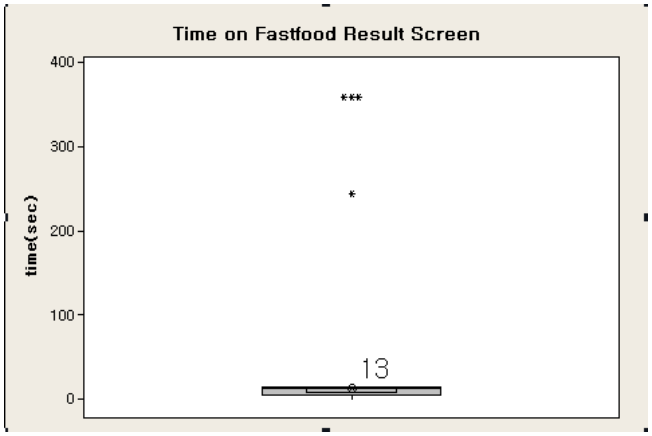


Figure 25 : BOX PLOT USED ON AVERAGE TIME ON PAGE

Unique Page Views				
	25-Jun	26-Jun	27-Jun	28
/#cloth	2	2	1	
/#entertainment	2	4	1	
/#korean_rest	1	4	1	
/#fastfood	1	4	3	
/#cafe	2	4	2	
/#western_rest	0	2	0	
/#dessert	1	1	2	
/#accessory	1	2	0	
/#shopping_etc	1	0	1	
/#book	1	0	0	

Unique Page Views				
	25-Jun	26-Jun	27-Jun	28
/#cloth	2	2	1	
/#entertainment	2	4	0	
/#korean_rest	1	4	0	
/#fastfood	1	4	3	
/#cafe	2	4	0	
/#western_rest	0	0	0	
/#dessert	1	1	2	
/#accessory	1	2	0	
/#shopping_etc	1	0	1	
/#book	1	0	0	

Figure 26 : SAMPLE ITERATION FOR CANCELING OUTLIERS

Figure 25 is a box plot of average time on 'fastfood' result page. The asterisk (*) in the box plot indicates extreme outliners and the number (13) on the center of the graph indicates median of the IQR sample. The four outliners correspond to the samples indicated in red of Figure 25. The median of IQR is significantly lower than the mean of the whole sample, which is 56 seconds; therefore it is necessary to remove the extreme outliers. The outlier-removed table is shown in Appendix 5.

After the iteration mentioned above, the new normalized 'Average Time on Page' is ready for next iteration. (Figure 26) Eliminating extreme outlier results in significant decrement in variance and standard deviation of 'Average Time on Page' as shown in Figure 27. Smaller variance and standard deviation means the data is constant, which allows better analysis for correlations between data.

Variance	46227.82		variance	67.066667
Std.ed	215.00656		std-ev	8.1894241

Figure 27 : VARIANCE AND STANDARD DEVIATION CHANGE AFTER OUTLIER ELIMINATION

Shop Name	Ave. Time on Page	UPV
cloth	11.00	30
entertainment	11.88	32
korean_rest	18.48	25
fastfood	10.25	24
cafe	12.21	19
western_rest	16.31	16
dessert	8.10	10
accessory	6.63	19
shopping_etc	12.75	16
book	8.67	15
japanese_rest	15.33	15
chinese_rest	9.67	9
med	8.14	7
beauty	9.25	8
service_etc	10.17	6

Figure 28 : AVERAGE TIME ON PAGE AND UNIQUE PAGE VISITS PER CATAGORY AFTER OUTLIER ELIMINATION

The amount of the data (Unique Page View – UPV) differs from page to page due to real-world environment - Customers has different preference of what they want to know in the shopping mall area. However, the data can be separated to three parts; UPV above 20 (green in Figure 28), UPV above 10 and below 20 (yellow in Figure 1), and UPV below 10. (indicated in red in Figure 1). Higher the UPV means the data has more credibility. For later iteration, higher UPV data is likely to have higher trim level to get more reliable mean data. (Executed in next section)

IV.1.2 Mean Trimming

Mean trimming is a statistical technique where you delete each end of ascending ordered data by certain percentage. This process allows decreasing standard deviation of the samples. Another advantage by performing multiple different level trimmed mean, the sample size (UPV) between pages will also have smaller standard deviation and variance. Due to wide range([6,32]) of UPV set, following rules has been set for iterations.

- Trimming level (5%, 10%, 20%) is done until a set of sample's (per page) extreme outlier is eliminated.
- Samples above 1000 seconds are eliminated, since they are obviously false data.
- The maximum trim level for samples over 20 (Unique Page Views –UPV) is 20%, sample over 10 is 10%, and sample less than 10 is 5%.

The first rule allows elimination of forcing out extreme outliers. Although, it might be fine to delete extreme outliers right away, due to the face that each outliers also differs with great amount of range (in this experiment – [33,3371]), it is ambiguous to find out if the smaller extreme outliers has statistical meaning or not. Therefore, by using trimmed mean and increasing the level up to the point where extreme outliers disappear will be more safe than eliminating the extreme outliers directly since only trimmed mean technique is used.

The third rule prohibits UPV per page to have greater standard deviation. Also, for the page that has low (less than 10) sample might also decrease the credentials to a level where it cannot be used. However, to preserve data, minimal trim level must be used (just about to eliminate extreme outliers)

The following figures show different levels (5%,10%, and 20%) of trimming process. The numbers marked on red is the outliers that iterations must target and make it to 0. The yellow box indicates targeted (subtracted) values due to trimming. Notice that yellow box increases and red number decreasing as trimming level increases. Some of the outliers may not be targeted ('med' page in Figure 29) since the trimming sample value is less than 1. ($8 \times 5\% = 0.4$)

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV
/#cloth	2	2	1	2	1	6	3	4	1	1	0	0	3	5	31
/#entertainment	2	2	0	0	1	4	1	1	5	2	0	0	7	2	27
/#korean_rest	0	4	0	0	1	1	0	2	4	1	2	2	3	4	24
/#fastfood	1	4	3	0	1	2	1	0	2	2	0	0	0	7	23
/#cafe	2	4	1	0	3	2	0	1	0	2	0	0	2	2	19
/#western_rest	0	1	0	0	2	2	0	2	4	2	1	0	1	1	16
/#dessert	0	1	2	0	2	2	0	1	1	1	0	0	0	0	10
/#accessory	1	2	0	2	1	4	1	0	1	1	1	0	3	0	17
/#shopping_etc	1	0	1	2	2	1	2	2	0	0	0	1	2	2	16
/#book	1	0	0	0	1	0	3	0	1	1	0	0	5	1	13
/#japanese_rest	0	1	0	0	0	3	0	1	2	3	1	2	0	0	13
/#chinese_rest	0	0	0	0	0	0	0	2	4	0	0	1	0	1	8
/#med	1	0	0	1	1	2	0	0	0	0	0	0	2	1	8
/#beauty	2	0	0	1	1	2	0	0	0	0	0	0	1	1	8
/#service_etc	1	0	0	2	1	0	1	0	0	0	0	0	1	0	6

Figure 29 : 5% MEAN TRIMMING

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV
/#cloth	2	2	1	2	1	6	2	4	0	1	0	0	1	5	27
/#entertainment	2	2	0	0	1	4	1	1	5	2	0	0	7	2	27
/#korean_rest	0	4	0	0	1	1	0	2	4	1	2	2	3	4	24
/#fastfood	0	4	2	0	1	2	1	0	2	2	0	0	0	7	21
/#cafe	2	4	0	0	3	2	0	1	0	2	0	0	2	1	17
/#western_rest	0	0	0	0	2	2	0	2	4	2	0	0	1	1	14
/#dessert	0	1	2	0	2	2	0	1	1	1	0	0	0	0	10
/#accessory	1	2	0	2	1	4	1	0	0	1	1	0	2	0	15
/#shopping_etc	1	0	1	2	2	0	2	2	0	0	0	1	1	2	14
/#book	1	0	0	0	1	0	3	0	0	1	0	0	5	0	11
/#japanese_rest	0	1	0	0	0	2	0	1	2	2	1	2	0	0	11
/#chinese_rest	0	0	0	0	0	0	0	2	4	0	0	1	0	1	8
/#med	0	0	0	1	1	1	0	0	0	0	0	0	2	1	6
/#beauty	1	0	0	1	0	2	0	0	0	0	0	0	1	1	6
/#service_etc	0	0	0	1	1	0	1	0	0	0	0	0	1	0	4

Figure 30 : 10% MEAN TRIMMING

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV
/#cloth	2	2	1	1	1	6	0	4	0	0	0	0	0	4	21
/#entertainment	2	0	0	0	1	4	1	1	5	0	0	0	7	2	23
/#korean_rest	0	4	0	0	1	1	0	2	2	1	2	2	1	4	20
/#fastfood	0	4	0	0	0	2	1	0	2	2	0	0	0	3	14
/#cafe	2	4	0	0	3	1	0	1	0	2	0	0	2	0	15
/#western_rest	0	0	0	0	1	1	0	2	4	2	0	0	0	0	10
/#dessert	0	1	2	0	2	2	0	0	1	0	0	0	0	0	8
/#accessory	1	2	0	0	1	4	1	0	0	1	1	0	0	0	11
/#shopping_etc	1	0	1	0	1	0	2	2	0	0	0	1	0	2	10
/#book	1	0	0	0	1	0	3	0	0	0	0	0	4	0	9
/#japanese_rest	0	1	0	0	0	1	0	1	2	1	1	2	0	0	9
/#chinese_rest	0	0	0	0	0	0	0	2	3	0	0	0	0	1	6
/#med	0	0	0	1	1	0	0	0	0	0	0	0	2	0	4
/#beauty	0	0	0	1	0	2	0	0	0	0	0	0	1	0	4
/#service_etc	0	0	0	1	1	0	1	0	0	0	0	0	1	0	4

Figure 31 : 20% MEAN TRIMMING

Another noticeable change is that minimum UPV value for 20% trim is too low, which mean it is scientifically difficult to validate the data. Therefore, next iterations selects maximum UPV possible per page according optimal trim level. Figure 32 shows the optimal trim levels per page.

Shop Name	Trim Level
cloth	10%
entertainment	5%
korean_rest	5%
fastfood	20%
cafe	10%
western_rest	10%
dessert	10%
accessory	-
shopping_etc	10%
book	-
japanese_rest	-
chinese_rest	N/A
med	-
beauty	-
service_etc	-

Figure 32 : OPTIMAL TRIM LEVEL PER CATEGORY

Chinese restaurant page is not applicable for this iteration due to small number of UPV (9) and very high outlier (3371 seconds – marked in orange in Figure 33). Therefore, the rules had to be violated and forced to eliminate the outlier. The final UPV table is shown in Figure 34.

Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV	trim level
/#cloth	2	2	1	2	1	6	2	4	0	1	0	0	1	5	27	10%
/#entertainment	2	2	0	0	1	4	1	1	5	2	0	0	7	2	27	5%
/#korean_rest	0	4	0	0	1	1	0	2	4	1	2	2	3	4	24	5%
/#fastfood	0	4	0	0	0	2	1	0	2	2	0	0	0	3	14	20%
/#cafe	2	4	0	0	3	2	0	1	0	2	0	0	2	1	17	10%
/#western_rest	0	0	0	0	2	2	0	2	4	2	0	0	1	1	14	10%
/#dessert	0	1	2	0	2	2	0	1	1	1	0	0	0	0	10	10%
/#accessory	1	2	0	2	1	4	1	1	2	1	1	0	3	0	19	-
/#shopping_etc	1	0	1	2	2	0	2	2	0	0	0	1	1	2	14	10%
/#book	1	0	0	0	1	1	3	0	2	1	0	0	5	1	15	-
/#japanese_rest	0	1	1	0	0	4	0	1	2	3	1	2	0	0	15	-
/#chinese_rest	0	0	0	0	0	0	0	2	4	0	0	2	0	1	9	N/A
/#med	1	0	0	1	1	2	0	0	0	0	0	0	2	1	8	-
/#beauty	2	0	0	1	1	2	0	0	0	0	0	0	1	1	8	-
/#service_etc	1	0	0	2	1	0	1	0	0	0	0	0	1	0	6	-

Figure 33 : FILTERED DATA AFTER OPTIMIZED MEAN TRIMMING

Shop Name	Ave. Time on Page		UPV
cloth	13.07		27
entertainment	12.00		27
korean_rest	19.21		24
fastfood	11.64		14
cafe	13.24		17
western_rest	18.14		14
dessert	10.50		10
accessory	6.63		19
shopping_etc	13.86		14
book	8.67		15
japanese_rest	15.33		15
chinese_rest	9.67		9
med	13.00		8
beauty	9.25		8
service_etc	10.17		6
variance	45.12381		
std.ev	6.7174258		

Figure 34 : AVERAGE TIME ON PAGE AND UNIQUE PAGE VISITS AFTER OPTIMIZED MEAN TRIMMING

The variance and standard deviation has decreased to 45, 6.1 from 67 , 8.1 compared to when extreme outliers were forced to be eliminated. This data will be use to find the correlation between ‘number of results’ vs. ‘decision time of the user’ and ‘decision time when distance information is presented’ vs. ‘decision time when distance information is neglected’.

IV.2 ‘Number of Results’ vs. ‘User Decision Time’ Experiment

From the Figure 34, number of result shown per page is added (Figure 35) and arranged by ascending order. Additionally, page number information is added; 1-all results are shown in the screen, 2- results overflow the area of the screen and needs to be scrolled.

Shop Name	results #	page #	UPV (SUM)	Ave. time on Page * Unique Page Views (SUM)
chinese_rest	2	1	9	87
book	4	1	15	130
japanese_rest	4	1	15	230
accessory	7	1	19	126
cafe	7	1	19	232
cloth	7	1	30	330
shopping_etc	8	2	16	204
western_rest	9	2	16	261
beauty	10	2	8	74
fastfood	10	2	24	246
entertainment	10	2	32	380
service_etc	12	2	6	61
med	14	2	7	57
dessert	17	2	10	81
korean_rest	17	2	25	462

Figure 35 : ORDERED BY ASCENDING NUMBER OF RESULTS PER CATEGORY

The pages are clustered by 'result #' since they have same property of number of search results. This iterations requires 'UPV' and 'Ave. time on Page ×UPV per page' to sum. As shown in Figure 36, the pages data has decreased to 9 data with change of property. (Number of search results) However, there is a slight problem with 2, 12, and 14 search results due to small number of samples (UPV marked in red). The data with relatively small number of UPV may be eliminated for comparison.

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP
2	1	9	87	9.67
4	1	30	360	12.00
7	1	68	688	10.12
8	2	16	204	12.75
9	2	16	261	16.31
10	2	64	700	10.94
12	2	6	61	10.17
14	2	7	57	8.14
17	2	35	543	15.51
Total UPV		**251**		

Figure 36 : AGGREGATED BY NUMBER OF PAGES

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP
4	1	30	360	12.00
7	1	68	688	10.12
8	2	16	204	12.75
9	2	16	261	16.31
10	2	64	700	10.94
17	2	35	543	15.51
Total UPV		**229**		

Figure 37 : AGGREGATED BY NUMBER OF PAGES EXCLUDING LOW UNIQUE PAGE VISITS (SAMPLES)

V. Analysis Result

V.1 Customer (Visitor) Statistics

During June 25th, 2011 and July 21th, 2011 there were total of 337 customers in Central City who used the Indoor Venue Search System.

Among the 387 visits, 330 visits were made by New Visitor and 57 visits were made by returning visitor. By looking at the statistics, customer in the shopping mall mostly (85%) one time user. Bounce Rate indicates the customer who entered the system and left after seeing the first page (main menu). These customers mostly disliked the service since they would not accidently scan the QR – most bounces are made by accident visit to a website.

Table 7 : VISITOR STATISTICS

Visits	387
Unique Visitors	337
Bounce Rate	18.86%

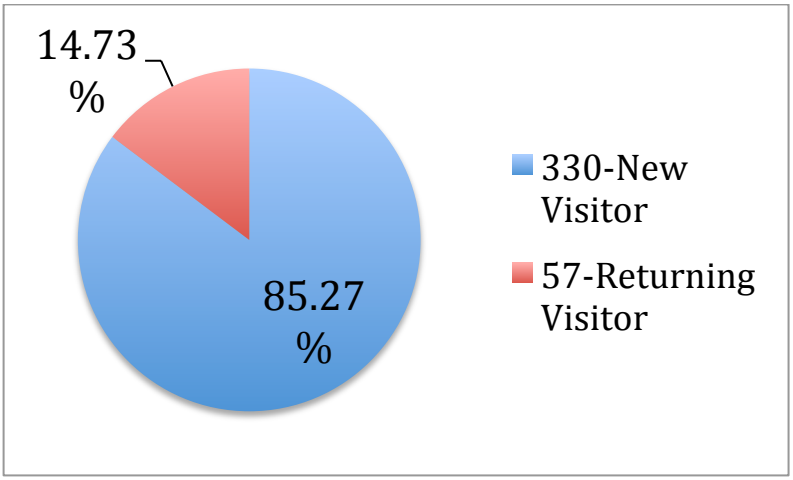


Figure 38 : OVERALL STATISTICS

IV.2 Usability Test (Distance vs. No Distance)

IV.2.1 Usage Time Comparison

From June 25th to July 8th, there was no distance information present on the search result screen and was listed in random orders. From July 9th to July 21st the distance from QR to the shop was present. Above bounce rate used cumulative duration since the two experiments are exactly the same until the customer reaches the search result screen.

The key highlight Table 8 is 'Page/Visit' and 'Ave. Time on Site' data. 'Page/Visit' is somewhat similar to each other but 'Ave. Time on Site' changed from 240 seconds to 104 seconds. This means despite of the same amount of contents customer acquired, he/she was much faster on making decisions. The efficiency might have increased but could not validate until the second experiment proves to have more 'map' clicks than first experiment.

Table 8 : USABILITY TEST RESULT

	W/O dist.	W/ dist.
Visits	226	160
Unique Visitors	192	147
Pages/Visit	6.35	5.93
Ave. Time on Site (sec)	240	104

Recency

	W/O dist.	W/ dist.
First Visit	186	143
Same day	36	12
1days ago	1	1
2days ago	2	0
3days ago	1	0
4days ago	0	1
5days ago	0	1
8-14days ago	0	2
Total	226	160

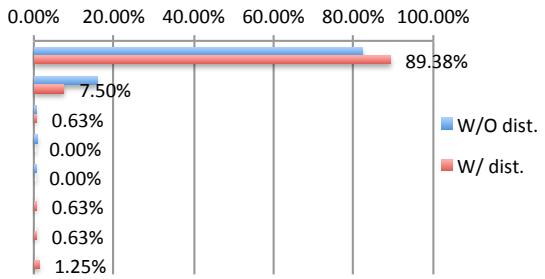


Figure 39 : RECENCY RESULT

IV.2.2 Recency

As shown in Figure 39, there are more percentage of users who visit the system back when there is no distance information provided. The user might be puzzled about the destination and might be returning to the system to check once more or since the distance gives a better idea of the location. - Usually top results are on the same floor. This data may also investigate deeper after 'map' clicks analysis.

IV.2.1 Search Result Accuracy (Validation)

When defining the word accuracy, the customer must benefit from search result by moving to the location. Due to technical infeasibility of installing indoor positioning systems, it is still likely to assume the customer views the map when their "willingness to go"(WTG) is very high. To achieve this, two-steps after clicking the search result has been created in order to measure the WTG. When a customer clicks the result, first thing on screen is shop detail page (SDP). SDP doesn't have exact location of the shop therefore it is impossible to find the shop by just given information. If a customer wants to go to the shops, which also means high WTG, they will need to click the map page.

Three data is acquired from analysis. The first data is 'Shop Detail Page / Search Result Page' (SDP/SRP). This data means among the whole search result page

views, certain percent of session has clicked on the search result (and not go back). This is true since only way to enter SDP is to go through SRP. Second data is 'Map Page / Shop Detail Page'.(MP/SDP) This means how many percentage of session liked the search result. By increasing MP/SDP the accuracy of the result will increase. Third data is 'Map Page / Search Result Page' (MP/SRP). This data has lesser significance than other data, but may prove the overall accuracy of search system. For clear reference, revisit Figure 17.

The result was very interesting. Experiment without distance information on search result page had higher accuracy of the search results. But on the other hand, it decreases the chance of user to find the shop of their preference. From the result following assumptions can be validated.

		Unique		Unique
	Page Views	Page Views	Page Views	Page Views
Search Result Page (SRP)	423	338	263	192
Shop Detail Page(SDP)	260	231	112	77
Map Page (MP)	95	88	56	53
SDP/SRP	61.47%	68.34%	42.59%	40.10%
MP/SDP	36.54%	38.10%	50.00%	68.83%
MP/SRP	22.46%	26.04%	21.29%	27.60%

Figure 40 : DISTANCE VS. NO DISTANCE SEARCH ACCURACY RESULT

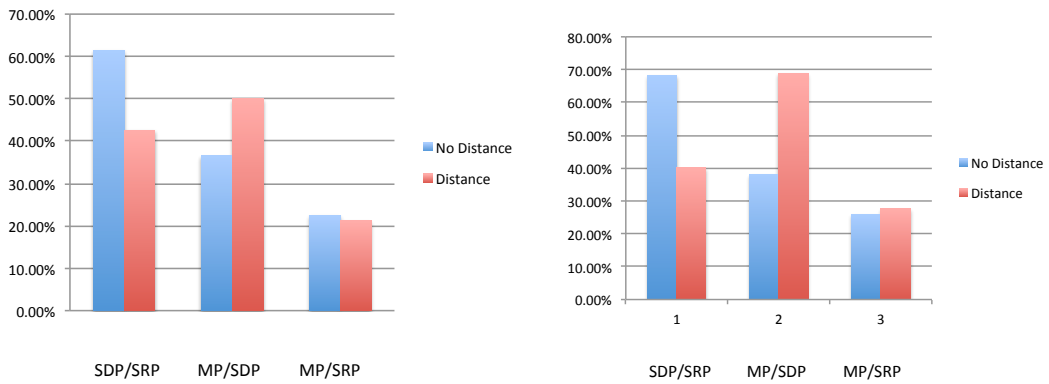


Figure 41 : GRAPH OF DISTANCE VS NO DISTANCE SEARCH RESULT ACCURACY

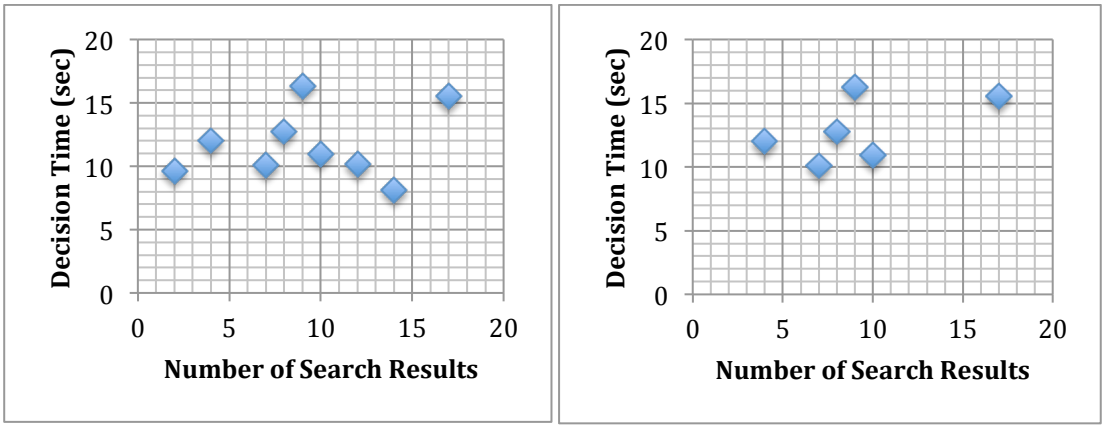
• Distance information decreases Willingness-to-Go of customers when the distance value is high

• Distance information increases Willingness-to-Go due to customer's perception of the store is nearby.

Surprisingly, the magnitude of ratio difference of SDP/SRP and MP/SDP was similar and eventually made the overall system accuracy (SP/SRP) similar in each case.

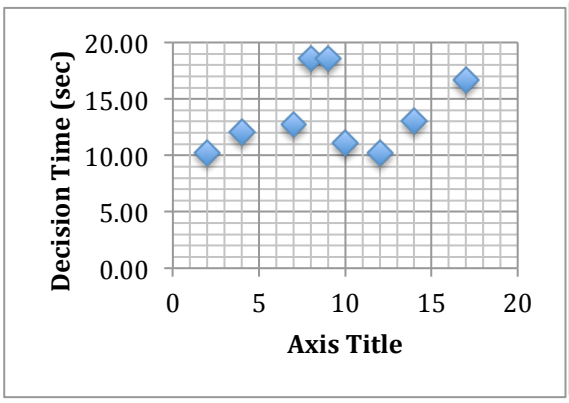
IV.3 'Number of Results' vs. 'User Decision Time' Result

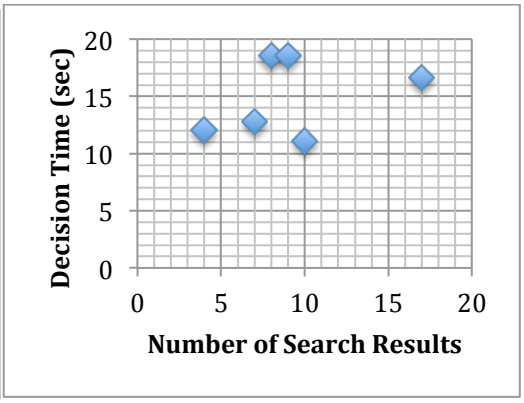
Using the refined data from the Data Analysis section five correlations results are available for comparison. Five correlation results includes usage of forced outlier eliminated data, 5% trimmed data, 10% trimmed data, 20% trimmed data, and mixed trimmed data.



Correlation	0.2159486	Correlation	0.538116193
Covariance	2.460626535	Covariance	4.854639356

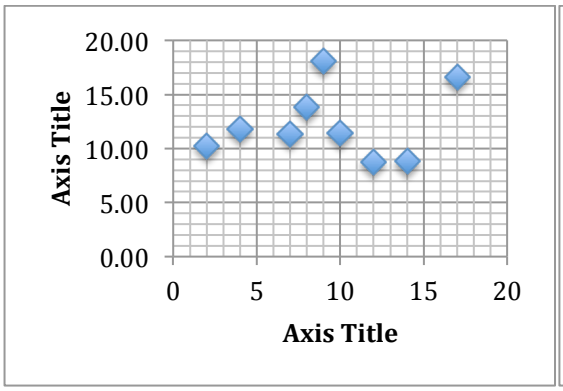
Figure 42 : 5% TRIM RESULT AND CORRELATION

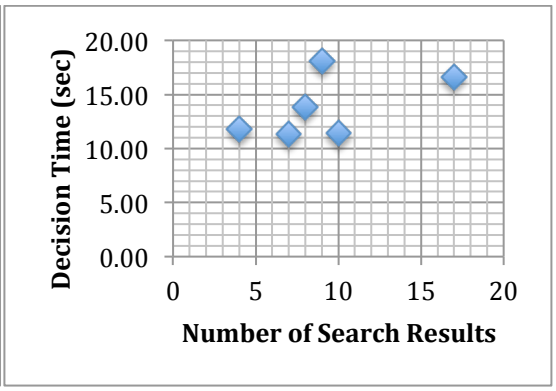




Correlation	0.284609244	Correlation	0.338634436
Covariance	4.022014284	Covariance	4.14302412

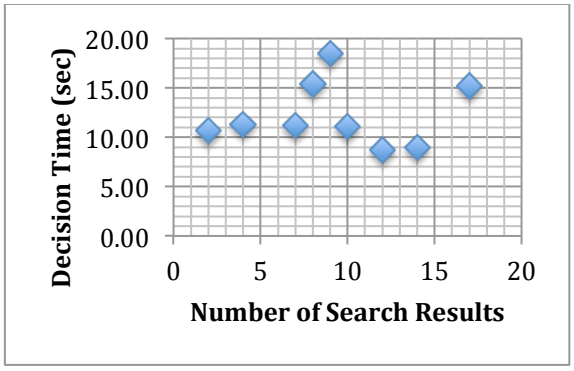
Figure 43 : 10% TRIM RESULT AND CORRELATION

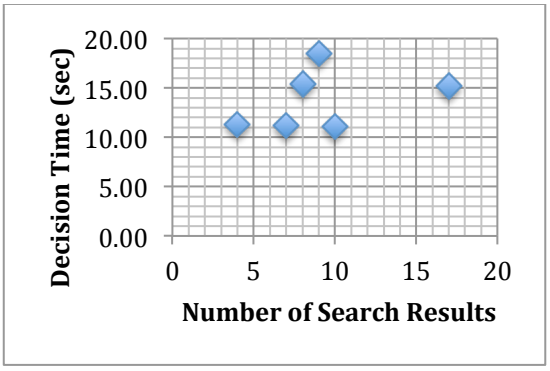




Correlation	0.185082246	Correlation	0.552525336
Covariance	2.542993508	Covariance	5.838540089

Figure 44 : 20% TRIM RESULT AND CORRELATION



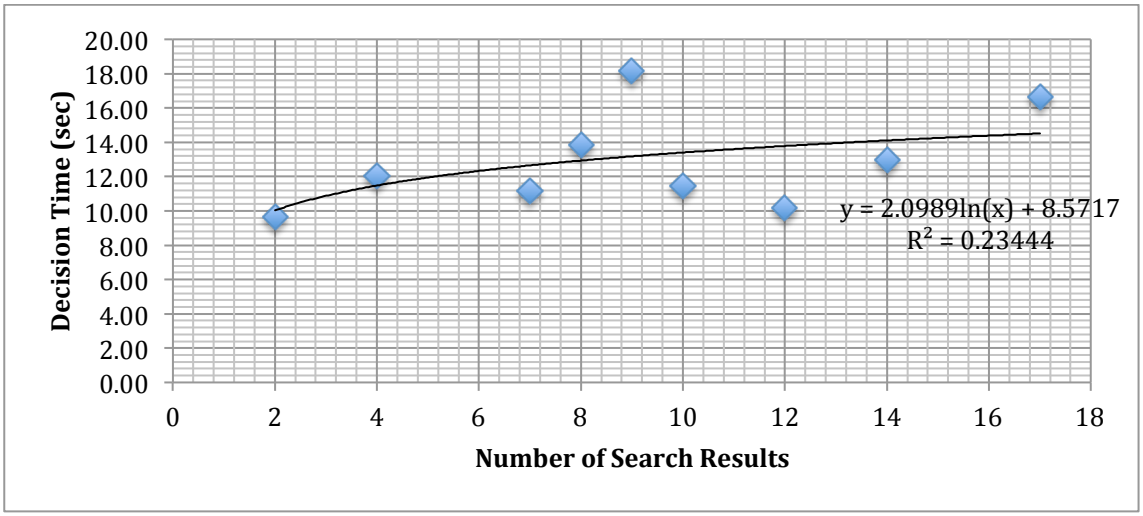


Correlation	0.082217589	Correlation	0.366218232
Covariance	1.131986969	Covariance	4.085296799

Figure 45 : OPTIMIZED TRIM RESULT AND CORRELATION

Above four scattered plot shows the difference of refined data. Observing the left hand data (all page data), the correlation is maximized at 5% trim level and decreases as more trimming is done. This partially indicates the raw data may have around 5% of outliers. The reason dropped low UPV data (right hand side) has low correlation is because Western Restaurant outlier has a value of 98 seconds, which is almost same but less than the rule where above 100 seconds data is considered an extreme outlier. Knowing this fact, the dropped low UPV graph shows almost constant correlation until 10% trim level. The reason that the correlation is constant is because there are many samples (UPV) and they have low variance between them.

Using the optimized trim level from Figure 46, 0.47 correlation is achieved. 1 being 100% correlation, value around 0.5 implying a good meaning in social science considering lots of uncertainties. The natural log trend line is selected since at some point the customer will make a decision no matter the number of search results. One



Correlation	0.465095267
Covariance	5.605727888

Figure 46 : OPTIMIZED TRIM NUMBER OF SEARCH RESULT VS. DECISION TIME GRAPH

part to consider is the R^2 value which is considerably small – indicates that trend graph has low accuracy. However, knowing that the experiment shows 7 search results on the first screen, we may assume the difference between scrollable search result and non-scrollable search result screen. Once thing to notice is that this only applies to horizontal scrolling and list-type of arrangement. Preceding assumption can be also made that since scrolling takes one more input (swipe down in case of a smartphone), it will considerably decrease the selection/decision time.

The result shows the difference is around 2.64 seconds as shown in Figure 47. Due to small number of R^2 this result of clustering may benefit more to the developers.

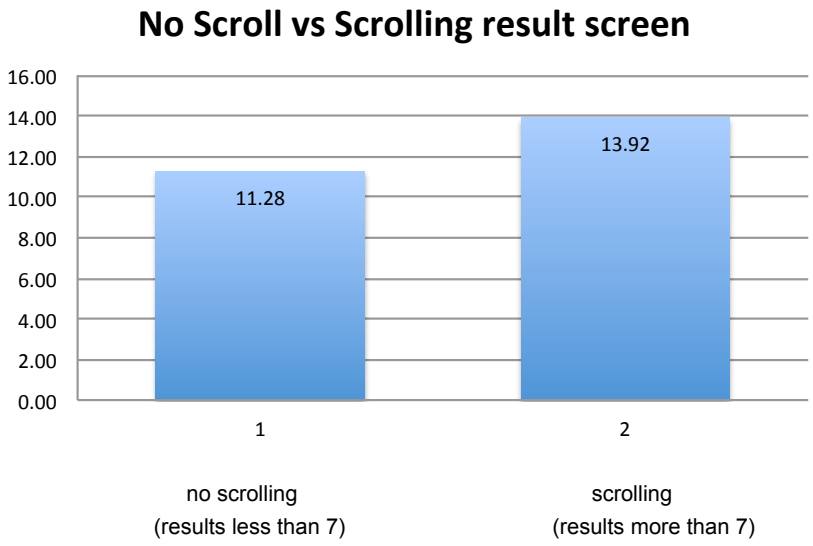
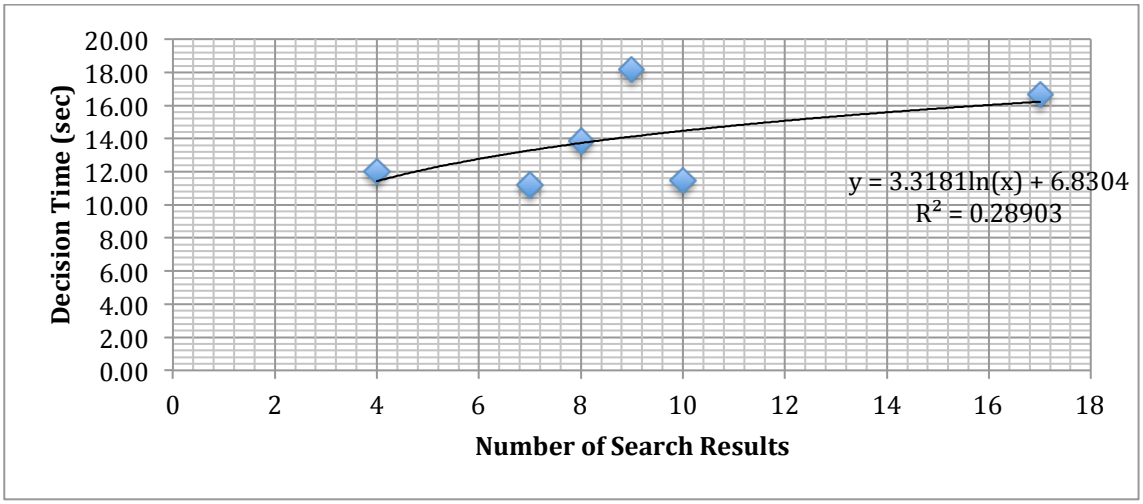


Figure 47 : SCROLLING VS NO SCROLLING TIME DIFFERENCE



Correlation	0.543479964
Covariance	5.756776785

Figure 48 : LOW-UNIQUE PAGE VISITS ELIMINATED NUMBER OF SEARCH RESULTS VS. DECISION TIME GRAPH

In case of low UPV data decreasing the credentials, low UPV dropped data is was also calculated to get correlation. The result was still good in correlation by marking over 0.5.

VI. Conclusion

VI.1 Overall summary

Although Korea has a high usage rate of smartphones, according to this research data the daily usage of an Indoor Venue Search System in the real world is around 10 users per day. This value is considerably small compared to the population flow of Central City – no exact quantitative number but regarded almost similar as regular shopping mall in major cities in US. The fact that QR code is a new concept in Korea due to late adoption, the complicated input method of activating QR scanner application and other factors might have affected the entrance to the Indoor Venue Search System. However, if indoor positioning technology is deployed, these issues will be solved and will significantly increase the entrance rate. Despite of this issue of having less participation rate per day, the total accumulated number of participants (approximately 300) is enough to support the conclusion.

One key insight from the experiment is that when distance is marked on the search results, the total time in the system on a session decreases dramatically without affecting the overall system accuracy. This proves that adding distance information (or usage of indoor positioning system) highly improves the recommendation element in the Indoor Venue Search System. The customers are satisfied with their selection within few trials compared to the system without the distance factor. However, the perception of the system might have negative effect to select the best result, since the customers will think that the results are good and give lesser trials each session. This perception can be neglected by setting the threshold of satisfaction lower than the maximum satisfaction level. In other words, customers may not chose the best choice of their request, but still satisfied with a certain level.

The decrement of average time use was 43% compared to system without distance-based recommendation. The magnitude is significantly large to affect the usability of the Indoor Venue Search System. Considering the mobile environment of mLBS, 136 second difference in searching offers the customers more chance and faster access to their enjoy goal activity whether it is shopping, dining and etc. Having this result validated with stable accuracy, further reasons may be assumed and be researched for future purpose. Following assumptions are made from the results.

- Customers values closeness of venues than their preference
- Customers are not willing to view (click) search results when they feel the venue is too far
- Customers are willing to visit the shop when the goal destination is close enough

These assumptions may be validated in future studies. From the validated result, quantitative numbers, such as degree of likeness of venue and maximum distance that affects the customer's decision, can be derived. These data can improve the overall user interface of the system. For example, a suggestion algorithm can be developed by suggesting other closer venues, which are outside of the requested pool of requested data parameter when there is an insufficient result. Another example is eliminating partial results, which is farther than the minimal distance that affects the customer's decision. By practically applying these solutions to the system, the Indoor Venue Search System will gain more potential to become a standard application for indoor positioning systems.

From the second part of the experiment, which is about the number of search

results per screen, the results prove that more search result will increase decision time of customers in a smartphone-based mLBS environment to a certain degree. Although time difference between 2~17 search results varies from 9 to 18 seconds, 9 seconds difference might be a lot for a situation of the customer who is in a hallway path of a mall. This result not just benefits the customers, but also benefits the developers when analyzing venues before they develop a system. As said in introduction, the building has different purpose and different clustering of shops. Using this research result, the analysis recommends clustering shops by multi-child level category until last-child category has around 7 or near so that the page doesn't have scrolling. Using the equation derived from the second experiment, the developer can create another category (or subcategory) of the venues or increase the tolerance of total time spent on the screen and set the results bit more than the suggested number of result (7). However, it is not recommended to increase more than 20 results because Figure 46 (Number of search results vs. decision time) has a negative exponential form, which means that no matter how much the developer add the results after 20, the customers will not even care what is beyond.

Despite that the experiment was done in indoor environment where no GPS or indoor positioning system signal around, this results may be applied on mLBS search system in general by combining GPS function since the smartphone user pool are the same. In a broader spectrum, any kind of smartphone LBS application may reference the result to design their user interface.

The main reason for the result is derived from human vision recognition. In other words, time difference of the decision comes from how clear and fast can human recognize the listing on a small screen. However, more human factor (recognition process) research needs to be done to explain the reasoning.

VI.2 Errors

Due to the nature of real-world participants, there were some obvious outliers despite of the effort to filter them out. As shown in appendix 11, one of the outliers was very large and had relatively small number of samples, which results in endowing exception to the iteration. Also, considerable amount of range difference of sample per page can be an issue to bring down the credibility of the analysis.

VI.3 Future Works

From this experiment data, following hypothesis may be researched for next stage.

First hypothesis,

$$\mathbf{H_0:}\ \boldsymbol{\mu_{t_r} > \mu_{t_d}}$$

(μ : mean time to finish finding shop location, r : random search result ordering, d: distance-based search result ordering)

Second hypothesis,

$$\mathbf{H_0:}\ \mathbf{0} < \boldsymbol{D_v} < \boldsymbol{\mu_{D_s}}$$

(D_v: distance of shops with in viewing range, μ_{D_s}: Mean distance of selections made by customers)

If the second hypothesis is plausible, then extended hypothesis will be tested.

Extended hypothesis,

$$\mathbf{H_0:}\ \mathbf{0} < \boldsymbol{D_v} < \boldsymbol{\mu_{D_{min}}}$$

($\mu_{D_{top}}$: Mean distance of shortest-distance shop selections made by customers in each page)

In words, first hypothesis is to see how distance information to customers affects their time of decision. Second hypothesis is generated from following hypothesis

"Customers are not likely to use indoor venue search system when the shop is in viewing range."

To validate this hypothesis, the expected distance value of selection should range somewhere between 50 meters or farther. Also, since the result is expected for the customers to choose shortest distance available, (top of the search result listings) the graph of 'number of selection' vs ' distance' is expected to have a sharp increment near $\boldsymbol{D_v}$ and have a negative linear form.

Also, in further future when indoor positioning system is deployed and rate of smartphone market shares dominates, a better quality of same experiment could be conducted.

VII. References

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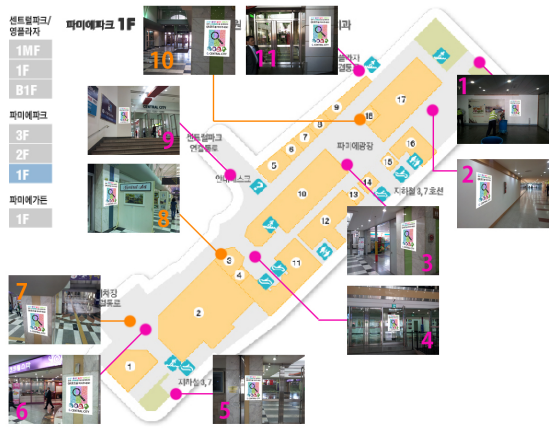
Appendix 1. Central City Floor Map / QR code Poster Location



Pamier Park 1F

Pamier Park 2F

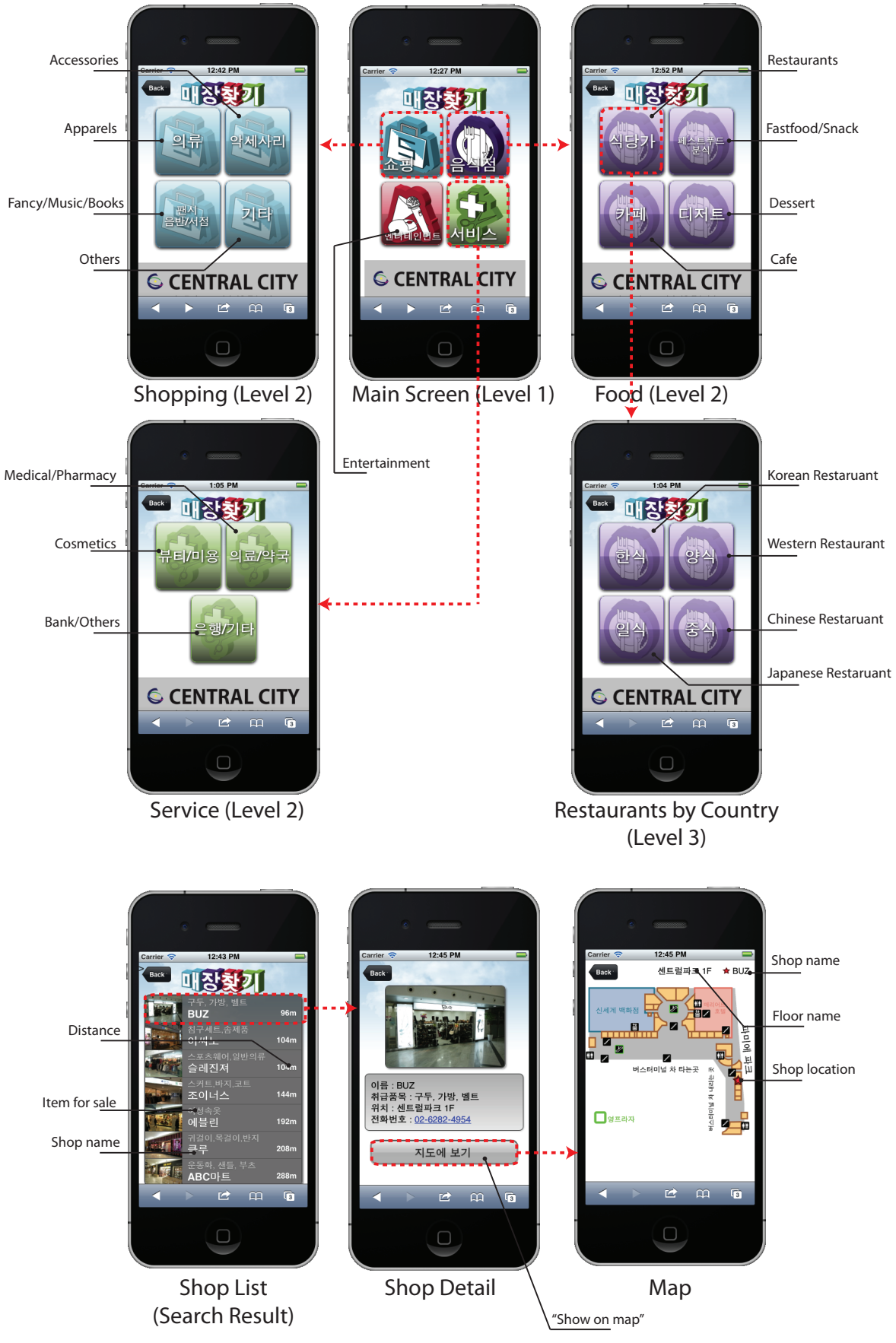
Pamier Park 3F

Central Park 1MF

Young Plaza B1F

Central Park 1F

Appendix 2. Experiment Prototype User Interfacee



Appendix 3. Random Order Experiment - Unique Page Views Data

Page : /#fastfood

Pages

Jun 25, 2011 - Jul 8, 2011

fastfood_J 1.63% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
fastfood_J	fastfood_J	fastfood_J	fastfood_J	fastfood_J
28	23	00:00:56	0.00%	0.00%
% of Total: 1.63% (1,714)	% of Total: 1.65% (1,395)	Site Avg: 00:01:15 (-25.91%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#fastfood	28	23	00:00:56	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#chinese_rest

Pages

Jun 25, 2011 - Jul 8, 2011

chinese_rest_J 0.70% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
chinese_rest_J	chinese_rest_J	chinese_rest_J	chinese_rest_J	chinese_rest_J
12	12	00:14:10	0.00%	0.00%
% of Total: 0.70% (1,714)	% of Total: 0.86% (1,395)	Site Avg: 00:01:15 (1,028.71%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#chinese_rest	12	12	00:14:10	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#korean_rest

Pages

Jun 25, 2011 - Jul 8, 2011

korean_rest_J 2.28% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
korean_rest_J	korean_rest_J	korean_rest_J	korean_rest_J	korean_rest_J
39	25	00:00:40	0.00%	0.00%
% of Total: 2.28% (1,714)	% of Total: 1.79% (1,395)	Site Avg: 00:01:15 (-47.04%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#korean_rest	39	25	00:00:40	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#cloth

Pages

Jun 25, 2011 - Jul 8, 2011

cloth_J 2.51% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
cloth_J	cloth_J	cloth_J	cloth_J	cloth_J
43	35	00:00:14	0.00%	0.00%
% of Total: 2.51% (1,714)	% of Total: 2.51% (1,395)	Site Avg: 00:01:15 (-80.97%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#cloth	43	35	00:00:14	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#entertainment

Pages

Jun 25, 2011 - Jul 8, 2011

entertainment_J 2.33% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
entertainment_J	entertainment_J	entertainment_J	entertainment_J	entertainment_J
40	33	00:00:13	0.00%	0.00%
% of Total: 2.33% (1,714)	% of Total: 2.37% (1,395)	Site Avg: 00:01:15 (-82.63%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#entertainment	40	33	00:00:13	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#cafe

Pages

Jun 25, 2011 - Jul 8, 2011

cafe_J 1.40% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
cafe_J	cafe_J	cafe_J	cafe_J	cafe_J
24	21	00:00:17	0.00%	0.00%
% of Total: 1.40% (1,714)	% of Total: 1.51% (1,395)	Site Avg: 00:01:15 (-77.70%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#cafe	24	21	00:00:17	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#western_rest

Pages

Jun 25, 2011 - Jul 8, 2011

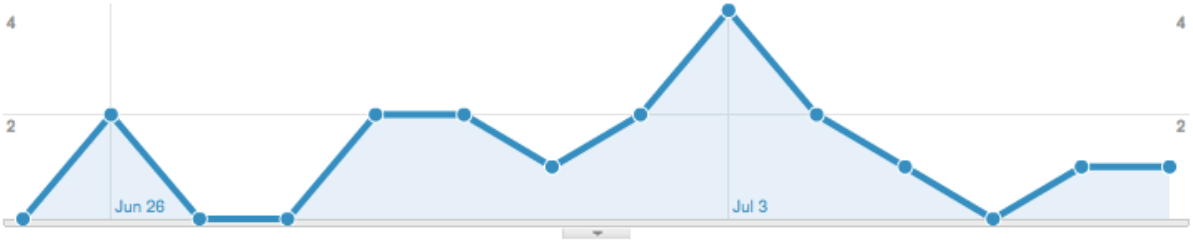
wertern_rest_J 1.52% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
wertern_rest_J	wertern_rest_J	wertern_rest_J	wertern_rest_J	wertern_rest_J
26	**18**	**00:00:21**	**0.00%**	**0.00%**
% of Total: 1.52% (1,714)	% of Total: 1.29% (1,395)	Site Avg: 00:01:15 (-72.67%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:



Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#western_rest	26	18	00:00:21	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#dessert

Pages

Jun 25, 2011 - Jul 8, 2011

dessert_J 0.99% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
dessert_J	dessert_J	dessert_J	dessert_J	dessert_J
17	**12**	**00:00:11**	**0.00%**	**0.00%**
% of Total: 0.99% (1,714)	% of Total: 0.86% (1,395)	Site Avg: 00:01:15 (-85.78%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#dessert	17	12	00:00:11	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#accessory

Pages

Jun 25, 2011 - Jul 8, 2011

accessory_J 1.34% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
accessory_J	accessory_J	accessory_J	accessory_J	accessory_J
23	19	00:00:06	0.00%	0.00%
% of Total: 1.34% (1,714)	% of Total: 1.36% (1,395)	Site Avg: 00:01:15 (-91.40%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#accessory	23	19	00:00:06	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#shopping_etc

Pages

Jun 25, 2011 - Jul 8, 2011

shopping_etc_J 1.28% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
shopping_etc_J	shopping_etc_J	shopping_etc_J	shopping_etc_J	shopping_etc_J
22	18	00:00:19	0.00%	0.00%
% of Total: 1.28% (1,714)	% of Total: 1.29% (1,395)	Site Avg: 00:01:15 (-74.46%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#shopping_etc	22	18	00:00:19	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#book

Pages

Jun 25, 2011 - Jul 8, 2011

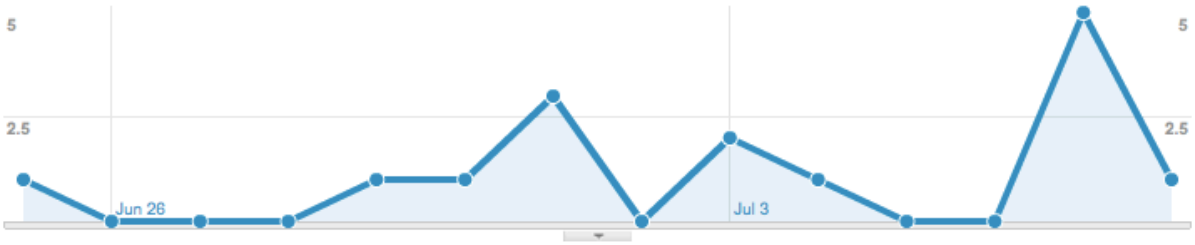
book_J 1.05% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
book_J	book_J	book_J	book_J	book_J
18	15	00:00:09	0.00%	0.00%
% of Total: 1.05% (1,714)	% of Total: 1.08% (1,395)	Site Avg: 00:01:15 (-88.64%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:



Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#book	18	15	00:00:09	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#japanese_rest

Pages

Jun 25, 2011 - Jul 8, 2011

japanese_rest 1.05% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
japanese_rest	japanese_rest	japanese_rest	japanese_rest	japanese_rest
18	15	00:00:14	0.00%	0.00%
% of Total: 1.05% (1,714)	% of Total: 1.08% (1,395)	Site Avg: 00:01:15 (-81.18%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#japanese_rest	18	15	00:00:14	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#med

Pages

Jun 25, 2011 - Jul 8, 2011

med_J 0.47% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
med_J	med_J	med_J	med_J	med_J
8	8	00:00:13	0.00%	0.00%
% of Total: 0.47% (1,714)	% of Total: 0.57% (1,395)	Site Avg: 00:01:15 (-83.07%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#med	8	8	00:00:13	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#beauty

Pages

Jun 25, 2011 - Jul 8, 2011

beauty_J 0.47% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
beauty_J	beauty_J	beauty_J	beauty_J	beauty_J
8	8	00:00:09	0.00%	0.00%
% of Total: 0.47% (1,714)	% of Total: 0.57% (1,395)	Site Avg: 00:01:15 (-87.71%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#beauty	8	8	00:00:09	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#service_etc

Pages

Jun 25, 2011 - Jul 8, 2011

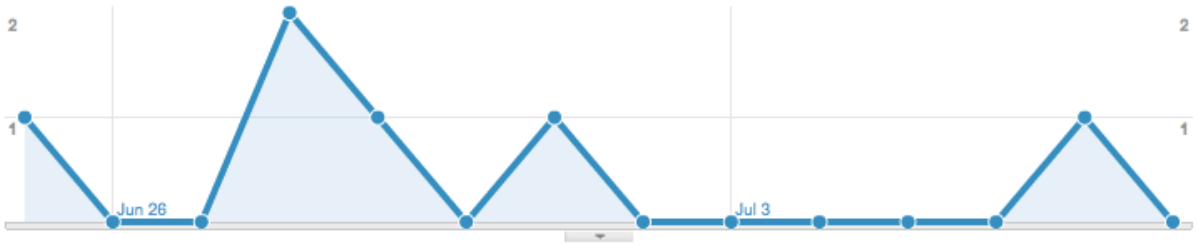
service_etc_J 0.35% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
service_etc_J	service_etc_J	service_etc_J	service_etc_J	service_etc_J
6	6	00:00:10	0.00%	0.00%
% of Total: 0.35% (1,714)	% of Total: 0.43% (1,395)	Site Avg: 00:01:15 (-86.72%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:



Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#service_etc	6	6	00:00:10	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Appendix 4. Random Order Experiment – Ave. Time on Page Data

Page : /#cloth

2.51% (43 of 1,714)

cloth_J 2.51% of total pageviews

Jun 25, 2011 - Jul 8, 2011

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
cloth_J	cloth_J	cloth_J	cloth_J	cloth_J
43	35	00:00:14	0.00%	0.00%
% of Total: 2.51% (1,714)	% of Total: 2.51% (1,395)	Site Avg: 00:01:15 (-80.97%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#cloth	43	35	00:00:14	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#fastfood

Pages

Jun 25, 2011 - Jul 8, 2011

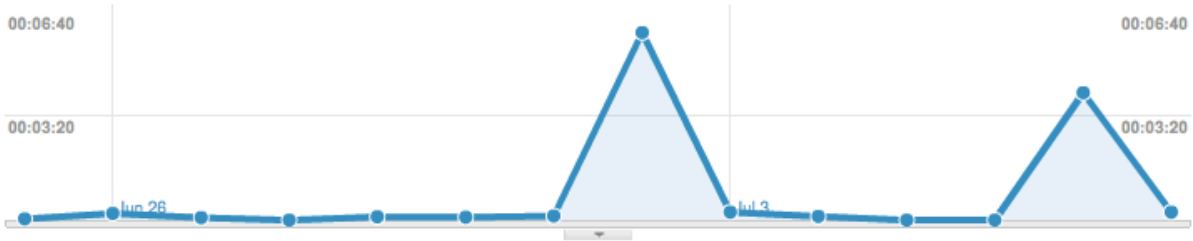
fastfood_J 1.63% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
fastfood_J	fastfood_J	fastfood_J	fastfood_J	fastfood_J
28	23	00:00:56	0.00%	0.00%
% of Total: 1.63% (1,714)	% of Total: 1.65% (1,395)	Site Avg: 00:01:15 (-25.91%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:



Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#fastfood	28	23	00:00:56	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#korean_rest

Pages

Jun 25, 2011 - Jul 8, 2011

korean_rest_J 2.28% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
korean_rest_J	korean_rest_J	korean_rest_J	korean_rest_J	korean_rest_J
39	25	00:00:40	0.00%	0.00%
% of Total: 2.28% (1,714)	% of Total: 1.79% (1,395)	Site Avg: 00:01:15 (-47.04%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#korean_rest	39	25	00:00:40	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#chinese_rest

Pages

Jun 25, 2011 - Jul 8, 2011

chinese_rest_J 0.70% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
chinese_rest_J	chinese_rest_J	chinese_rest_J	chinese_rest_J	chinese_rest_J
12	12	00:14:10	0.00%	0.00%
% of Total: 0.70% (1,714)	% of Total: 0.86% (1,395)	Site Avg: 00:01:15 (1,028.71%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#chinese_rest	12	12	00:14:10	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#entertainment

Pages

Jun 25, 2011 - Jul 8, 2011

entertainment_J 2.33% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
entertainment_J	entertainment_J	entertainment_J	entertainment_J	entertainment_J
40	33	00:00:13	0.00%	0.00%
% of Total: 2.33% (1,714)	% of Total: 2.37% (1,395)	Site Avg: 00:01:15 (-82.63%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#entertainment	40	33	00:00:13	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#cafe

Pages

Jun 25, 2011 - Jul 8, 2011

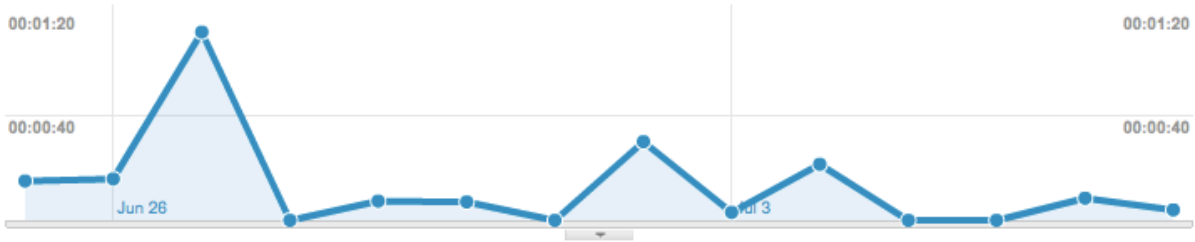
cafe_J 1.40% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
cafe_J	cafe_J	cafe_J	cafe_J	cafe_J
24	21	00:00:17	0.00%	0.00%
% of Total: 1.40% (1,714)	% of Total: 1.51% (1,395)	Site Avg: 00:01:15 (-77.70%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:



Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#cafe	24	21	00:00:17	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#western_rest

Pages

Jun 25, 2011 - Jul 8, 2011

wertern_rest_J 1.52% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
wertern_rest_J	wertern_rest_J	wertern_rest_J	wertern_rest_J	wertern_rest_J
26	18	00:00:21	0.00%	0.00%
% of Total: 1.52% (1,714)	% of Total: 1.29% (1,395)	Site Avg: 00:01:15 (-72.67%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#western_rest	26	18	00:00:21	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#dessert

Pages

Jun 25, 2011 - Jul 8, 2011

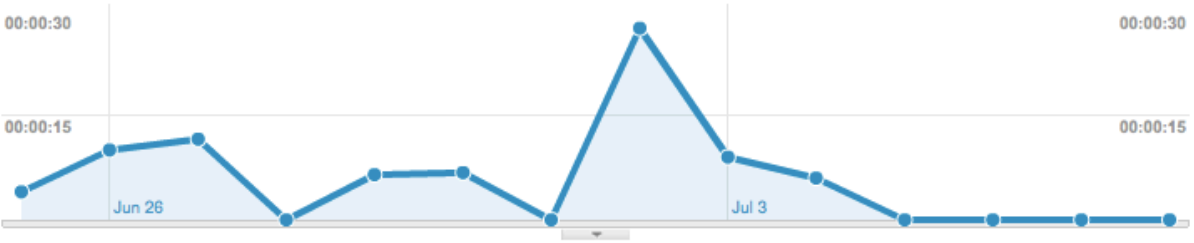
dessert_J 0.99% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
dessert_J	dessert_J	dessert_J	dessert_J	dessert_J
17	12	00:00:11	0.00%	0.00%
% of Total: 0.99% (1,714)	% of Total: 0.86% (1,395)	Site Avg: 00:01:15 (-85.78%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:



Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#dessert	17	12	00:00:11	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#accessory

Pages

Jun 25, 2011 - Jul 8, 2011

accessory_J 1.34% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
accessory_J	accessory_J	accessory_J	accessory_J	accessory_J
23	19	00:00:06	0.00%	0.00%
% of Total: 1.34% (1,714)	% of Total: 1.36% (1,395)	Site Avg: 00:01:15 (-91.40%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#accessory	23	19	00:00:06	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#shopping_etc

Pages

Jun 25, 2011 - Jul 8, 2011

shopping_etc_J 1.28% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
shopping_etc_J	shopping_etc_J	shopping_etc_J	shopping_etc_J	shopping_etc_J
22	18	00:00:19	0.00%	0.00%
% of Total: 1.28% (1,714)	% of Total: 1.29% (1,395)	Site Avg: 00:01:15 (-74.46%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#shopping_etc	22	18	00:00:19	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#book

Pages

Jun 25, 2011 - Jul 8, 2011

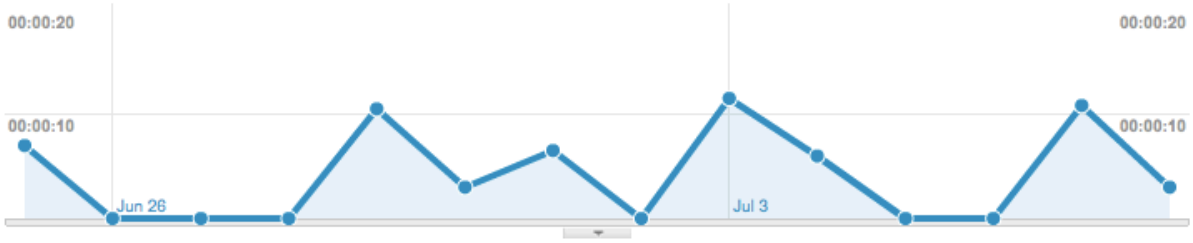
book_J 1.05% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
book_J	book_J	book_J	book_J	book_J
18	15	00:00:09	0.00%	0.00%
% of Total: 1.05% (1,714)	% of Total: 1.08% (1,395)	Site Avg: 00:01:15 (-88.64%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:



Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#book	18	15	00:00:09	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#japanese_rest

Pages

Jun 25, 2011 - Jul 8, 2011

japanese_rest 1.05% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
japanese_rest	japanese_rest	japanese_rest	japanese_rest	japanese_rest
18	15	00:00:14	0.00%	0.00%
% of Total: 1.05% (1,714)	% of Total: 1.08% (1,395)	Site Avg: 00:01:15 (-81.18%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#japanese_rest	18	15	00:00:14	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#med

Pages

Jun 25, 2011 - Jul 8, 2011

med_J 0.47% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
med_J	med_J	med_J	med_J	med_J
8	8	00:00:13	0.00%	0.00%
% of Total: 0.47% (1,714)	% of Total: 0.57% (1,395)	Site Avg: 00:01:15 (-83.07%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#med	8	8	00:00:13	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#beauty

Pages

Jun 25, 2011 - Jul 8, 2011

beauty_J 0.47% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
beauty_J	beauty_J	beauty_J	beauty_J	beauty_J
8	8	00:00:09	0.00%	0.00%
% of Total: 0.47% (1,714)	% of Total: 0.57% (1,395)	Site Avg: 00:01:15 (-87.71%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:

Viewing: Page Other

Secondary dimension: Select... advanced View: 1 - 1 of 1

	Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#beauty	8	8	00:00:09	0.00%	0.00%

Show rows: 10 Go to: 1 1 - 1 of 1

Page : /#service_etc

Pages

Jun 25, 2011 - Jul 8, 2011

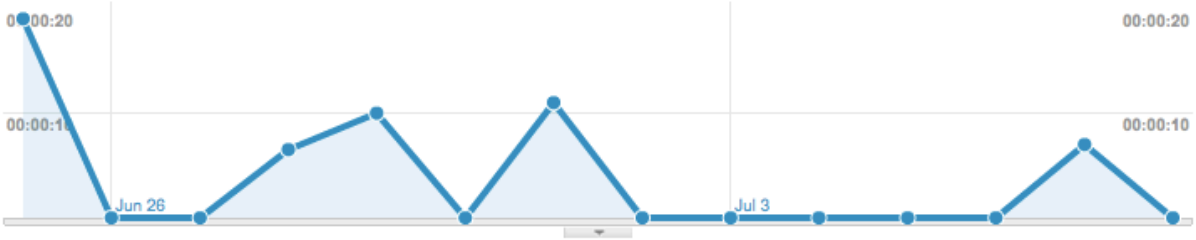
service_etc_J 0.35% of total pageviews

Explorer | Navigation Summary

Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
service_etc_J	service_etc_J	service_etc_J	service_etc_J	service_etc_J
6	6	00:00:10	0.00%	0.00%
% of Total: 0.35% (1,714)	% of Total: 0.43% (1,395)	Site Avg: 00:01:15 (-86.72%)	Site Avg: 18.86% (-100.00%)	Site Avg: 16.39% (-100.00%)

Graph Mode: Line Chart Compare Metric Graph By:



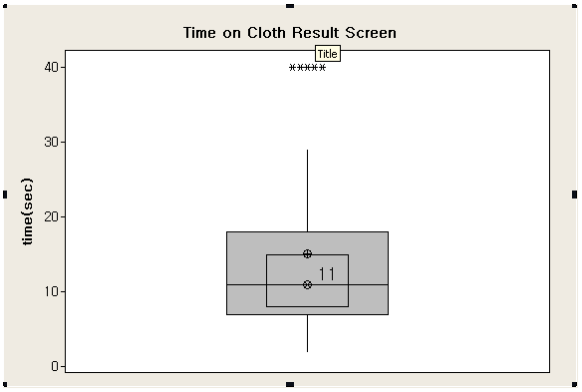
Viewing: Page Other

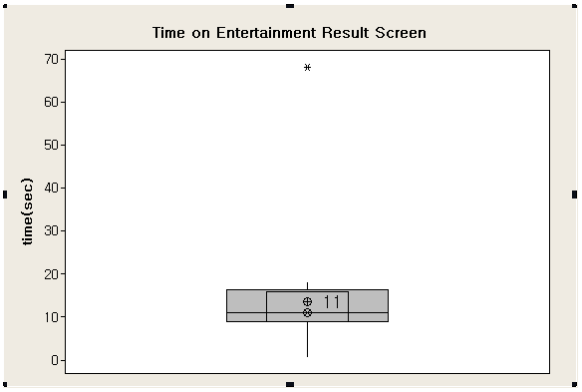
Secondary dimension: Select... advanced View: 1 - 1 of 1

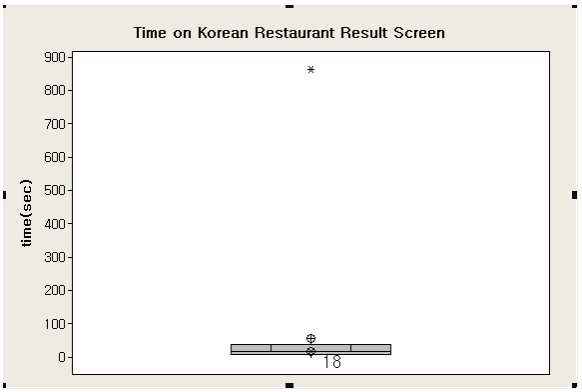
	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit
1.	/#service_etc	6	6	00:00:10	0.00%	0.00%

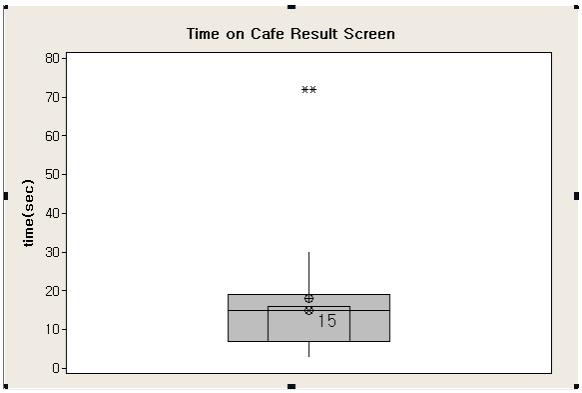
Show rows: 10 Go to: 1 1 - 1 of 1

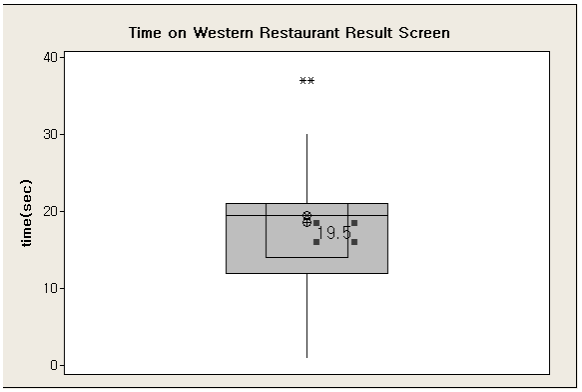
Appendix 5. Random Order Experiment Average Time on Page/Day Box Plot (Outlier Identification)

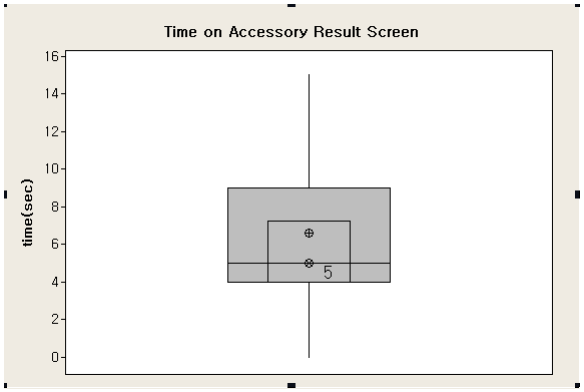


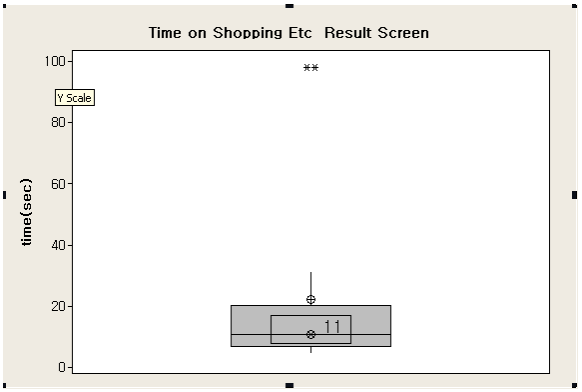


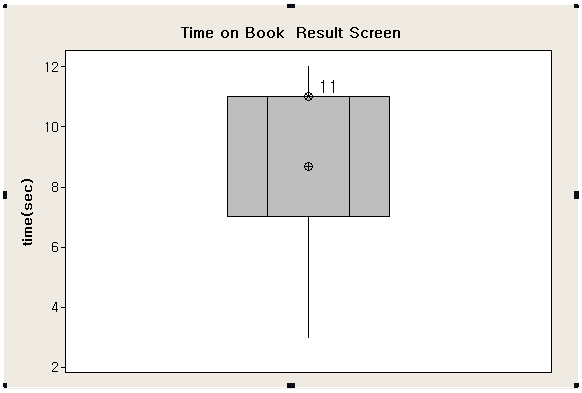


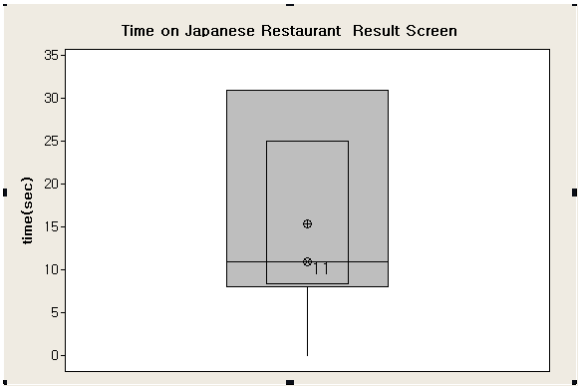


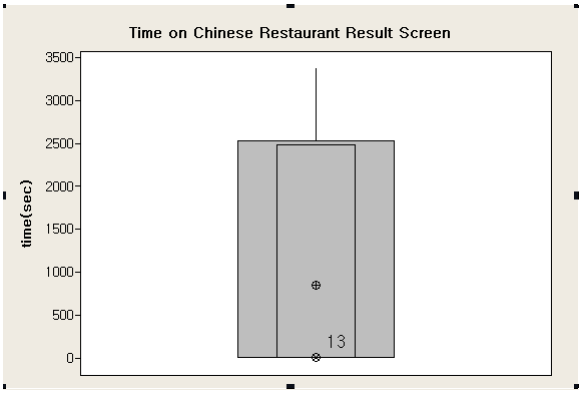


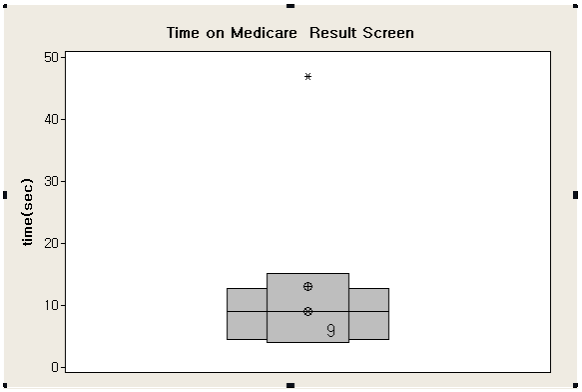


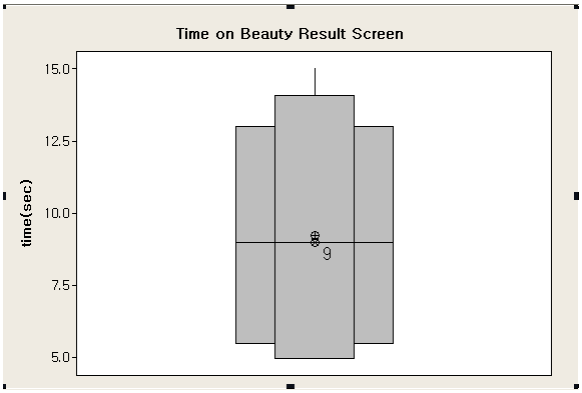


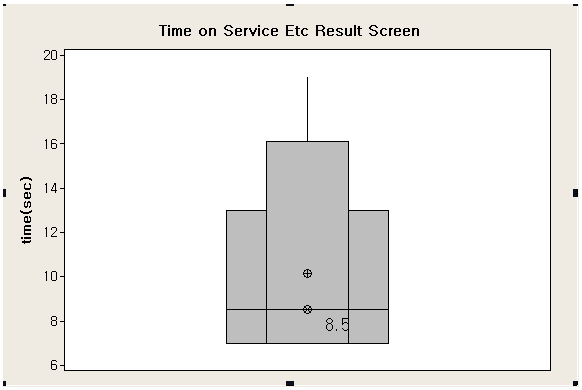



Time on Japanese Restaurant Result Screen
time(sec)
35
30
25
20
15
10
5
0
11


Time on Chinese Restaurant Result Screen
time(sec)
3500
3000
2500
2000
1500
1000
500
0
13


Time on Medicare Result Screen
time(sec)
50
40
30
20
10
0
*
9


Time on Beauty Result Screen
time(sec)
15.0
12.5
10.0
7.5
5.0
9


Time on Service Etc Result Screen
time(sec)
20
18
16
14
12
10
8
6
8.5

Appendix 6. Random Order Experiment – Raw Data

Extreme Outlier in Red

Average time on search results (sec)

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total Time
/#cloth	8	7	11	5	11	15	5	8	5	29	2	0	40	18	11.7142857
/#entertainment	6	18	68	0	16	11	10	1	16	17	0	18	9	14	14.5714286
/#korean_rest	1	18	864	0	8	24	0	9	45	17	17	22	8	10	74.5
/#fastfood	2	13	5	0	6	6	8	359	15	8	0	0	244	15	48.6428571
/#cafe	15	16	72	0	7	7	0	30	3	22	0	0	9	4	13.2142857
/#western_rest	0	37	0	0	21	12	1	16	21	18	6	0	30	6	12
/#dessert	4	10	12	0	7	7	0	28	9	6	0	0	0	0	5.92857143
/#accessory	7	5	0	13	7	4	5	0	15	7	9	0	3	0	5.35714286
/#shopping_etc	11	0	9	14	7	98	17	10	0	0	0	11	5	31	15.2142857
/#book	7	0	0	0	11	3	7	0	12	6	0	0	11	3	4.28571429
/#japanese_rest	0	15	0	0	0	31	0	11	9	8	10	14	0	0	7
/#chinese_rest	0	0	0	0	0	0	0	8	13	3371	0	5	0	9	243.285714
/#med	47	0	0	6	6	4	0	0	0	0	0	0	12	13	6.28571429
/#beauty	5	0	0	8	15	10	0	0	0	0	0	0	7	14	4.21428571
/#service_etc	19	0	0	7	10	0	11	0	0	0	0	0	7	0	3.85714286

Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV
/#cloth	2	2	1	2	1	6	3	4	2	1	1	0	5	5	35
/#entertainment	2	4	1	0	1	4	1	3	5	2	0	1	7	2	33
/#korean_rest	1	4	1	0	1	1	0	2	4	1	2	2	3	4	26
/#fastfood	1	4	3	0	1	2	1	3	2	2	1	0	1	7	28
/#cafe	2	4	2	0	3	2	0	1	1	2	0	0	2	2	21
/#western_rest	0	2	0	0	2	2	1	2	4	2	1	0	1	1	18
/#dessert	1	1	2	0	2	2	0	2	1	1	0	0	0	0	12
/#accessory	1	2	0	2	1	4	1	1	2	1	1	0	3	0	19
/#shopping_etc	1	0	1	2	2	2	2	2	0	0	0	1	3	2	18
/#book	1	0	0	0	1	1	3	0	2	1	0	0	5	1	15
/#japanese_rest	0	1	1	0	0	4	0	1	2	3	1	2	0	0	15
/#chinese_rest	0	0	0	0	0	0	0	2	4	3	0	2	0	1	12
/#med	1	0	0	1	1	2	0	0	0	0	0	0	2	1	8
/#beauty	2	0	0	1	1	2	0	0	0	0	0	0	1	1	8
/#service_etc	1	0	0	2	1	0	1	0	0	0	0	0	1	0	6

Appendix 7. Random Order Experiment – Deleted Extreme Outliers

Average time on search results (sec)

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	ave. Time	results #
/#cloth	8	7	11	5	11	15	5	8	5	29	2	0	0	18	8.85714286	7
/#entertainment	6	18	0	0	16	11	10	1	16	17	0	18	9	14	9.71428571	10
/#korean_rest	1	18	0	0	8	24	0	9	45	17	17	22	8	10	12.7857143	17
/#fastfood	2	13	5	0	6	6	8	0	15	8	0	0	0	15	5.57142857	10
/#cafe	15	16	0	0	7	7	0	30	3	22	0	0	9	4	8.07142857	7
/#western_rest	0	0	0	0	21	12	1	16	21	18	6	0	30	6	9.35714286	9
/#dessert	4	10	12	0	7	7	0	0	9	6	0	0	0	0	3.92857143	17
/#accessory	7	5	0	13	7	4	5	0	15	7	9	0	3	0	5.35714286	7
/#shopping_etc	11	0	9	14	7	0	17	10	0	0	0	11	5	31	8.21428571	8
/#book	7	0	0	0	11	3	7	0	12	6	0	0	11	3	4.28571429	4
/#japanese_rest	0	15	0	0	0	31	0	11	9	8	10	14	0	0	7	4
/#chinese_rest	0	0	0	0	0	0	0	8	13	0	0	5	0	9	2.5	2
/#med	0	0	0	6	6	4	0	0	0	0	0	0	12	13	2.92857143	14
/#beauty	5	0	0	8	15	10	0	0	0	0	0	0	7	14	4.21428571	10
/#service_etc	19	0	0	7	10	0	11	0	0	0	0	0	7	0	3.85714286	12

Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV	results #
/#cloth	2	2	1	2	1	6	3	4	2	1	1	0	0	5	30	7
/#entertainment	2	4	0	0	1	4	1	3	5	2	0	1	7	2	32	10
/#korean_rest	1	4	0	0	1	1	0	2	4	1	2	2	3	4	25	17
/#fastfood	1	4	3	0	1	2	1	0	2	2	1	0	0	7	24	10
/#cafe	2	4	0	0	3	2	0	1	1	2	0	0	2	2	19	7
/#western_rest	0	0	0	0	2	2	1	2	4	2	1	0	1	1	16	9
/#dessert	1	1	2	0	2	2	0	0	1	1	0	0	0	0	10	17
/#accessory	1	2	0	2	1	4	1	1	2	1	1	0	3	0	19	7
/#shopping_etc	1	0	1	2	2	0	2	2	0	0	0	1	3	2	16	8
/#book	1	0	0	0	1	1	3	0	2	1	0	0	5	1	15	4
/#japanese_rest	0	1	1	0	0	4	0	1	2	3	1	2	0	0	15	4
/#chinese_rest	0	0	0	0	0	0	0	2	4	0	0	2	0	1	9	2
/#med	0	0	0	1	1	2	0	0	0	0	0	0	2	1	7	14
/#beauty	2	0	0	1	1	2	0	0	0	0	0	0	1	1	8	10
/#service_etc	1	0	0	2	1	0	1	0	0	0	0	0	1	0	6	12

Ave. time on search result * Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total	results #	Ave. Time on Page
/#cloth	16	14	11	10	11	90	15	32	10	29	2	0	0	90	330	7	11.00
/#entertainment	12	72	0	0	16	44	10	3	80	34	0	18	63	28	380	10	11.88
/#korean_rest	1	72	0	0	8	24	0	18	180	17	34	44	24	40	462	17	18.48
/#fastfood	2	52	15	0	6	12	8	0	30	16	0	0	0	105	246	10	10.25
/#cafe	30	64	0	0	21	14	0	30	3	44	0	0	18	8	232	7	12.21
/#western_rest	0	0	0	0	42	24	1	32	84	36	6	0	30	6	261	9	16.31
/#dessert	4	10	24	0	14	14	0	0	9	6	0	0	0	0	81	17	8.10
/#accessory	7	10	0	26	7	16	5	0	30	7	9	0	9	0	126	7	6.63
/#shopping_etc	11	0	9	28	14	0	34	20	0	0	0	11	15	62	204	8	12.75
/#book	7	0	0	0	11	3	21	0	24	6	0	0	55	3	130	4	8.67
/#japanese_rest	0	15	0	0	0	124	0	11	18	24	10	28	0	0	230	4	15.33
/#chinese_rest	0	0	0	0	0	0	0	16	52	0	0	10	0	9	87	2	9.67
/#med	0	0	0	6	6	8	0	0	0	0	0	0	24	13	57	14	8.14
/#beauty	10	0	0	8	15	20	0	0	0	0	0	0	7	14	74	10	9.25
/#service_etc	19	0	0	14	10	0	11	0	0	0	0	0	7	0	61	12	10.17

Appendix 8. Random Order Experiment – 5% trimmed mean + Deleted Outliers over 100sec

Trimmed Value in Yellow

Average time on search results (sec)

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	ave. Time	results #
/#cloth	8	7	11	5	11	15	5	8	5	29	2	0	40	18	11.7142857	7
/#entertainment	6	18	68	0	16	11	10	1	16	17	0	18	9	14	14.5714286	10
/#korean_rest	1	18	864	0	8	24	0	9	45	17	17	22	8	10	74.5	17
/#fastfood	2	13	5	0	6	6	8	359	15	8	0	0	244	15	48.6428571	10
/#cafe	15	16	72	0	7	7	0	30	3	22	0	0	9	4	13.2142857	7
/#western_rest	0	37	0	0	21	12	1	16	21	18	6	0	30	6	12	9
/#dessert	4	10	12	0	7	7	0	28	9	6	0	0	0	0	5.92857143	17
/#accessory	7	5	0	13	7	4	5	0	15	7	9	0	3	0	5.35714286	7
/#shopping_etc	11	0	9	14	7	98	17	10	0	0	0	11	5	31	15.2142857	8
/#book	7	0	0	0	11	3	7	0	12	6	0	0	11	3	4.28571429	4
/#japanese_rest	0	15	0	0	0	31	0	11	9	8	10	14	0	0	7	4
/#chinese_rest	0	0	0	0	0	0	0	8	13	3371	0	5	0	9	243.285714	2
/#med	47	0	0	6	6	4	0	0	0	0	0	0	12	13	6.28571429	14
/#beauty	5	0	0	8	15	10	0	0	0	0	0	0	7	14	4.21428571	10
/#service_etc	19	0	0	7	10	0	11	0	0	0	0	0	7	0	3.85714286	12

Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV	results #
/#cloth	2	2	1	2	1	6	3	4	1	1	0	0	3	5	31	7
/#entertainment	2	2	0	0	1	4	1	1	5	2	0	0	7	2	27	10
/#korean_rest	0	4	0	0	1	1	0	2	4	1	2	2	3	4	24	17
/#fastfood	1	4	3	0	1	2	1	0	2	2	0	0	0	7	23	10
/#cafe	2	4	1	0	3	2	0	1	0	2	0	0	2	2	19	7
/#western_rest	0	1	0	0	2	2	0	2	4	2	1	0	1	1	16	9
/#dessert	0	1	2	0	2	2	0	1	1	1	0	0	0	0	10	17
/#accessory	1	2	0	2	1	4	1	0	1	1	1	0	3	0	17	7
/#shopping_etc	1	0	1	2	2	1	2	2	0	0	0	1	2	2	16	8
/#book	1	0	0	0	1	0	3	0	1	1	0	0	5	1	13	4
/#japanese_rest	0	1	0	0	0	3	0	1	2	3	1	2	0	0	13	4
/#chinese_rest	0	0	0	0	0	0	0	2	4	0	0	1	0	1	8	2
/#med	1	0	0	1	1	2	0	0	0	0	0	0	2	1	8	14
/#beauty	2	0	0	1	1	2	0	0	0	0	0	0	1	1	8	10
/#service_etc	1	0	0	2	1	0	1	0	0	0	0	0	1	0	6	12

Ave. time on search result * Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total	Ave. Time on Page
/#cloth	16	14	11	10	11	90	15	32	5	29	0	0	120	90	443	14.29
/#entertainment	12	36	0	0	16	44	10	1	80	34	0	0	63	28	324	12.00
/#korean_rest	0	72	0	0	8	24	0	18	180	17	34	44	24	40	461	19.21
/#fastfood	2	52	15	0	6	12	8	0	30	16	0	0	0	105	246	10.70
/#cafe	30	64	72	0	21	14	0	30	0	44	0	0	18	8	301	15.84
/#western_rest	0	37	0	0	42	24	0	32	84	36	6	0	30	6	297	18.56
/#dessert	0	10	24	0	14	14	0	28	9	6	0	0	0	0	105	10.50
/#accessory	7	10	0	26	7	16	5	0	15	7	9	0	9	0	111	6.53
/#shopping_etc	11	0	9	28	14	98	34	20	0	0	0	11	10	62	297	18.56
/#book	7	0	0	0	11	0	21	0	12	6	0	0	55	3	115	8.85
/#japanese_rest	0	15	0	0	0	93	0	11	18	24	10	28	0	0	199	15.31
/#chinese_rest	0	0	0	0	0	0	0	16	52	0	0	5	0	9	82	10.25
/#med	47	0	0	6	6	8	0	0	0	0	0	0	24	13	104	13.00
/#beauty	10	0	0	8	15	20	0	0	0	0	0	0	7	14	74	9.25
/#service_etc	19	0	0	14	10	0	11	0	0	0	0	0	7	0	61	10.17

Appendix 9. Random Order Experiment – 10% trimmed mean + Deleted Outliers over 100sec

Average time on search results (sec)

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	ave. Time	results #
/#cloth	8	7	11	5	11	15	5	8	5	29	2	0	40	18	11.7142857	7
/#entertainment	6	18	68	0	16	11	10	1	16	17	0	18	9	14	14.5714286	10
/#korean_rest	1	18	864	0	8	24	0	9	45	17	17	22	8	10	74.5	17
/#fastfood	2	13	5	0	6	6	8	359	15	8	0	0	244	15	48.6428571	10
/#cafe	15	16	72	0	7	7	0	30	3	22	0	0	9	4	13.2142857	7
/#western_rest	0	37	0	0	21	12	1	16	21	18	6	0	30	6	12	9
/#dessert	4	10	12	0	7	7	0	28	9	6	0	0	0	0	5.92857143	17
/#accessory	7	5	0	13	7	4	5	0	15	7	9	0	3	0	5.35714286	7
/#shopping_etc	11	0	9	14	7	98	17	10	0	0	0	11	5	31	15.2142857	8
/#book	7	0	0	0	11	3	7	0	12	6	0	0	11	3	4.28571429	4
/#japanese_rest	0	15	0	0	0	31	0	11	9	8	10	14	0	0	7	4
/#chinese_rest	0	0	0	0	0	0	0	8	13	3371	0	5	0	9	243.285714	2
/#med	47	0	0	6	6	4	0	0	0	0	0	0	12	13	6.28571429	14
/#beauty	5	0	0	8	15	10	0	0	0	0	0	0	7	14	4.21428571	10
/#service_etc	19	0	0	7	10	0	11	0	0	0	0	0	7	0	3.85714286	12

Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV	results #
/#cloth	2	2	1	2	1	6	2	4	0	1	0	0	1	5	27	7
/#entertainment	2	2	0	0	1	4	1	1	5	2	0	0	7	2	27	10
/#korean_rest	0	4	0	0	1	1	0	2	4	1	2	2	3	4	24	17
/#fastfood	0	4	2	0	1	2	1	0	2	2	0	0	0	7	21	10
/#cafe	2	4	0	0	3	2	0	1	0	2	0	0	2	1	17	7
/#western_rest	0	0	0	0	2	2	0	2	4	2	0	0	1	1	14	9
/#dessert	0	1	2	0	2	2	0	1	1	1	0	0	0	0	10	17
/#accessory	1	2	0	2	1	4	1	0	0	1	1	0	2	0	15	7
/#shopping_etc	1	0	1	2	2	0	2	2	0	0	0	1	1	2	14	8
/#book	1	0	0	0	1	0	3	0	0	1	0	0	5	0	11	4
/#japanese_rest	0	1	0	0	0	2	0	1	2	2	1	2	0	0	11	4
/#chinese_rest	0	0	0	0	0	0	0	2	4	0	0	1	0	1	8	2
/#med	0	0	0	1	1	1	0	0	0	0	0	0	2	1	6	14
/#beauty	1	0	0	1	0	2	0	0	0	0	0	0	1	1	6	10
/#service_etc	0	0	0	1	1	0	1	0	0	0	0	0	1	0	4	12

Ave. time on search result * Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total	Ave. Time on Page
/#cloth	16	14	11	10	11	90	10	32	0	29	0	0	40	90	353	13.07
/#entertainment	12	36	0	0	16	44	10	1	80	34	0	0	63	28	324	12.00
/#korean_rest	0	72	0	0	8	24	0	18	180	17	34	44	24	40	461	19.21
/#fastfood	0	52	10	0	6	12	8	0	30	16	0	0	0	105	239	11.38
/#cafe	30	64	0	0	21	14	0	30	0	44	0	0	18	4	225	13.24
/#western_rest	0	0	0	0	42	24	0	32	84	36	0	0	30	6	254	18.14
/#dessert	0	10	24	0	14	14	0	28	9	6	0	0	0	0	105	10.50
/#accessory	7	10	0	26	7	16	5	0	0	7	9	0	6	0	93	6.20
/#shopping_etc	11	0	9	28	14	0	34	20	0	0	0	11	5	62	194	13.86
/#book	7	0	0	0	11	0	21	0	0	6	0	0	55	0	100	9.09
/#japanese_rest	0	15	0	0	0	62	0	11	18	16	10	28	0	0	160	14.55
/#chinese_rest	0	0	0	0	0	0	0	16	52	0	0	5	0	9	82	10.25
/#med	0	0	0	6	6	4	0	0	0	0	0	0	24	13	53	8.83
/#beauty	5	0	0	8	0	20	0	0	0	0	0	0	7	14	54	9.00
/#service_etc	0	0	0	7	10	0	11	0	0	0	0	0	7	0	35	8.75

Appendix 10. Random Order Experiment – 20% Trimmed Mean + Deleted Outliers over 100sec

Average time on search results (sec)

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	ave. Time	results #
/#cloth	8	7	11	5	11	15	5	8	5	29	2	0	40	18	11.7142857	7
/#entertainment	6	18	68	0	16	11	10	1	16	17	0	18	9	14	14.5714286	10
/#korean_rest	1	18	864	0	8	24	0	9	45	17	17	22	8	10	74.5	17
/#fastfood	2	13	5	0	6	6	8	359	15	8	0	0	244	15	48.6428571	10
/#cafe	15	16	72	0	7	7	0	30	3	22	0	0	9	4	13.2142857	7
/#western_rest	0	37	0	0	21	12	1	16	21	18	6	0	30	6	12	9
/#dessert	4	10	12	0	7	7	0	28	9	6	0	0	0	0	5.92857143	17
/#accessory	7	5	0	13	7	4	5	0	15	7	9	0	3	0	5.35714286	7
/#shopping_etc	11	0	9	14	7	98	17	10	0	0	0	11	5	31	15.2142857	8
/#book	7	0	0	0	11	3	7	0	12	6	0	0	11	3	4.28571429	4
/#japanese_rest	0	15	0	0	0	31	0	11	9	8	10	14	0	0	7	4
/#chinese_rest	0	0	0	0	0	0	0	8	13	3371	0	5	0	9	243.285714	2
/#med	47	0	0	6	6	4	0	0	0	0	0	0	12	13	6.28571429	14
/#beauty	5	0	0	8	15	10	0	0	0	0	0	0	7	14	4.21428571	10
/#service_etc	19	0	0	7	10	0	11	0	0	0	0	0	7	0	3.85714286	12

Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV	results #
/#cloth	2	2	1	1	1	6	0	4	0	0	0	0	0	4	21	7
/#entertainment	2	0	0	0	1	4	1	1	5	0	0	0	7	2	23	10
/#korean_rest	0	4	0	0	1	1	0	2	2	1	2	2	1	4	20	17
/#fastfood	0	4	0	0	0	2	1	0	2	2	0	0	0	3	14	10
/#cafe	2	4	0	0	3	1	0	1	0	2	0	0	2	0	15	7
/#western_rest	0	0	0	0	1	1	0	2	4	2	0	0	0	0	10	9
/#dessert	0	1	2	0	2	2	0	0	1	0	0	0	0	0	8	17
/#accessory	1	2	0	0	1	4	1	0	0	1	1	0	0	0	11	7
/#shopping_etc	1	0	1	0	1	0	2	2	0	0	0	1	0	2	10	8
/#book	1	0	0	0	1	0	3	0	0	0	0	0	4	0	9	4
/#japanese_rest	0	1	0	0	0	1	0	1	2	1	1	2	0	0	9	4
/#chinese_rest	0	0	0	0	0	0	0	2	3	0	0	0	0	1	6	2
/#med	0	0	0	1	1	0	0	0	0	0	0	0	2	0	4	14
/#beauty	0	0	0	1	0	2	0	0	0	0	0	0	1	0	4	10
/#service_etc	0	0	0	1	1	0	1	0	0	0	0	0	1	0	4	12

Ave. time on search result * Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total	Ave. Time on Page
/#cloth	16	14	11	5	11	90	0	32	0	0	0	0	0	72	251	11.95
/#entertainment	12	0	0	0	16	44	10	1	80	0	0	0	63	28	254	11.04
/#korean_rest	0	72	0	0	8	24	0	18	90	17	34	44	8	40	355	17.75
/#fastfood	0	52	0	0	0	12	8	0	30	16	0	0	0	45	163	11.64
/#cafe	30	64	0	0	21	7	0	30	0	44	0	0	18	0	214	14.27
/#western_rest	0	0	0	0	21	12	0	32	84	36	0	0	0	0	185	18.50
/#dessert	0	10	24	0	14	14	0	0	9	0	0	0	0	0	71	8.88
/#accessory	7	10	0	0	7	16	5	0	0	7	9	0	0	0	61	5.55
/#shopping_etc	11	0	9	0	7	0	34	20	0	0	0	11	0	62	154	15.40
/#book	7	0	0	0	11	0	21	0	0	0	0	0	44	0	83	9.22
/#japanese_rest	0	15	0	0	0	31	0	11	18	8	10	28	0	0	121	13.44
/#chinese_rest	0	0	0	0	0	0	0	16	39	0	0	0	0	9	64	10.67
/#med	0	0	0	6	6	0	0	0	0	0	0	0	24	0	36	9.00
/#beauty	0	0	0	8	0	20	0	0	0	0	0	0	7	0	35	8.75
/#service_etc	0	0	0	7	10	0	11	0	0	0	0	0	7	0	35	8.75

Appendix 11. Random Order Experiment – mixed trimmed mean

Error (Exception) in Orange

Average time on search results (sec)

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	ave. Time	results #
/#cloth	8	7	11	5	11	15	5	8	5	29	2	0	40	18	11.7142857	7
/#entertainment	6	18	68	0	16	11	10	1	16	17	0	18	9	14	14.5714286	10
/#korean_rest	1	18	864	0	8	24	0	9	45	17	17	22	8	10	74.5	17
/#fastfood	2	13	5	0	6	6	8	359	15	8	0	0	244	15	48.6428571	10
/#cafe	15	16	72	0	7	7	0	30	3	22	0	0	9	4	13.2142857	7
/#western_rest	0	37	0	0	21	12	1	16	21	18	6	0	30	6	12	9
/#dessert	4	10	12	0	7	7	0	28	9	6	0	0	0	0	5.92857143	17
/#accessory	7	5	0	13	7	4	5	0	15	7	9	0	3	0	5.35714286	7
/#shopping_etc	11	0	9	14	7	98	17	10	0	0	0	0	11	5	31	15.2142857	8
/#book	7	0	0	0	11	3	7	0	12	6	0	0	11	3	4.28571429	4
/#japanese_rest	0	15	0	0	0	31	0	11	9	8	10	14	0	0	7	4
/#chinese_rest	0	0	0	0	0	0	0	8	13	3371	0	5	0	9	243.285714	2
/#med	47	0	0	6	6	4	0	0	0	0	0	0	12	13	6.28571429	14
/#beauty	5	0	0	8	15	10	0	0	0	0	0	0	7	14	4.21428571	10
/#service_etc	19	0	0	7	10	0	11	0	0	0	0	0	7	0	3.85714286	12

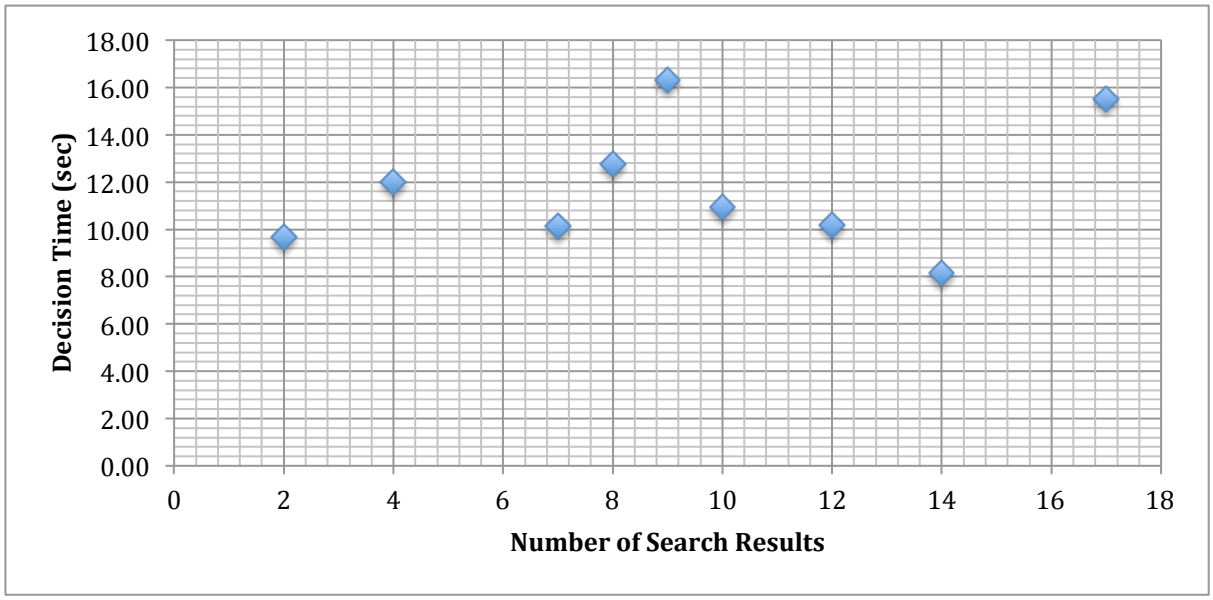
Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total UPV	results #
/#cloth	2	2	1	2	1	6	2	4	0	1	0	0	1	5	27	7
/#entertainment	2	2	0	0	1	4	1	1	5	2	0	0	7	2	27	10
/#korean_rest	0	4	0	0	1	1	0	2	4	1	2	2	3	4	24	17
/#fastfood	0	4	0	0	0	2	1	0	2	2	0	0	0	3	14	10
/#cafe	2	4	0	0	3	2	0	1	0	2	0	0	2	1	17	7
/#western_rest	0	0	0	0	2	2	0	2	4	2	0	0	1	1	14	9
/#dessert	0	1	2	0	2	2	0	1	1	1	0	0	0	0	10	17
/#accessory	1	2	0	2	1	4	1	1	2	1	1	0	3	0	19	7
/#shopping_etc	1	0	1	2	2	0	2	2	0	0	0	1	1	2	14	8
/#book	1	0	0	0	1	1	3	0	2	1	0	0	5	1	15	4
/#japanese_rest	0	1	1	0	0	4	0	1	2	3	1	2	0	0	15	4
/#chinese_rest	0	0	0	0	0	0	0	2	4	0	0	2	0	1	9	2
/#med	1	0	0	1	1	2	0	0	0	0	0	0	2	1	8	14
/#beauty	2	0	0	1	1	2	0	0	0	0	0	0	1	1	8	10
/#service_etc	1	0	0	2	1	0	1	0	0	0	0	0	1	0	6	12

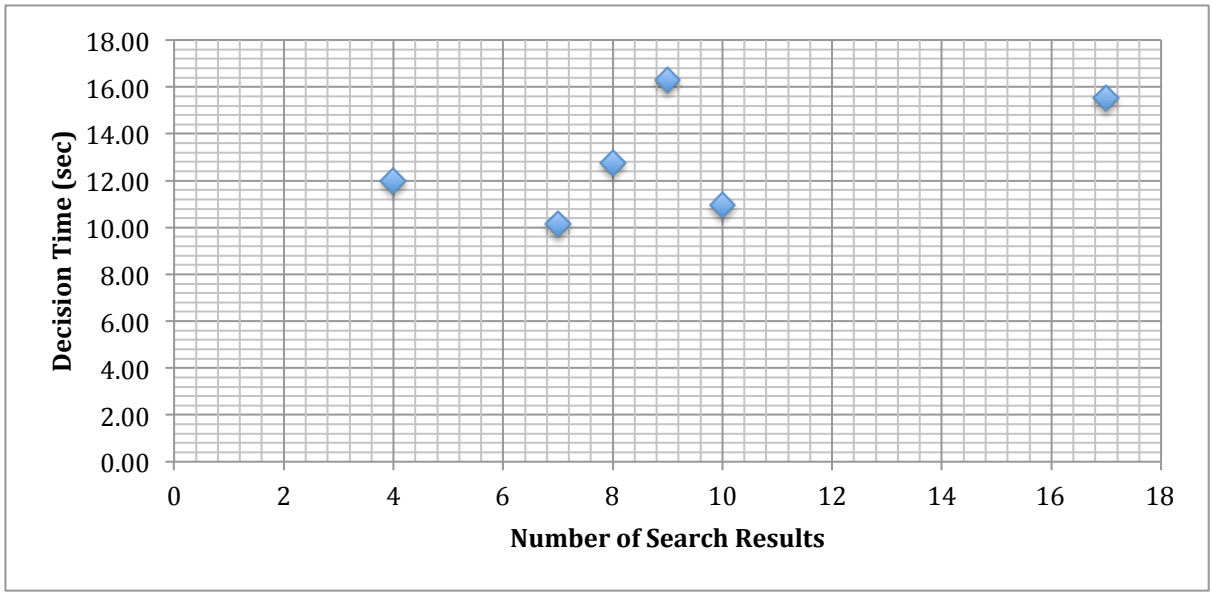
Ave. time on search result * Unique Page Views

	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	Total	Ave. Time on Page
/#cloth	16	14	11	10	11	90	10	32	0	29	0	0	40	90	353	13.07
/#entertainment	12	36	0	0	16	44	10	1	80	34	0	0	63	28	324	12.00
/#korean_rest	0	72	0	0	8	24	0	18	180	17	34	44	24	40	461	19.21
/#fastfood	0	52	0	0	0	12	8	0	30	16	0	0	0	45	163	11.64
/#cafe	30	64	0	0	21	14	0	30	0	44	0	0	18	4	225	13.24
/#western_rest	0	0	0	0	42	24	0	32	84	36	0	0	30	6	254	18.14
/#dessert	0	10	24	0	14	14	0	28	9	6	0	0	0	0	105	10.50
/#accessory	7	10	0	26	7	16	5	0	30	7	9	0	9	0	126	6.63
/#shopping_etc	11	0	9	28	14	0	34	20	0	0	0	0	11	5	62	194	13.86
/#book	7	0	0	0	11	3	21	0	24	6	0	0	55	3	130	8.67
/#japanese_rest	0	15	0	0	0	124	0	11	18	24	10	28	0	0	230	15.33
/#chinese_rest	0	0	0	0	0	0	0	16	52	0	0	10	0	9	87	9.67
/#med	47	0	0	6	6	8	0	0	0	0	0	0	24	13	104	13.00
/#beauty	10	0	0	8	15	20	0	0	0	0	0	0	7	14	74	9.25
/#service_etc	19	0	0	14	10	0	11	0	0	0	0	0	7	0	61	10.17

Appendix 12. Number of Search Results vs. Decision Time (No trim)



All trimmed data



UPV < 10 eliminated data

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP
2	1	9	87	9.67
4	1	30	360	12.00
7	1	68	688	10.12
8	2	16	204	12.75
9	2	16	261	16.31
10	2	64	700	10.94
12	2	6	61	10.17
14	2	7	57	8.14
17	2	35	543	15.51
		251		

Correlation	0.2159486
Covariance	2.46062653

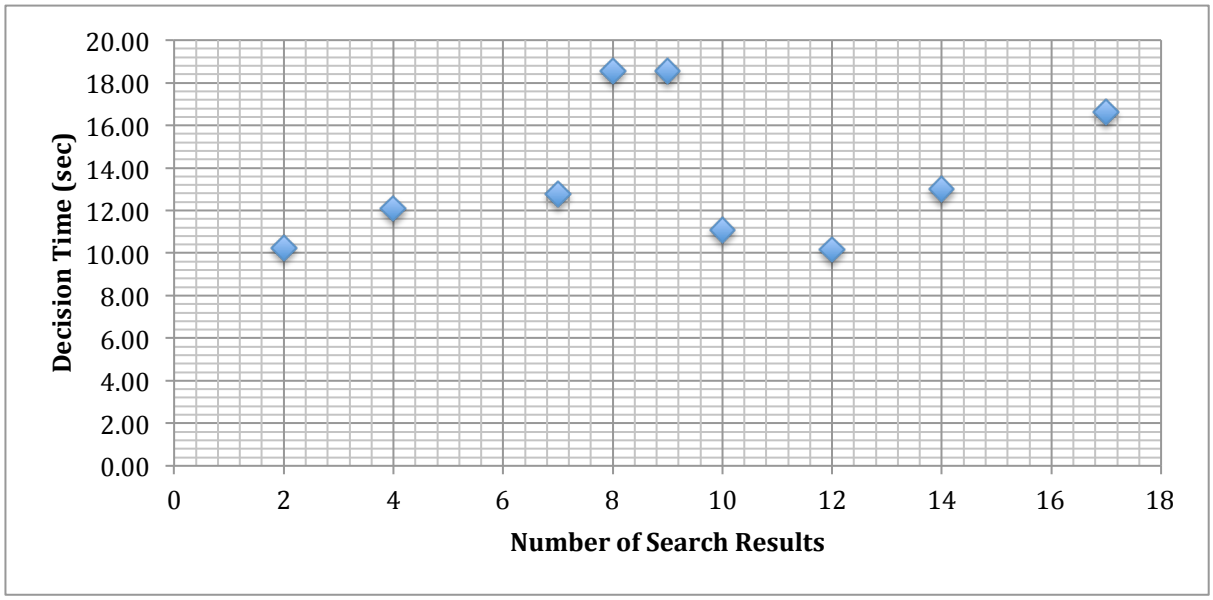
All trimmed data

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP
4	1	30	360	12.00
7	1	68	688	10.12
8	2	16	204	12.75
9	2	16	261	16.31
10	2	64	700	10.94
17	2	35	543	15.51

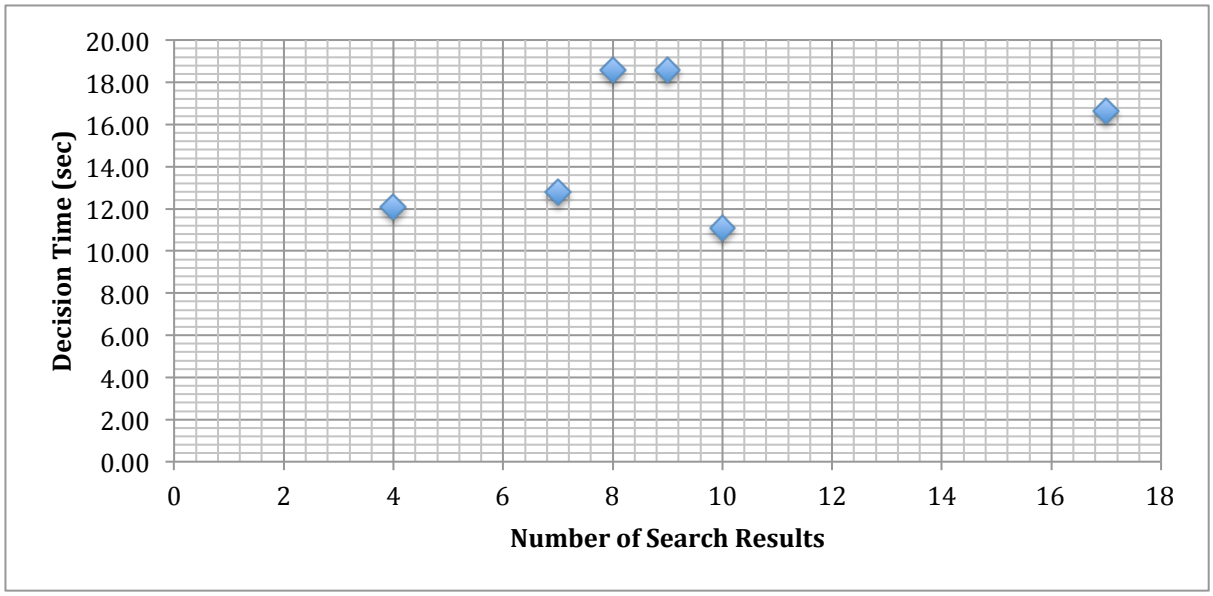
Correlation	0.538116193
Covariance	4.854639356

UPV < 10 eliminated data

Appendix 13. Number of Search Results vs. Decision Time(5% trim)



All trimmed data



UPV < 10 eliminated data

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP (sec)
2	1	8	82	10.25
4	1	26	314	12.08
7	1	67	855	12.76
8	2	16	297	18.56
9	2	16	297	18.56
10	2	58	644	11.10
12	2	6	61	10.17
14	2	8	104	13.00
17	2	34	566	16.65
		239		

Correlatio	0.284609244
Covarianc	4.022014284

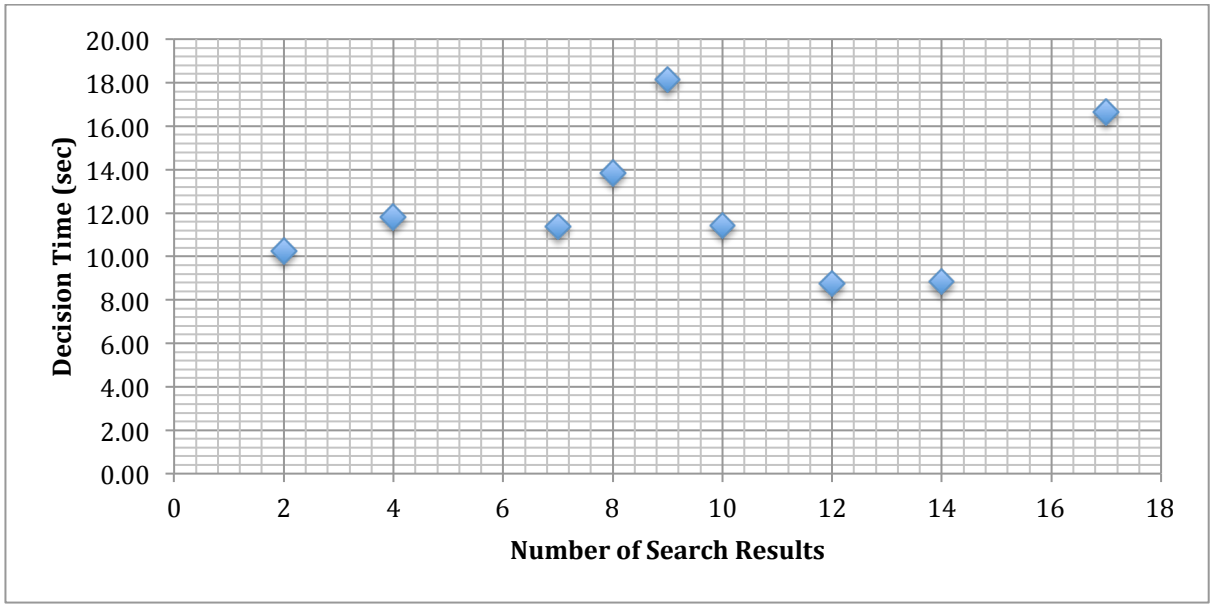
All trimmed data

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP (sec)
4	1	26	314	12.08
7	1	67	855	12.76
8	2	16	297	18.56
9	2	16	297	18.56
10	2	58	644	11.10
17	2	34	566	16.65

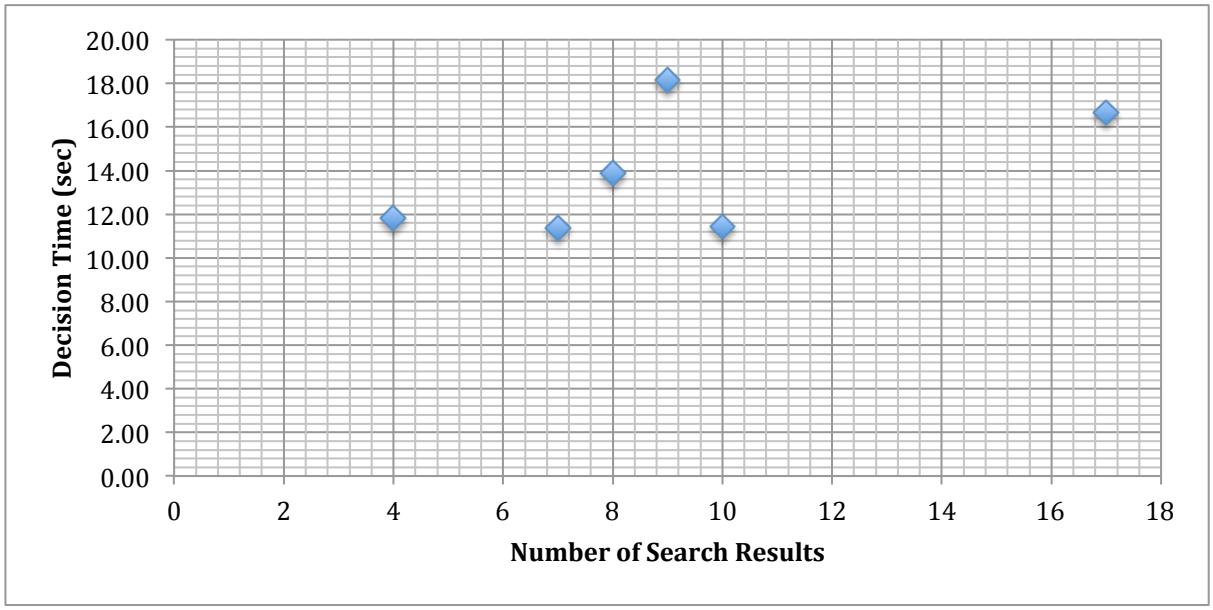
Correlatio	0.338634
Covarianc	4.143024

UPV < 10 eliminated data

Appendix 14. Number of Search Results vs. Decision Time(10% T)



All trimmed data



UPV < 10 eliminated data

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP (sec)
2	1	8	82	10.25
4	1	22	260	11.82
7	1	59	671	11.37
8	2	14	194	13.86
9	2	14	254	18.14
10	2	54	617	11.43
12	2	4	35	8.75
14	2	6	53	8.83
17	2	34	566	16.65
		215		

Correlatio	0.185082246
Covarianc	2.542993508

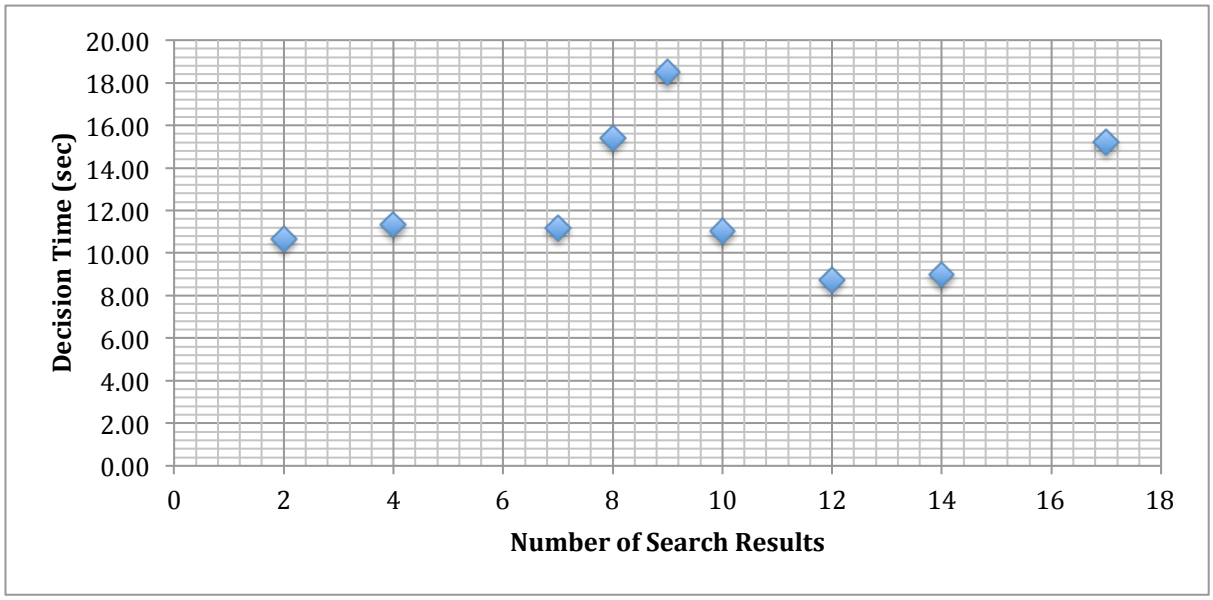
All trimmed data

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP (sec)
4	1	22	260	11.82
7	1	59	671	11.37
8	2	14	194	13.86
9	2	14	254	18.14
10	2	54	617	11.43
17	2	34	566	16.65

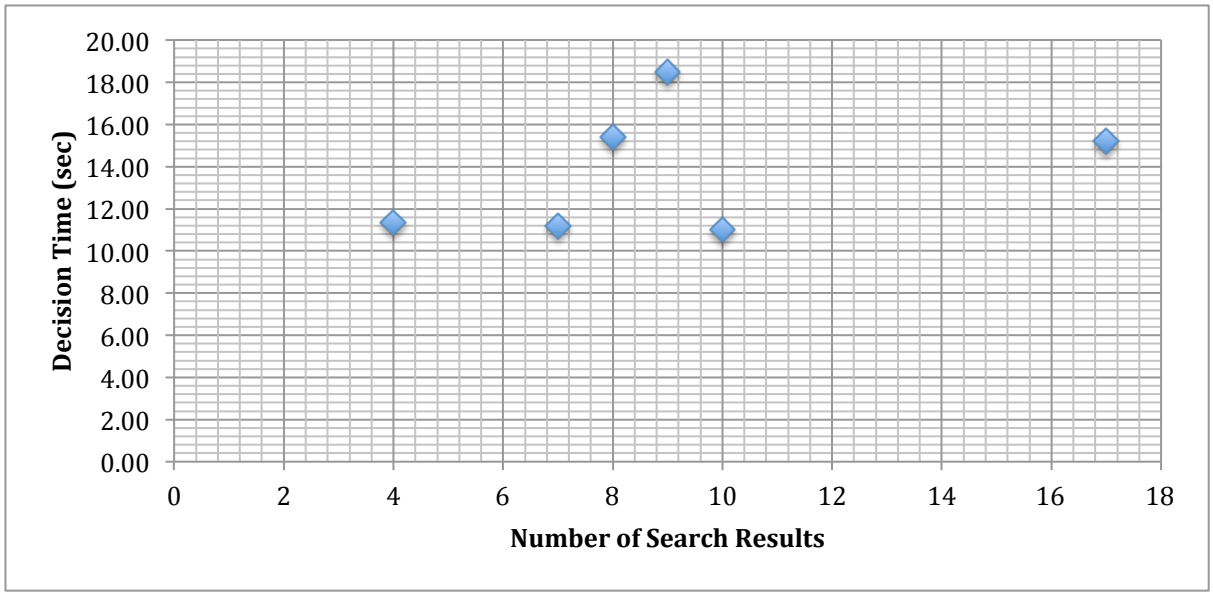
Correlatio	0.552525
Covarianc	5.83854

UPV < 10 eliminated data

Appendix 15. Number of Search Results vs. Decision Time (20% T)



All trimmed data



UPV < 10 eliminated data

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP (sec)
2	1	6	64	10.67
4	1	18	204	11.33
7	1	47	526	11.19
8	2	10	154	15.40
9	2	10	185	18.50
10	2	41	452	11.02
12	2	4	35	8.75
14	2	4	36	9.00
17	2	28	426	15.21
		168		

Correlatio	0.082217589
Covarianc	1.131986969

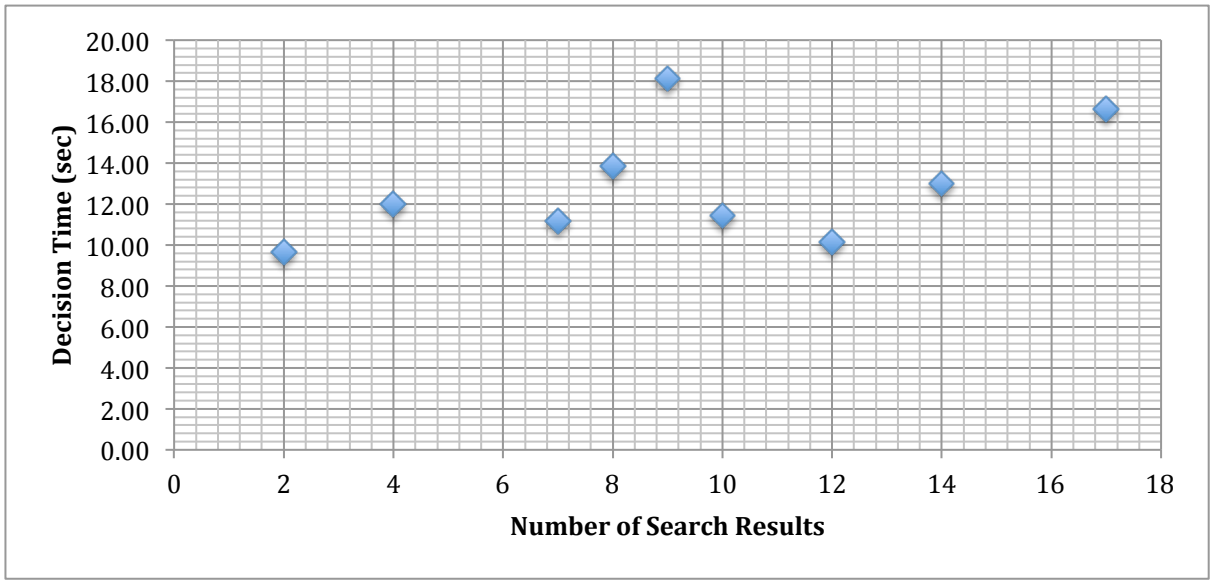
All trimmed data

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP (sec)
4	1	18	204	11.33
7	1	47	526	11.19
8	2	10	154	15.40
9	2	10	185	18.50
10	2	41	452	11.02
17	2	28	426	15.21

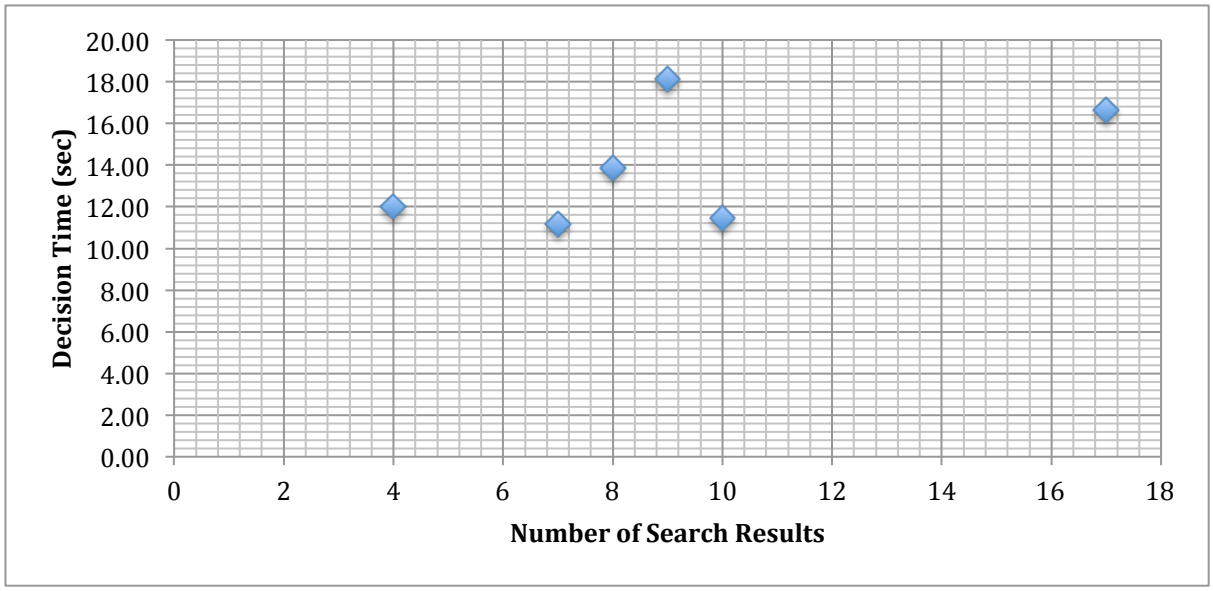
Correlatio	0.366218
Covarianc	4.085297

UPV < 10 eliminated data

Appendix 16. Number of Search Results vs. Decision Time(Mixed T)



All trimmed data



UPV < 10 eliminated data

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP (sec)
2	1	9	87	9.67
4	1	30	360	12.00
7	1	63	704	11.17
8	2	14	194	13.86
9	2	14	254	18.14
10	2	49	561	11.45
12	2	6	61	10.17
14	2	8	104	13.00
17	2	34	566	16.65
		227		
Correlatio		0.465095267		
Covarianc		5.605727888		

All trimmed data

#of results	page #	UPV by # of results	ATP*UPV by # of results	Aggregated ATP (sec)
4	1	30	360	12.00
7	1	63	704	11.17
8	2	14	194	13.86
9	2	14	254	18.14
10	2	49	561	11.45
17	2	34	566	16.65
Correlatio		0.54348		
Covarianc		5.756777		

UPV < 10 eliminated data

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www.smap.co.kr
Pages
20110625-20110708

Page	Pageviews	Unique Page	Avg. Time on	Bounce Rate	% Exit
/#restaurant	141	93	0:00:14	0.00%	4.96%
/#shopping	88	73	0:00:09	0.00%	6.82%
/#country	74	54	0:00:07	0.00%	4.05%
/#cloth	61	48	0:00:14	0.00%	21.31%
/#service	59	49	0:03:48	0.00%	11.86%
/#entertainn	52	41	0:00:13	0.00%	15.38%
/#korean_re	46	30	0:00:39	0.00%	10.87%
/#fastfood	38	30	0:00:52	0.00%	18.42%
/index.asp	35	20	0:00:30	22.22%	20.00%
/#cafe	30	26	0:00:16	0.00%	16.67%
/#western_r	30	22	0:00:21	0.00%	13.33%
/#dessert	28	18	0:00:15	0.00%	21.43%
/#accessory	27	23	0:00:06	0.00%	14.81%
/#shopping_	27	22	0:00:18	0.00%	14.81%
/index.asp?q	25	17	0:00:28	13.33%	16.00%
/#book	22	19	0:00:09	0.00%	18.18%
/index.asp?q	22	17	0:04:22	23.53%	27.27%
/#japanese_	20	17	0:00:14	0.00%	10.00%
/index.asp?q	18	15	0:00:27	40.00%	33.33%
/index.asp?q	18	14	0:00:20	21.43%	22.22%
/index.asp?q	17	11	0:00:11	33.33%	29.41%
/index.asp?q	16	11	0:00:36	18.18%	18.75%
/index.asp?q	15	9	0:00:25	0.00%	6.67%
/#chinese_re	14	14	0:14:10	0.00%	14.29%
/index.asp?q	13	9	0:02:26	11.11%	23.08%
/index.asp?q	11	9	0:01:21	11.11%	9.09%
/#med	10	10	0:00:13	0.00%	20.00%
/#beauty	9	9	0:00:09	0.00%	11.11%
/#service_et	9	9	0:00:10	0.00%	33.33%
/#96	8	7	0:00:02	0.00%	37.50%
/index.asp?q	8	8	0:00:15	0.00%	0.00%
/#100	7	6	0:00:12	0.00%	28.57%
/#102	7	7	0:00:07	0.00%	14.29%
/#68	7	4	0:00:02	0.00%	28.57%
/index.asp?q	7	7	0:00:11	14.29%	14.29%
/index.asp?q	7	7	0:00:23	28.57%	28.57%
/#78	6	4	0:00:14	0.00%	0.00%
/#95	6	6	0:00:11	0.00%	16.67%
/index.asp?q	6	4	0:00:12	0.00%	0.00%
/index.asp?q	6	5	0:00:30	25.00%	33.33%
/index.asp?q	6	4	0:00:21	0.00%	0.00%
/index.asp?q	6	6	0:00:32	16.67%	16.67%
/#29	5	4	0:00:12	0.00%	20.00%
/#34	5	5	0:00:22	0.00%	40.00%
/#35	5	4	0:00:06	0.00%	0.00%
/#35map	5	4	0:00:19	0.00%	60.00%
/#5	5	4	0:00:17	0.00%	20.00%
/#50	5	5	0:00:30	0.00%	0.00%
/#53	5	4	0:01:34	0.00%	0.00%
/#69	5	1	0:00:06	0.00%	0.00%
/#98	5	5	0:00:01	0.00%	40.00%
/index.asp?q	5	5	0:00:16	0.00%	0.00%
/index.asp?q	5	5	0:00:18	0.00%	0.00%
/index.asp?q	5	5	0:00:14	20.00%	20.00%
/index.asp?q	5	3	0:00:17	33.33%	20.00%
/#10	4	4	0:00:11	0.00%	0.00%
/#103	4	3	0:00:06	0.00%	0.00%
/#13	4	3	0:00:09	0.00%	0.00%
/#131	4	3	0:00:04	0.00%	0.00%
/#2	4	4	0:00:14	0.00%	0.00%
/#26	4	4	0:00:28	0.00%	0.00%
/#52	4	3	0:00:36	0.00%	25.00%
/#54	4	4	0:00:03	0.00%	0.00%
/#54map	4	4	0:00:00	0.00%	100.00%
/#65	4	3	0:00:25	0.00%	0.00%
/#67	4	3	0:00:04	0.00%	25.00%
/#77	4	4	0:00:13	0.00%	0.00%
/#79	4	3	0:00:03	0.00%	25.00%
/#9	4	3	0:06:00	0.00%	0.00%
/#96map	4	3	0:00:28	0.00%	75.00%
/#99	4	4	0:00:08	0.00%	0.00%
/index.asp?q	4	4	0:00:18	0.00%	0.00%
/index.asp?q	4	4	0:00:16	25.00%	25.00%
/index.asp?q	4	4	0:00:04	66.67%	50.00%
/#100map	3	2	0:01:27	0.00%	66.67%
/#102map	3	3	0:00:22	0.00%	66.67%
/#132	3	1	0:00:04	0.00%	0.00%
/#14	3	3	0:00:08	0.00%	33.33%
/#18	3	3	0:00:12	0.00%	0.00%
/#25	3	3	0:00:11	0.00%	0.00%
/#27	3	3	0:00:13	0.00%	0.00%
/#2map	3	3	0:00:21	0.00%	66.67%
/#42	3	3	0:00:14	0.00%	0.00%
/#44	3	3	0:00:34	0.00%	33.33%
/#46	3	3	0:03:57	0.00%	0.00%
/#56	3	2	0:00:10	0.00%	0.00%
/#58	3	3	0:00:07	0.00%	33.33%
/#70	3	2	0:00:02	0.00%	0.00%
/#70map	3	2	0:00:17	0.00%	33.33%
/#71	3	3	0:00:06	0.00%	0.00%
/#80	3	2	0:00:12	0.00%	33.33%
/#84	3	3	0:00:03	0.00%	0.00%
/#84map	3	3	0:00:22	0.00%	0.00%
/#86	3	3	0:00:06	0.00%	0.00%
/#97	3	3	0:00:04	0.00%	33.33%
/#98map	3	2	0:00:01	0.00%	66.67%
/index.asp?q	3	3	0:00:21	0.00%	0.00%
/index.asp?q	3	3	0:00:14	33.33%	33.33%

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second
Pages
20110708-20110721

Page	Pageviews	Unique Page	Avg. Time on	Bounce Rate	% Exit
/restaurant.asp	126	64	0:00:08	0.00%	5.56%
/shopping.asp	61	36	0:00:06	100.00%	18.03%
/resultScr.asp?ScrTxt=Entertainment	59	36	0:00:20	0.00%	18.64%
/country.asp	54	32	0:00:14	0.00%	5.56%
/resultScr.asp?ScrTxt=fastfood	40	28	0:00:34	100.00%	20.00%
/service.asp	36	25	0:00:06	0.00%	5.56%
/resultScr.asp?ScrTxt=cafe	26	17	0:00:23	0.00%	15.38%
/resultScr.asp?ScrTxt=dessert	24	16	0:00:22	0.00%	12.50%
/resultScr.asp?ScrTxt=cloth	22	20	0:00:23	0.00%	36.36%
/resultScr.asp?ScrTxt=korean_rest	22	14	0:00:27	100.00%	18.18%
/?qr=15	21	11	0:00:07	0.00%	9.52%
/?qr=34	18	14	0:00:17	21.43%	27.78%
/?qr=18	17	12	0:00:36	8.33%	5.88%
/?qr=32	17	10	0:00:16	11.11%	35.29%
/?qr=16	13	8	0:00:05	25.00%	23.08%
/?qr=30	13	5	0:00:08	20.00%	15.38%
/shopdetail.asp?shop=100	13	7	0:00:06	0.00%	7.69%
/?qr=19	11	4	0:00:10	25.00%	18.18%
/?qr=39	11	7	0:00:07	28.57%	45.45%
/resultScr.asp?ScrTxt=japanese_rest	11	10	0:00:18	0.00%	9.09%
/resultScr.asp?ScrTxt=western_rest	11	10	0:00:18	0.00%	9.09%
/?qr=20	10	8	0:00:16	12.50%	10.00%
/resultScr.asp?ScrTxt=shopping_etc	10	9	0:01:24	0.00%	10.00%
/?qr=24	9	6	0:00:40	20.00%	11.11%
/?qr=35	9	6	0:00:08	16.67%	22.22%
/resultScr.asp?ScrTxt=med	9	6	0:00:36	0.00%	0.00%
/resultScr.asp?ScrTxt=service_etc	9	8	0:00:13	0.00%	11.11%
/?qr=26	8	8	0:00:09	0.00%	0.00%
/?qr=21	7	5	0:00:04	20.00%	28.57%
/?qr=28	7	5	0:00:07	20.00%	42.86%
/resultScr.asp?ScrTxt=beauty	7	5	0:00:15	0.00%	14.29%
/shopdetail.asp?shop=23	7	4	0:00:06	0.00%	14.29%
/?qr=22	6	4	0:00:23	25.00%	16.67%
/?qr=3	6	3	0:00:16	0.00%	33.33%
/?qr=33	6	5	0:00:23	0.00%	0.00%
/map.asp?shop=100	6	5	0:11:57	0.00%	33.33%
/resultScr.asp?ScrTxt=book	6	6	0:00:12	0.00%	16.67%
/shopdetail.asp?shop=102	6	4	0:00:06	0.00%	16.67%
/	5	4	0:00:06	66.67%	60.00%
/?qr=14	5	3	0:00:10	0.00%	0.00%
/?qr=23	5	2	0:00:03	50.00%	40.00%
/?qr=40	5	2	0:00:14	0.00%	0.00%
/resultScr.asp?ScrTxt=accessory	5	5	0:00:12	0.00%	0.00%
/shopdetail.asp?shop=2	5	3	0:00:03	0.00%	40.00%
/shopdetail.asp?shop=96	5	5	0:00:10	0.00%	0.00%
/?qr=27	4	2	0:00:06	0.00%	25.00%
/?qr=29	4	4	0:00:13	50.00%	50.00%
/?qr=36	4	4	0:00:06	25.00%	25.00%
/?qr=4	4	4	0:00:12	75.00%	75.00%
/?qr=6	4	2	0:00:28	0.00%	25.00%
/shopdetail.asp?shop=131	4	3	0:00:05	0.00%	0.00%
/shopdetail.asp?shop=64	4	1	0:00:31	0.00%	25.00%
/?qr=7	3	2	0:00:12	0.00%	0.00%
/?qr=8	3	2	0:00:07	0.00%	33.33%
/map.asp?shop=23	3	3	0:00:09	0.00%	0.00%
/map.asp?shop=25	3	2	0:00:50	0.00%	66.67%
/map.asp?shop=94	3	3	0:00:51	0.00%	66.67%
/shopdetail.asp?shop=11	3	2	0:00:04	0.00%	0.00%
/shopdetail.asp?shop=22	3	1	0:00:12	0.00%	0.00%
/shopdetail.asp?shop=25	3	2	0:00:05	0.00%	0.00%
/shopdetail.asp?shop=31	3	3	0:00:07	0.00%	0.00%
/shopdetail.asp?shop=38	3	1	0:00:11	0.00%	0.00%
/shopdetail.asp?shop=56	3	2	0:00:05	0.00%	0.00%
/shopdetail.asp?shop=62	3	1	0:00:12	0.00%	0.00%
/shopdetail.asp?shop=94	3	2	0:00:12	0.00%	33.33%
/?qr=1	2	1	0:00:09	0.00%	50.00%
/?qr=37	2	2	0:00:07	50.00%	50.00%
/map.asp?shop=102	2	2	0:00:14	0.00%	50.00%
/map.asp?shop=11	2	2	0:00:15	0.00%	50.00%
/map.asp?shop=131	2	2	0:00:18	0.00%	50.00%
/map.asp?shop=2	2	2	0:02:38	0.00%	0.00%
/map.asp?shop=22	2	1	0:00:05	0.00%	0.00%
/map.asp?shop=39	2	2	0:00:00	100.00%	100.00%
/map.asp?shop=62	2	2	0:00:23	0.00%	50.00%
/resultScr.asp?ScrTxt=chinese_rest	2	2	0:00:08	0.00%	0.00%
/shopdetail.asp?shop=119	2	1	0:00:06	0.00%	0.00%
/shopdetail.asp?shop=17	2	2	0:13:17	0.00%	0.00%
/shopdetail.asp?shop=20	2	1	0:00:04	0.00%	0.00%
/shopdetail.asp?shop=33	2	1	0:00:09	0.00%	0.00%
/shopdetail.asp?shop=37	2	1	0:00:04	0.00%	0.00%
/shopdetail.asp?shop=39	2	2	0:00:06	0.00%	50.00%
/shopdetail.asp?shop=6	2	1	0:00:04	0.00%	0.00%
/shopdetail.asp?shop=61	2	1	0:00:04	0.00%	0.00%
/shopdetail.asp?shop=65	2	1	0:00:04	0.00%	50.00%
/shopdetail.asp?shop=97	2	2	0:00:05	0.00%	50.00%
/shopdetail.asp?shop=98	2	2	0:00:07	0.00%	0.00%
/shopdetail.asp?shop=99	2	1	0:00:04	0.00%	50.00%
/?qr=12	1	1	0:00:00	100.00%	100.00%
/?qr=14&mVersion=2.0.4	1	1	0:00:00	100.00%	100.00%
/map.asp?shop=111	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=119	1	1	0:00:06	0.00%	0.00%
/map.asp?shop=126	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=127	1	1	0:01:53	0.00%	0.00%
/map.asp?shop=18	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=20	1	1	0:00:20	0.00%	0.00%
/map.asp?shop=30	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=31	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=33	1	1	0:00:31	0.00%	0.00%

/#70map	3	2	0:00:17	0.00%	33.33%
/#71	3	3	0:00:06	0.00%	0.00%
/#80	3	2	0:00:12	0.00%	33.33%
/#84	3	3	0:00:03	0.00%	0.00%
/#84map	3	3	0:00:22	0.00%	0.00%
/#86	3	3	0:00:06	0.00%	0.00%
/#97	3	3	0:00:04	0.00%	33.33%
/#98map	3	2	0:00:01	0.00%	66.67%
/index.asp?q	3	3	0:00:21	0.00%	0.00%
/index.asp?q	3	3	0:00:14	33.33%	33.33%
/index.asp?q	3	3	0:00:16	0.00%	0.00%
/#1	2	2	0:00:05	0.00%	0.00%
/#101	2	2	0:00:16	0.00%	50.00%
/#10map	2	2	0:02:31	0.00%	0.00%
/#12	2	2	0:00:19	0.00%	50.00%
/#131map	2	2	0:00:13	0.00%	50.00%
/#14map	2	2	0:00:12	0.00%	0.00%
/#1map	2	2	0:00:14	0.00%	50.00%
/#21	2	2	0:00:25	0.00%	50.00%
/#28	2	2	0:00:06	0.00%	0.00%
/#3	2	2	0:00:10	0.00%	0.00%
/#32	2	2	0:00:11	0.00%	0.00%
/#33map	2	2	0:42:03	0.00%	50.00%
/#4	2	2	0:00:12	0.00%	50.00%
/#43map	2	1	0:00:00	0.00%	50.00%
/#46map	2	2	0:00:10	0.00%	50.00%
/#49	2	2	0:00:01	0.00%	50.00%
/#51	2	2	0:00:04	0.00%	0.00%
/#57	2	2	0:00:07	0.00%	0.00%
/#58map	2	2	0:00:29	0.00%	0.00%
/#59	2	2	0:00:08	0.00%	0.00%
/#61	2	2	0:00:02	0.00%	50.00%
/#63	2	2	0:00:06	0.00%	0.00%
/#63map	2	2	0:00:09	0.00%	50.00%
/#65map	2	2	0:00:58	0.00%	0.00%
/#7	2	2	0:00:02	0.00%	0.00%
/#71map	2	2	0:19:36	0.00%	50.00%
/#72	2	1	0:00:02	0.00%	0.00%
/#72map	2	1	0:00:28	0.00%	0.00%
/#74	2	2	0:00:00	0.00%	100.00%
/#75	2	2	0:00:10	0.00%	0.00%
/#76	2	2	0:00:04	0.00%	50.00%
/#76map	2	2	0:00:25	0.00%	50.00%
/#77map	2	2	0:00:15	0.00%	0.00%
/#87	2	2	0:00:06	0.00%	0.00%
/#87map	2	2	0:00:15	0.00%	0.00%
/#89	2	2	0:00:06	0.00%	0.00%
/#91	2	2	0:00:10	0.00%	0.00%
/#94	2	2	0:00:10	0.00%	0.00%
/#95map	2	2	0:00:00	0.00%	50.00%
/#97map	2	2	0:00:03	0.00%	50.00%
/index.asp?q	2	2	0:00:04	0.00%	0.00%
/index.asp?q	2	2	0:00:26	0.00%	0.00%
/index.asp?q	2	2	0:00:08	50.00%	50.00%
/index.asp?q	2	2	0:00:31	50.00%	50.00%
/index.asp?q	2	2	0:00:10	0.00%	0.00%
/index.asp?q	2	2	0:01:04	0.00%	0.00%
/#101map	1	1	0:00:00	0.00%	100.00%
/#106	1	1	0:00:44	0.00%	0.00%
/#11	1	1	0:00:04	0.00%	0.00%
/#111	1	1	0:00:00	0.00%	100.00%
/#112	1	1	0:00:00	0.00%	100.00%
/#115	1	1	0:00:00	0.00%	100.00%
/#117	1	1	0:00:00	0.00%	100.00%
/#117map	1	1	0:00:21	0.00%	0.00%
/#121	1	1	0:00:07	0.00%	0.00%
/#123	1	1	0:00:13	0.00%	0.00%
/#123map	1	1	0:00:00	0.00%	100.00%
/#12map	1	1	0:00:12	0.00%	0.00%
/#130	1	1	0:00:10	0.00%	0.00%
/#135	1	1	0:00:14	0.00%	0.00%
/#136	1	1	0:00:14	0.00%	0.00%
/#17	1	1	0:00:08	0.00%	0.00%
/#23	1	1	0:00:05	0.00%	0.00%
/#23map	1	1	0:00:12	0.00%	0.00%
/#25map	1	1	0:00:00	0.00%	100.00%
/#27map	1	1	0:10:11	0.00%	0.00%
/#31	1	1	0:00:12	0.00%	0.00%
/#34map	1	1	0:00:07	0.00%	0.00%
/#38	1	1	0:00:04	0.00%	0.00%
/#39map	1	1	0:00:00	0.00%	100.00%
/#40	1	1	0:04:13	0.00%	0.00%
/#41	1	1	0:00:07	0.00%	0.00%
/#41map	1	1	0:00:55	0.00%	0.00%
/#42map	1	1	0:00:00	0.00%	100.00%
/#43	1	1	0:02:37	0.00%	0.00%
/#48	1	1	0:00:00	0.00%	100.00%
/#49map	1	1	0:00:50	0.00%	0.00%
/#4map	1	1	0:00:00	0.00%	100.00%
/#50map	1	1	0:00:00	0.00%	100.00%
/#51map	1	1	0:00:08	0.00%	0.00%
/#53map	1	1	0:00:31	0.00%	0.00%
/#55	1	1	0:00:00	0.00%	100.00%
/#56map	1	1	0:00:25	0.00%	0.00%
/#59map	1	1	0:00:00	0.00%	100.00%
/#5map	1	1	0:00:00	0.00%	100.00%
/#61map	1	1	0:02:02	0.00%	0.00%
/#62	1	1	0:00:01	0.00%	0.00%
/#62map	1	1	0:00:00	0.00%	100.00%
/#66	1	1	0:00:08	0.00%	0.00%
/#68map	1	1	0:00:00	0.00%	100.00%
/#69map	1	1	0:00:17	0.00%	0.00%
/#73	1	1	0:00:10	0.00%	0.00%
/#75map	1	1	0:00:08	0.00%	0.00%
/#78map	1	1	0:00:12	0.00%	0.00%
/?qr=14&mVersion=2.0.4	1	1	0:00:00	100.00%	100.00%
/map.asp?shop=111	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=119	1	1	0:00:06	0.00%	0.00%
/map.asp?shop=126	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=127	1	1	0:01:53	0.00%	0.00%
/map.asp?shop=18	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=20	1	1	0:00:20	0.00%	0.00%
/map.asp?shop=30	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=31	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=33	1	1	0:00:31	0.00%	0.00%
/map.asp?shop=36	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=37	1	1	0:00:08	0.00%	0.00%
/map.asp?shop=38	1	1	0:00:06	0.00%	0.00%
/map.asp?shop=48	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=49	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=52	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=56	1	1	0:00:19	0.00%	0.00%
/map.asp?shop=6	1	1	0:00:02	0.00%	0.00%
/map.asp?shop=61	1	1	0:00:17	0.00%	0.00%
/map.asp?shop=64	1	1	0:03:43	0.00%	0.00%
/map.asp?shop=65	1	1	0:00:14	0.00%	0.00%
/map.asp?shop=67	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=68	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=71	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=87	1	1	0:00:00	0.00%	100.00%
/map.asp?shop=95	1	1	0:00:12	0.00%	0.00%
/map.asp?shop=97	1	1	0:00:35	0.00%	0.00%
/map.asp?shop=99	1	1	0:00:10	0.00%	0.00%
/shopdetail.asp?shop=111	1	1	0:00:04	0.00%	0.00%
/shopdetail.asp?shop=113	1	1	0:00:03	0.00%	0.00%
/shopdetail.asp?shop=122	1	1	0:00:04	0.00%	0.00%
/shopdetail.asp?shop=126	1	1	0:00:04	0.00%	0.00%
/shopdetail.asp?shop=127	1	1	0:00:03	0.00%	0.00%
/shopdetail.asp?shop=21	1	1	0:00:00	0.00%	100.00%
/shopdetail.asp?shop=27	1	1	0:00:09	0.00%	0.00%
/shopdetail.asp?shop=29	1	1	0:00:12	0.00%	0.00%
/shopdetail.asp?shop=30	1	1	0:00:20	0.00%	0.00%
/shopdetail.asp?shop=36	1	1	0:00:03	0.00%	0.00%
/shopdetail.asp?shop=48	1	1	0:00:07	0.00%	0.00%
/shopdetail.asp?shop=50	1	1	0:00:12	0.00%	0.00%
/shopdetail.asp?shop=52	1	1	0:00:36	0.00%	0.00%
/shopdetail.asp?shop=67	1	1	0:00:05	0.00%	0.00%
/shopdetail.asp?shop=68	1	1	0:00:04	0.00%	0.00%
/shopdetail.asp?shop=7	1	1	0:00:08	0.00%	0.00%
/shopdetail.asp?shop=71	1	1	0:00:03	0.00%	0.00%
/shopdetail.asp?shop=78	1	1	0:00:07	0.00%	0.00%
/shopdetail.asp?shop=87	1	1	0:00:11	0.00%	0.00%
/shopdetail.asp?shop=95	1	1	0:00:04	0.00%	0.00%
	949	636	0:00:21	20.62%	16.86%

/#5map	1	1	0:00:00	0.00%	100.00%
/#61map	1	1	0:02:02	0.00%	0.00%
/#62	1	1	0:00:01	0.00%	0.00%
/#62map	1	1	0:00:00	0.00%	100.00%
/#66	1	1	0:00:08	0.00%	0.00%
/#68map	1	1	0:00:00	0.00%	100.00%
/#69map	1	1	0:00:17	0.00%	0.00%
/#73	1	1	0:00:10	0.00%	0.00%
/#75map	1	1	0:00:08	0.00%	0.00%
/#78map	1	1	0:00:12	0.00%	0.00%
/#7map	1	1	0:00:11	0.00%	0.00%
/#8	1	1	0:00:05	0.00%	0.00%
/#82	1	1	0:00:14	0.00%	0.00%
/#83	1	1	0:00:06	0.00%	0.00%
/#90	1	1	0:00:01	0.00%	0.00%
/#92	1	1	0:00:11	0.00%	0.00%
/#92map	1	1	0:00:00	0.00%	100.00%
/#93map	1	1	0:01:25	0.00%	0.00%
/#94map	1	1	0:00:55	0.00%	0.00%
/#9map	1	1	0:03:36	0.00%	0.00%
/index.asp?q	1	1	0:00:23	0.00%	0.00%
/index.asp?q	1	1	0:00:15	0.00%	0.00%
/index.asp?q	1	1	0:00:07	0.00%	0.00%
/index.asp?q	1	1	0:00:12	0.00%	0.00%
/index.asp?q	1	1	0:00:05	0.00%	0.00%
/index.asp?q	1	1	0:00:06	0.00%	0.00%
/index.asp?q	1	1	0:00:10	0.00%	0.00%
	1,435	1,156	0:00:45	17.26%	15.75%