Keio University

Thesis Abstract

No.

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Title of Thesis:

Context-Dependent Corporate Analysis Methods Using Integrated Multi-Domain Semantic Space

This thesis proposes a new evaluation method and system implementation for companies and exchange-traded financial assets.

Companies are the source of economic value generation in the modern societies and stakeholders (investors, suppliers, employees, customers, regional residents, analysts, etc.) play important roles in economic activities. Stakeholders attempt to avoid risks and maximize profits and to that end evaluate companies at various stages of their engagements with the companies. Today, the useful information they have access to is limited thus an elaborate methodology and evaluation system is highly demanded that compensates stakeholders' insufficient capabilities to evaluate companies in a proper manner.

This thesis presents a numeric computational method that evaluates variety of companies according to the stakeholders' individual evaluation criteria. The computational method is realized by constructing a multidimensional semantic metric space that characterizes the entities, mapping each entity and a stakeholder's contextual needs in the space, and calculating the relevant semantic distances. It utilizes the Mathematical Model of Meaning as a semantic association mechanism in a multidimensional semantic metric space, define a stakeholder's evaluation criteria as a "context", and calculate the special distance within the subspace selected by the context. The methodology enables customized evaluation of entities by translating the stakeholder's context to defining a proper semantic subspace, thus allowing individualized evaluation unlike the currently available special purpose systems.

This thesis's evaluation methodologies apply to companies as well as exchange-traded financial assets and an investment return prediction model was demonstrated. States of an Exchange Traded Fund in time series was characterized to construct a multidimensional semantic metric space, the state of each instance in times series was mapped in the semantic space, current instance and historical instances were compared for similarities by semantic special distance calculations, and the instance of the highest similarities (shortest distance) is identified, and the very next instance of the discovered instance is taken as the predicted state for the immediate future from the current state. Manipulations of subspace selection caused different precision of the predictive capability of the model represented by the correlation between the actual return and the predicted return leading to improving the model. The use of historical data as actual "predicted" return values led to a discovery of a methodology for solving inverse problems of the Mathematical Model of Meaning. This thesis indicates that by specifying resulting value, the associated context can be found.

Keywords: Multidimensional Semantic Matric Space, Context-dependent, Corporate Evaluation, Stakeholders, The Mathematical Model of Meaning, Inverse Problem