Financial Time Series Prediction with Information Fusion

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Abstract

Our proposed prediction and learning method is a hybrid referred to as MKL-GA, which combines multiple kernel learning (MKL) for regression (MKR) and a genetic algorithm (GA) to construct the trading rules. In this study, we demonstrate that the evaluation criteria used to examine the effectiveness of a financial market price forecasting method should be the profit and profit-risk ratio, rather than errors in prediction. Thus, it is necessary to use a price prediction method and a trading rules learning method. We tested the proposed method on the foreign exchange market and stock market, and we tested MKR on crude oil market. The features used for prediction on FX market were extracted from the trading history of multiple markets and multiple time horizons, and the features used for prediction on stock market were from historical stock prices and volumes, as well as social network services (SNS). MKR is essential for utilizing the information contained in many of the features derived from different information sources and for various representations of the same information source. The GA is essential for generating trading rules, which are described using a mixture of discrete structures and continuous parameters. First, the MKR predicts the change in the FX market or stock market based on technical indicators such as the moving average convergence and divergence (MACD). Next, the GA generates a trading rule by combining the results of the MKR with several commonly used overbought/oversold technical indicators. For simulation, we show the application of MKL-GA on FX market and stock market, as well as application of MKL on two well-known crude oil markets. The experimental results show that the proposed method outperforms other benchmark methods in terms of the price prediction, returns and return-risk ratio.

Keywords: Financial Prediction, Multiple Kernel Learning, Genetic Algorithm, Hybrid Method