Information Fusion 65 (2021) 95–107

Contents lists available at ScienceDirect

Information Fusion

journal homepage: www.elsevier.com/locate/inffus

Full length article

Fusion in stock market prediction: A decade survey on the necessity, recent developments, and potential future directions

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ARTICLE INFO

Keywords:
Stock market prediction
Information fusion
Feature fusion
Model fusion
Machine learning
Deep learning

ABSTRACT

Investment in a financial market is aimed at getting higher benefits; this complex market is influenced by a large number of events wherein the prediction of future market dynamics is challenging. The investors' etiquettes towards stock market may demand the need of studying various associated factors and extract the useful information for reliable forecasting. Fusion can be considered as an approach to integrate data or characteristics, in general, and enhance the prediction based on the combinational approach that can aid each other. We conduct a systematic approach to present a survey for the years 2011–2020 by considering articles that have used fusion techniques for various stock market applications and broadly categorize them into information fusion, feature fusion, and model fusion. The major applications of stock market include stock price and trend prediction, risk analysis and return forecasting, index prediction, as well as portfolio management. We also provide an infographic overview of fusion in stock market prediction and extend our survey for other finely addressed financial prediction problems. Based on our surveyed articles, we provide potential future directions and concluding remarks on the significance of applying fusion in stock market.

1. Introduction

The financial market is an attractive field of study; it offers a variety of opportunities to investors, market analysts, as well as researchers from various disciplines. The market participation perspectives may differ among individuals, for example, learning the market behaviours, deriving influential aspects, trading through stocks, predicting future market trend, recommending assets for portfolio management, etc., however, the lack of financial literacy and knowledge of fundamental economic principles can critically affect the investment returns [1]. Therefore, an individual's understanding and approach towards a financial market can determine the type as well as extent of information required to study this domain. The economic market can be considered as a combination of financial investments, transactions, potential earning and/or losing, and several other actions that are performed at a massive level. It has extensively reached to a large number of fields and consequently, it also gets affected by numerous events; with this regard, the financial market can be interpreted as a model of complex systems [2].

In financial markets, various instruments such as stocks, bonds, commodities, derivatives, currencies, etc. are explored, investigated, studied, and traded in an exhaustive manner; such trading is based on buying and selling of instruments. Stock market is a financial market where the new issues of stocks, i.e., initial public offerings (IPOs), are created and sold at the primary market whereas the succeeding buying and selling are carried out at the secondary market [3]. The primary motivation behind investing in a stock market is to gain potential benefits of the investment [4]; while careful tradings can earn higher returns, the associated risk may sometimes result into loss of valuables. Such markets are non-linear, highly volatile, and chaotic in nature; they can get influenced by various events and hence, experience fluctuations. Therefore, it raises the demand of market valuation and several analytical evaluation to study the market behaviours. Based on the knowledge and expertise of stock market, a fundamental analysis can be carried out by examining the dominating factors to primarily derive long-term predictions whereas using the historical stock price data, derived information can be integrated for a technical analysis [5]; such characteristics can be fused using different strategies to prepare a reliable forecasting model [6].

Fusion can be considered as a transformation of single or multiple aspects with an aim to derive effective representation; it can be understood as the process of combining various factors that can improve the performance and provide useful results. The diversity of data, features, methods, parameters, etc. play a vital role in exploring as well as exploiting its environment; such information can be fused with each other to get performance benefits. While data fusion is the

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https://doi.org/10.1016/j.inffus.2020.08.019
Received 10 June 2020; Received in revised form 27 July 2020; Accepted 20 August 2020
Available online 26 August 2020