

## Chapter 6

# Predicting Stock Price Movement from Financial News Articles

**Robert P. Schumaker**  
*Cleveland State University, USA*

**Hsinchun Chen**  
*University of Arizona, USA*

### ABSTRACT

*The ability to predict stock market movement has been a source of interest for many researchers. While numerous scientific attempts have been made, no single method has yet been discovered to accurately predict stock price movement. Difficulty in prediction comes from the complexities associated with market dynamics where parameters are constantly shifting and not fully defined.*

*One area of limited success in stock market prediction comes from textual data. Not all data begins first as quantitative data and ratios. Information from quarterly reports or breaking news stories, which can dramatically affect the share price of a security, begin as qualitative data and must be translated to numeric form before many computational systems can process it. This information lag could be capitalized on by applying computational methods to the textual data and forms the basis of financial text mining. Most existing literature on financial text mining applies a representational technique to news articles where only certain terms are used, and weights are assigned to the terms based on the direction the stock price moves. Prediction then applies these weighted terms to a new article to determine a likely direction of movement. To their credit, these simpler forms of analyses have shown a weak but definite ability to predict price direction but not the price itself.*

*However, using computational approaches to predict stock prices using financial data is not unique. In recent years, interest has increased in Quantitative funds, or Quants, that automatically sift through numeric financial data and issue stock recommendations. While these systems are based on proprietary technology, they do differ in the amount of trading control they have, ranging from simple stock recommenders to trade executors.*

DOI: 10.4018/978-1-61350-162-7.ch006

*Using historical market data and complex mathematical models, these methods are constrained to make assessments within the scope of existing information. This weakness means that they are unable to react to unexpected events falling outside of historical norms. However, this disadvantage has not stopped fund managers at Federated, Janus, Schwab, and Vanguard from trusting billions of dollars of assets to the decisions of these computational systems.*

## INTRODUCTION

In this chapter, we introduce a different type of quant trader called AZFinText (Arizona Financial Text system), which focuses on making discrete numeric predictions based on the combination of financial news articles and stock price quotes. Our contribution rests on system building of the AZFinText system where trends and patterns are machine learned from stock quotes and textual financial news. While prior textual financial research has relied on tracking price direction alone, AZFinText leverages statistical learning to generate numeric price predictions and then make trading decisions from them. We further demonstrate that AZFinText outperforms the market average and performs well against existing quant funds.

We also continue further and investigate the roles that different linguistic representations can have on prediction, such as bag of words, noun phrases, proper nouns and named entities. Some representations, namely bag of words, have been the de facto representational technique in financial news analysis. From our work, we show that this representation actually performs the worst.

Our chapter builds upon the previously proven AZFinText system and explores the many branches of research that have been recently conducted using this platform. We feel that this topic is current and relevant and neatly blends together the finance and information systems sectors in an interesting way.

Predicting changes in the stock market has always had a certain appeal to researchers. While numerous attempts have been made (Chan et al., 1996; Cho et al., 1999; Gidofalvi, 2001; Mittermayer, 2004; Seo et al., 2002; Wuthrich et al., 1998; Yoon & Swales, 1991), the difficulty has

always centered on the behaviors of human traders within a socially constructed system. With parameters ill-defined and constantly shifting, prediction has been difficult at best. To further create confusion, there have been two diametrically opposed philosophies of stock market research: fundamental and technical analysis techniques (Technical-Analysis, 2005). Fundamental analysis leverages the security's relative data, ratios and earnings, while technical analysis utilizes charts and modeling techniques based on historic trading volume and prices. The main difference between them becomes *can the market be timed or not?*

Regardless of the technique used, both strategies rely on information. This desire for information is changing the way brokerage houses and securities analysts are approaching securities trading (Baldwin & Rice, 1997). With the advent of cheaper processing and knowledge acquisition techniques, the roles of computers in stock prediction has increased dramatically, where they have become mostly automated versions of existing fundamental and/or technical strategies. The goal of these systems is to achieve better returns than their human counterparts by removing the elements of emotions and biases from trading (Jelveh, 2006). The drawback is that these systems lack intuition, context and exterior channels of information where they have been known to continue buying battered stocks even after unfavorable news events, such as losing a costly court battle. These systems rely on news events to be translated into numeric data before appropriate decisions can be made. This information transcription problem introduces serious lag-time into decisions and in some cases, trades must be overridden by human analysts.

31 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:  
[www.igi-global.com/chapter/predicting-stock-price-movement-financial/61440](http://www.igi-global.com/chapter/predicting-stock-price-movement-financial/61440)

## Related Content

---

### Crypto-Currency: Future of FinTech

S. Iqbal, Muzammil Hussain, Muhammad Umar Munir, Zunair Hussain, Sobia Mehrban, Muhammad Adeel Ashraf and Salah-u-din Ayubi (2019). *FinTech as a Disruptive Technology for Financial Institutions* (pp. 1-13).

[www.irma-international.org/chapter/crypto-currency/221588](http://www.irma-international.org/chapter/crypto-currency/221588)

### Tax Avoidance and Transfer Pricing: Evidence From Greece – Transfer Price Manipulation and Earnings Management

Nikolaos Eriotis, Spyros Missiakoulis, Ioannis Dokas, Marios Tzavaras and Dimitrios Vasiliou (2021). *International Journal of Corporate Finance and Accounting* (pp. 28-39).

[www.irma-international.org/article/tax-avoidance-and-transfer-pricing/285970](http://www.irma-international.org/article/tax-avoidance-and-transfer-pricing/285970)

### Fintech Challenges and Outlook in India

Neeta Baporikar (2021). *Innovative Strategies for Implementing FinTech in Banking* (pp. 136-153).

[www.irma-international.org/chapter/fintech-challenges-and-outlook-in-india/260367](http://www.irma-international.org/chapter/fintech-challenges-and-outlook-in-india/260367)

### Effective Approaches in Higher Education Development: A Survey in Fundraising Best Practices

Andrew Aaron Shafer (2016). *Facilitating Higher Education Growth through Fundraising and Philanthropy* (pp. 206-227).

[www.irma-international.org/chapter/effective-approaches-in-higher-education-development/141831](http://www.irma-international.org/chapter/effective-approaches-in-higher-education-development/141831)

### Volatility Transmission Between ASEAN-5 Stock Exchanges: An Approach in the Context of China's Stock Market Crash

Rui Manuel Dias, Nuno Teixeira, Pedro Pardal and Teresa Godinho (2023). *International Journal of Corporate Finance and Accounting* (pp. 1-17).

[www.irma-international.org/article/volatility-transmission-between-asean-5-stock-exchanges/319711](http://www.irma-international.org/article/volatility-transmission-between-asean-5-stock-exchanges/319711)