

Chapter 10

Recent Advances of Exception Mining in Stock Market

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ABSTRACT

This chapter aims to provide a comprehensive survey of the current advanced technologies of exception mining in stock market. The stock market surveillance is to identify market anomalies so as to provide a fair and efficient trading platform. The technologies of market surveillance developed from simple statistical rules to more advanced technologies, such as data mining and artificial intelligent. This chapter provides the basic concepts of exception mining in stock market. Then the recent advances of exception mining in this domain are presented and the key issues are discussed. The advantages and disadvantages of the advanced technologies are analyzed. Furthermore, our model of OMM (Outlier Mining on Multiple time series) is introduced. Finally, this chapter points out the future research directions and related issues in reality.

INTRODUCTION

Stock market is a place where buyer and seller trade for company stock and derivatives. It has become

an important part of the economic activities all over the world. The transaction volume of stocks keeps increasing significantly all the time. However, there are some illegal behaviors which impair the development of stock market, and some people try to maximize their profit by breaking the rules of stock

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markets, even breaking relevant laws. The above illegal behaviors are referred to as market abuse, anomalies or exceptions in stock markets.

Stock market surveillance is responsible for the detection of illegal behaviors in stock markets. The technologies play important roles in effective market surveillance. With the development of stock market, the technologies of market surveillance have evolved from simple rule based approaches to advanced approaches based on artificial intelligence and data mining. In particular, the researches on how to effectively utilize the advanced technologies for the task of surveillance have been developed in most stock exchanges. These researches can be summarized as exception mining in stock markets.

In this chapter, we will present a comprehensive literature review on the recent advances of exception mining in stock markets. Various approaches are currently being used for the detection of exceptions by researchers all over the world. For example, outlier mining technologies have been researched and utilized in some exchanges. Most of the publications in this area focus on the specific technologies. So it is necessary to summarize the current advances of exceptions mining in stock markets. By doing so, we expect to provide a clear picture of the technologies utilized in this area. We hope it can provide guidance to professionals and researchers in this area to find the appropriate solutions for their own purposes.

The rest of this chapter is organized as follows. Section 2 will introduce the related background of stock market and stock surveillance. Some important concepts and issues, such as the concept of insider trading and market manipulation, will be described and illustrated with real-life examples. Section 3 will discuss recent technologies for stock market surveillance, such as rule-based approaches, statistic methods, outlier detection technologies, etc. The technologies will be analyzed and compared, and their strength and weakness will be pointed out. A detailed introduction of

our current research, outlier mining on multiple time series, will be given in Section 4. Section 5 will discuss some future research directions in exception mining in stock market. The chapter will be concluded in the last section.

BACKGROUND OF STOCK MARKET AND STOCK SURVEILLANCE

Stock Market

Stock market is the platform where the buyer and seller trade for stock and its derivatives (Cheng 2006, Allen 1992, Lucas 1993). It is one of the most important sources for companies to raise money (Jain 2005). The business is able to be traded publicly in the form of stock. The accumulation of additional capital makes companies expansion by selling shares of ownership of the company in a public market. In addition, exchanges provide the liquidity which affords investors the ability to quickly and easily sell securities (Charest 1978). Stock market has become an important part of the dynamics of economic activity. Nowadays it has become an indicator of economy and can influence the social mood. For example, when the stock market is on the rise, the economy is considered to be positive; otherwise, the economy is regarded as upsetting. Therefore, the stock market is regarded as the primary indicator of a country's economic strength and development (Jain 2005).

The stocks are listed and traded on stock exchanges. Exchanges act as the clearinghouse for each transaction in stock markets (John & Narayanan 1997). They guarantee payment to the seller of a security by collecting and delivering the shares. The risks for buyers or sellers are expected to be eliminated or controlled to some extent. Exchanges also take the responsibilities of regulations of stock markets (Bettis et al. 1998). They have the duty to provide fair and transparent platform for all participants.

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