


Chapter 8

Enhancing Stock Market Analytics in Real Time With Apache Kafka

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ABSTRACT

Modern structure of financial system relies strongly on live trend of stock-market price and the real-time deviations of values that enriches a healthy competition and instant decision-making capability in a fast-moving market environment. Due to the inherent dynamic properties of big data, it becomes challenging for typical data-mining tools, technologies, methods and techniques to be applied on big-data streaming task. The significant resistance faced by real time streaming of big data involves lack of adaptability, controllability and programmability. Apache kafka is one of the best frameworks to work with for resolving real time data streaming tasks for its unique characteristics of being reliable, distributed and having high through-

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put and low latency. The essential features of kafka are thoroughly summarized in this abstract which empowers market regulators to manage and analyze stock value movement in a real-time manner to cop up with momentary changes.

1. INTRODUCTION

In this modern era of fast-paced and internally connected global economy system, the stock market serves as a crucial indicator of the health of the economy, a haven for investors, and a field of combat for traders. In 2020, the global stock market capitalization reached an astounding \$95.2 trillion, underlining the critical role of real-time data in this vast ecosystem. According to a survey, over 85% of financial institutions and stock market experts believe that real-time data of heavy volume is essential for making wise investment decisions and controlling risk. The global data flood has astronomical hit to every dimension for an estimated production of 2.5 quintillion bytes in each day. Conventional methods are now on the way of getting obsolete and also, not sufficient to address the real-time analytical needs of businesses and industries in this data-driven world. Nearly 76% of firms, according to a recent poll, view real-time data analytics and business insights as essential for their production & operations, highlighting the severe need of developing effective solutions in this area. Real-time data streaming has its own set of difficulties. Tools and procedures that can ingest, process, and analyze data as it flows are required due to the continuous and limitless nature of data arrival. Traditional databases and batch processing methods fail in this modern complex requirement for the financial market analysis, resulting in delays in the availability of data and useful insights. The ability to make informed decisions instantly in the stock market can often make the great difference between financial profit and loss. To gain an edge in this highly competitive arena, market participants need easy access to real-time data that is not only reliable but also efficiently processed and effectively analyzed. This is where Apache Kafka, a powerful and innovative data streaming platform, emerges a new direction to a transformative solution.

This research paper delves deep for the architecture, application cases, and actual implementation of real-time stock market data streaming analysis using Apache Kafka. Through empirical studies, this article aims to shed light on how Kafka has altered the landscape of real-time data analytics, providing organizations and individuals with a potent instrument to navigate the data-driven future business scenarios through a thorough analysis for navigating around the complex and volatile world of financial market. Moreover, Kafka is integrated with Spark in this project for the real-time analytics based on the application of structured streaming API technique. From statistical point of view, stock market data calculation matrix is based on rolling or

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