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A Model for the Analytical Performance of Data Lake in Stock Market Analysis with Databricks Delta Lake

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Abstract:

Stock market investments are highly rewarding but also high in risk. Modern investors use variety of tools to take informed investment decisions. In the current era of digital world, financial service industry has generated huge volume and immense verities of data with extreme speed. Due to the rapid growth in data collection and the heterogeneous nature and complexity of the data, there is a need for Big Data analytical solution that would be able to deal with the stock market data. Large volumes of unstructured, heterogeneous raw data can be stored in a massively scalable manner using data lakes, which are the ideal solution to the big data storage conundrum. The ability of a data lake to preserve data in its original format while processing it at runtime using a schema on-read technique is its key feature. The challenge faced in the data lake is performing analytics which is a significant tool to calculate and analyze the stock market. The proposed architecture of Azure Databricks DeltaLake (ADDL) with Azure DataLake Storage Generation 2 (ADLSG2) is used for analytical processes like Fibonacci retracement for better stock analysis, which aid in forecasting the market price for better investment. As a result, the research focus is to produce a storage having read as well as write capabilities by taking into consideration the Extract-Load-Transform (ELT) operation on the datasource. In this experimental databricks implementation, runtime is performed using open source of Apache Spark API and a highly improved execution engine, which results in a significant performance improvement when comparing to the



standard source of Apache Spark available on the ADLS platform. Additionally, the Fibonacci retracement level calculation is achieved with the analytics and forecasting of test close price with various ML and DL techniques such as KNN, LSTM are compared with original price of the test data for better prediction of forecast close price.

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I. Introduction

Investing in stocks involves taking risk. Modern investors rely on a variety of tools to make judgments. Apart from fundamental analysis, technical analysis that employs several tools for a detailed assessment of developments in Stock market and predicts the future trends and fluctuations in price is becoming increasingly popular. A trend is the general pattern of the price of a market or an asset. Trend does not move in a straight line. We can understand the market trend by looking at longer-term pricing trends. A stock is said to be in an 'Uptrend' when the direction of the price movement is upwards. An easy way to identify an 'Uptrend' is to see if the stock is going above its previous high and not falling below its previous low. A stock is said to be in a 'Downtrend' when the direction of the price movement is downwards. An easy way to identify a stock in 'Downtrend' is to see if the stock goes down, rises, and then goes below its previous low. The finance services business has amassed vast amounts of data at rapid speed, creating the fresh crop of data analytical instances known as Big Data Analytics (BDA). Customer demand for data computing as well as increase in growth of data volume ultimately result in the emergence of big data concept [1], [2]. The evolution of the big data concept may be influenced by data volume [1], [2]. Big data is defined by six characteristics: volume, variability, velocity, veracity, value, and variety [3]. A data lake is also intended to enable the capability to reliably do analytics, batch processing, and real-time analysis on enormous volume of data. [4]–[6]. This is accomplished by uniting the advantages of SQL and NoSQL database approaches and supplementing them with OLTP and OLAP capabilities. All the data components of data lake are identified by a unique ID as well as frequently include more metadata.

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