

**MASINDE MULIRO UNIVERSITY OF SCIENCE OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF COMPUTING AND INFORMATICS**

**DEPARTMENT OF COMPUTER SCIENCE**

**BACHELOR OF SCIENCE IN COMPUTER SCIENCE**

**PROJECT PROPOSAL**

**BCS 326: COMPUTER SCIENCE PROJECT 1**

**REG NO: COM/B/01-00177/2021**

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**TITLE:**

**EXPLORING TESLA’S STOCK DYNAMICS AND CONSTRUCTING PREDICTIVE MODELS**

**ABSTRACT**

This proposal outlines a comprehensive approach to analyse historical stock prices of TESLA, employing data analytics, visualization, and predictive modelling techniques. By leveraging machine learning algorithms and fundamental analysis, the project aims to provide stakeholders with valuable insights for strategic investment decisions.

**INTRODUCTION**

Tesla holds a significant position in the global automotive and energy markets, making it imperative to understand its stock behaviour for informed decision-making. This study proposes an in-depth analysis of Tesla's historical stock prices, utilizing advanced analytics techniques to forecast future trends and evaluate its financial health.

**PROBLEM DEFINITION**

While traditional methods exist for analysing stock prices, they often lack the predictive power required for effective decision-making. The proposed solution aims to overcome this limitation by employing machine learning models to predict Tesla's stock prices accurately, addressing the need for robust forecasting mechanisms in the financial sector.

**OBJECTIVES**

**General Objective:** To analyse Tesla's historical stock prices and develop predictive models for informed investment decisions.

**Specific Objectives:**

Collect and preprocess historical stock price data of Tesla.

Utilize exploratory data analysis to identify trends and patterns in the data.

Develop machine learning models for predicting future stock prices.

Evaluate Tesla's financial health through fundamental analysis.

Provide strategic investment recommendations based on the findings.

**PROBLEM JUSTIFICATION**

The automation of stock price analysis through predictive modelling offers several advantages over traditional methods, including enhanced accuracy and efficiency. By automating the process, stakeholders can make timely and informed investment decisions, mitigating risks and maximizing returns in the volatile stock market environment.

**LITERATURE**

Existing literature highlights the importance of accurate stock price prediction for effective investment strategies. However, traditional methods often face challenges in capturing the complexities of market dynamics. The proposed approach aims to address these limitations by integrating machine learning techniques with fundamental analysis, offering a more comprehensive understanding of Tesla's stock behaviour.

**METHODOLOGY**

**System Requirements:**

**Data Acquisition:**

The system should be able to retrieve historical stock price data from external sources such as financial data providers.

It should ensure the accuracy and completeness of the acquired data.

**Data Preprocessing:**

The system should preprocess the acquired data to handle missing values, outliers, and inconsistencies.

It should perform data cleaning, normalization, and feature engineering to prepare the data for analysis.

**Model Development:**

The system should support the development and training of machine learning models for stock price prediction.

It should provide functionality for model evaluation and selection based on performance metrics.

**Visualization:**

The system should enable interactive visualization of stock price movements and key financial metrics.

It should support the creation of dynamic dashboards for stakeholders to explore and analyse the data.

**Functional Requirements:**

**Data Collection:**

The system should collect historical stock price data for Tesla from the desired timeframe.

It should retrieve data for relevant financial metrics such as open price, close price, high price, low price, and trading volume.

**Exploratory Data Analysis (EDA):**

The system should perform exploratory data analysis to identify trends, patterns, and anomalies in the data.

It should generate descriptive statistics, histograms, box plots, and time series plots for visualization.

**Model Development:**

The system should implement machine learning algorithms suitable for stock price prediction.

It should split the data into training and testing sets for model training and evaluation.

**Fundamental Analysis:**

The system should calculate key financial metrics for Tesla such as revenue, profit margin, and debt-to-equity ratio.

It should assess market trends and industry outlook to evaluate the company's financial health and growth prospects.

**Non-functional Requirements:**

**Performance:**

The system should be capable of handling large volumes of data efficiently and processing tasks within reasonable time frames.

It should provide real-time or near-real-time insights to support timely decision-making.

**Accuracy:**

The system's predictive models should demonstrate high accuracy and reliability in forecasting Tesla's stock prices.

It should minimize errors and uncertainties in prediction results to ensure the trustworthiness of the insights generated.

**Scalability:**

The system should be scalable to accommodate future growth in data volume and user demand.

It should support the addition of new features or functionalities without compromising performance.

**Usability:**

The system should have an intuitive user interface that is easy to navigate and understand.

It should provide clear instructions and guidance for users to interact with the data and interpret the results effectively.

**PROJECT SCHEDULE**

**Project Initiation (Week 1):**

Define project scope, objectives, and deliverables

Identify key stakeholders and establish communication channels

Set up project management tools and repositories

**Data Collection and Preprocessing (Week 2):**

Collect historical stock price data from Wall Street Journal or other sources

Preprocess the data to handle missing values, outliers, and inconsistencies

Perform data cleaning, normalization, and feature engineering as necessary

**Exploratory Data Analysis (Week 3)**

Conduct exploratory data analysis (EDA) using Python libraries (e.g., Pandas, Matplotlib)

Identify trends, patterns, and anomalies in the data

Visualize stock price movements and key financial metrics using PowerBI or other tools

**Model Development (Week 4-5)**

Develop machine learning models for stock price prediction (e.g., Linear Regression, ARIMA)

Train and fine-tune the models using historical data

Evaluate model performance using appropriate metrics (e.g., RMSE, MAE)

**Fundamental Analysis (Week 6)**

Conduct fundamental analysis of TESLA financial health and growth prospects

Evaluate key financial metrics (e.g., revenue, profit margin, debt-to-equity ratio)

Assess market trends and industry outlook for strategic insights

**Integration and Testing (Week 7-8)**

Integrate predictive models and fundamental analysis findings into a cohesive framework

Conduct system testing to ensure accuracy, reliability, and scalability

Validate the models against out-of-sample data to assess real-world performance

**Documentation and Reporting (Week 9)**

Prepare project documentation including code documentation, technical reports, and user manuals

Generate insights and recommendations based on the analysis and findings

Present findings to stakeholders and solicit feedback for further refinement

**Project Closure (Week 10)**

Conduct a project review to assess achievements, challenges, and lessons learned

Archive project artifacts and deliverables for future reference

Celebrate project success and acknowledge contributions from team members

**BUDGET**

**Data Acquisition:**

Subscription to financial data provider: Kaggle - Free

**Software and Tools:**

Python environment setup (Anaconda distribution): Free

Data visualization tools: PowerBI license – Kshs. 1,000 per user per month