

## **Abstract**

This study explores the application of machine learning models for predicting the closing stock price of Apple Inc. over an 11-year period from 2012 to 2023. The primary objective is to develop accurate predictive models using historical stock price data. Four machine learning models, including Long Short-Term Memory (LSTM), Convolutional Neural Network (CNN), Random Forest Regressor, and Support Vector Regression (SVR), are evaluated for their performance in this scenario.

The choice of these models is based on their suitability for time series forecasting tasks and their ability to capture complex relationships in the data. LSTM models are particularly well-suited for sequential data like stock prices, as they can effectively learn temporal dependencies. CNN models, although primarily used for image processing, can also be adapted for sequential data with appropriate data transformations. Random Forest models are versatile and robust, capable of handling non-linear relationships and high-dimensional data. SVR models, while sensitive to parameter tuning, offer the potential for capturing non-linear relationships in the data.

Prior to modeling, exploratory data analysis (EDA) was conducted on the stock prices of four technology companies: Apple, Google, Microsoft, and Amazon. This comprehensive analysis allowed for the assessment of data quality, identification of trends and patterns, and exploration of relationships between stocks. EDA is crucial for ensuring the suitability and reliability of the data for modeling purposes.

By training and evaluating multiple machine learning models on Apple's stock price data, this study aims to provide valuable insights for investors and financial analysts, aiding in informed decision-making and potentially enhancing investment strategies.

Overall, this research contributes to the growing body of literature on the application of machine learning in financial markets, demonstrating the potential for leveraging advanced techniques to predict stock prices with accuracy and reliability.