# LSTM Stock Price Prediction Project Report

## Introduction

This report details an LSTM-based model developed to predict stock prices. The goal of this project is to leverage deep learning techniques, particularly Long Short-Term Memory (LSTM) networks, to forecast the future prices of various tech stocks based on historical data. This approach is significant in the field of financial analysis, providing insights that potentially aid in investment decisions.

## Data Description

The dataset consists of historical stock prices for major technology companies including Apple, Google, Microsoft, Amazon, and Tesla. The data covers a span of one year and was sourced from Yahoo Finance via the yfinance API. The dataset includes daily stock prices such as open, close, high, and low prices, along with trading volume.

## Methodology

The methodology section outlines the steps taken from data preprocessing to model building and training. Initially, the data is cleaned and preprocessed to handle any inconsistencies or missing values. The stock prices are normalized to aid in the training of the LSTM model. The LSTM network is configured with multiple layers and neurons to learn dependencies in stock price movements effectively.

The model is trained using historical price data, employing techniques such as backpropagation through time and minimizing a loss function, typically Mean Squared Error (MSE), across several epochs.

## Model Performance

Model performance is evaluated based on its accuracy and the ability to predict future stock prices. Key metrics such as Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) are calculated to quantify the model's predictions. Charts and graphs comparing the predicted values against the actual stock prices are presented to visually assess the model’s effectiveness.

## Conclusions and Future Work

The LSTM model demonstrates a significant capability to capture and predict stock price movements, though with some limitations in handling sudden market changes. Future improvements could include integrating more diverse data sources, refining the LSTM architecture, and employing techniques like dropout or regularization to enhance model performance. Further research could also explore hybrid models that combine LSTM with other predictive techniques to improve accuracy.

## Appendices and References

This section includes code snippets used throughout the project, documented in the accompanying Jupyter notebook. References to the yfinance library and other utilized tools are also provided to facilitate further exploration and replication of the project.