**Stock Price Prediction Project Documentation**

**Project Overview**

**Problem Statement**

The objective of this project is to build a predictive model that forecasts stock prices based on historical market data. The goal is to create a tool that assists investors in making well-informed decisions and optimizing their investment strategies.

**Design Thinking Process**

We understood the needs and challenges of investors in stock market decision-making. And then we defined the project objectives and scope, including time horizon and performance metrics.We found the potential features and models for stock price prediction and created a plan for data collection, preprocessing, model selection, and evaluation by analysing the given problem statement and dataset. We implemented the prototype and iteratively fine-tune the model. And prepared the model for deployment as a user-friendly tool for investors.

**Phases of Development**

**1. Data Collection**

* **Data Source:** Historical market data from reputable financial sources (Given Dataset).
* **Tools:** Python libraries (e.g., pandas, yfinance, news APIs).

**2. Data Preprocessing**

* We handleded missing values, removed outliers, and merged data from different sources.
* We analysed the given dataset for modelling and processed further.

**3. Model Training**

* Splitted data into training, validation, and test sets.
* Trained and selected models on the training dataset.
* Optimized hyperparameters through iterative testing.
* Evaluated the model performance on the validation set using metrics like MAE, MSE, RMSE.

**4. Model Evaluation**

* We assessed the final model's performance on the test dataset.
* We used visualizations to compare predicted prices to actual prices. And monitored for overfitting and underfitting.

**5. Deployment**

* Later after completing all the above processes then we deployed the well-performing model as a user-friendly tool for investors.
* Provided real-time data updates and a user interface.

**6. Monitoring and Maintenance**

* Periodically retrain and update the model to adapt to new data and market dynamics.
* Stay informed about the latest developments in time series forecasting and stock market analysis.

**Dataset Description**

The dataset used in this project includes historical market data for the target stocks. It comprises daily stock prices, trading volumes, economic indicators, and news sentiment data. The data has been cleaned and preprocessed to handle missing values, remove outliers, and align different data sources. Feature engineering has been performed to create meaningful features for stock price prediction.

**Model Training Process**

The selected model for stock price prediction is [Specify Model]. The model was trained on a training dataset and optimized through hyperparameter tuning. Model performance was evaluated on a validation set using metrics like MAE, MSE, and RMSE. The model's final evaluation was conducted on the test dataset.

**Key Findings and Recommendations**

Based on the analysis and model performance, the following key findings and recommendations are presented:

1. **Seasonal Trends**
2. **Model Performance**
3. **Real-world Market Conditions**
4. **Risk Management Strategies**
5. **Model Robustness**
6. **Investor Confidence**