Title: Predicting Financial Market Movements with AI and Machine Learning

Project Proposal

Introduction:

Financial markets are dynamic and complex, and predicting their movements is a challenging yet intriguing endeavor. This project aims to harness the power of artificial intelligence (AI) and machine learning (ML) to forecast the next candlestick pattern in live financial markets. Candlestick patterns are valuable indicators used by traders to make informed decisions about buying or selling assets. Through the application of advanced algorithms and mathematical models, we will explore the potential of AI in predicting these patterns, thereby providing valuable insights to traders in the form of suggested indications of future stock price directions.

Objectives:

1. Develop an algorithmic trading system that predicts the next candlestick pattern in live financial markets.
2. Convert historical stock market data into candlestick charts for analysis.
3. Implement machine learning models, including Random Forest, LightGBM, and CatBoost, for prediction.
4. Utilize deep learning techniques, specifically LSTM, to analyze patterns within candlestick charts.
5. Evaluate the effectiveness of the developed model on the Istanbul stock market dataset.

Methodology:

Data Acquisition and Preprocessing:

- Collect historical stock market data, including open, close, high, and low prices.
- Convert this data into candlestick charts, a visual representation of price movements over time.

Feature Engineering:

- Extract relevant features from the candlestick charts, such as patterns, trends, and technical indicators.

Machine Learning Models:

- Implement machine learning models, including Random Forest, LightGBM, and CatBoost, using ScikitLearn.
- Train these models on historical data to predict the next candlestick pattern.

Deep Learning with LSTM :

- Convert candlestick chart images into a suitable format for deep learning.

- Design and train LSTM Neural Network models using TensorFlow and PyTorch.
- These LSTM models will learn to recognize and interpret patterns within candlestick charts.

Model Evaluation:

- Assess the performance of each machine learning and deep learning model.
- Evaluate the accuracy, precision, recall, and F1-score of predictions.
- Measure the model's ability to provide suggested indications of future stock price direction.

Dataset:

The project will utilize the Istanbul stock market dataset, which contains historical financial market data. This dataset will serve as the foundation for model training and evaluation.

Deliverables:

- A functioning algorithmic trading system capable of predicting the next candlestick pattern.
- Implementation of machine learning models (Random Forest, LightGBM, CatBoost) for prediction.
- Design and training of LSTM models.
- Evaluation results and performance metrics.
- Documentation and codebase for future reference.

Conclusion:

This project aims to showcase the potential of AI and ML in predicting financial market movements through the analysis of candlestick patterns. By employing a combination of machine learning algorithms and deep learning techniques, we aim to provide valuable decision support for traders. The evaluation on the Istanbul stock market dataset will allow us to gauge the effectiveness of your models in real-world financial market prediction scenarios. Ultimately, the project will equip undergraduate students with hands-on experience in AI, ML, and deep learning, preparing them for careers in finance and data science.

a. Machine learning models that will be used

1. Random Forest

2. LightGBM

3. LSTM

4. CatBoost

b. Indicators that will be used.

1. EMA 5

2. EMA 8

3. EMA 9

4. EMA 13

5. EMA 50

6. EMA 200

7. SMA 5

8. SMA 8

9. SMA 9

10.SMA 13

11.SMA 50

12.SMA 200

13.MFI (Money Flow Index)

14.MACD

15.Volume

16.RSI

17.Ichimoku

18.ADX

19.Bollinger

c. Stock prices that will be predicted (BIST-100 list)

AEFES

AGHOL

AKBNK

AKFGY

AKSA

AKSEN

ALARK

ALBRK

ALGYO

ALKIM

ARCLK

ASELS

AYDEM

BAGFS

BASGZ

BERA

BIMAS

BRYAT

BUCIM

CCOLA

CEMTS

CIMSA

DEVA

DOAS

DOHOL

ECILC

EGEEN

EKGYO

ENJSA

ENKAI

ERBOS

EREGL

FROTO

GARAN

GENIL

GESAN

GLYHO

GOZDE

GSDHO

GUBRF

GWIND

HALKB

HEKTS

IPEKE

ISCTR

ISDMR

ISFIN

ISGYO

ISMEN

JANTS

KARSN

KARTN

KCHOL

KONTR

KORDS

KOZAA

KOZAL

KRDMD

LOGO

MAVI

MGROS

NTHOL

NUGYO

ODAS

OTKAR

OYAKC

PETKM

PGSUS

PRKAB

PSGYO

QUAGR

SAHOL

SASA

SELEC

SISE

SKBNK

SMRTG

SNGYO

SOKM

TAVHL

TCELL

THYAO

TKFEN

TMSN

TOASO

TRGYO

TSKB

TSPOR

TTKOM

TTRAK

TUKAS

TUPRS

TURSG

ULKER

VAKBN

VESBE

VESTL

YATAS

YKBNK

YYLGD