Alpha Strategy: Trend Detection and Trade Strategy Builder

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December 17, 2024

1 Introduction

The Alpha Strategy is designed to develop a trading strategy using historical price data to detect trends and build a robust trade model. The primary objective is to use a machine learning-based model, specifically Long Short-Term Memory (LSTM) networks, to predict future price movements, maximize alpha, and calculate performance metrics such as the Sharpe Ratio.

2 Strategy Overview

The trading strategy involves predicting the percentage change in the price of a given instrument (e.g., stock, cryptocurrency) based on historical price data, including the open, high, low, close prices, percentage change, and trading volume. The model is trained on a dataset that includes these features, and predictions are used to generate buy or sell signals.

2.1 Key Components

- **Data Preprocessing:** Data is cleaned, scaled using MinMaxScaler, and structured into sequences for LSTM-based training.

- **Model Architecture:** A sequential model with two LSTM layers followed by dense layers for output prediction.

- **Backtesting:** Once trained, the model is used to generate trading signals (buy/sell) based on predicted price changes, and the performance is evaluated using the Sharpe Ratio.

- **Performance Metrics:** The Sharpe Ratio is used to evaluate the effectiveness of the strategy by comparing the strategy's returns against the risk-free rate.

3 Model Training and Code

The model is trained on the entire dataset, where historical price data is fed into the LSTM network. The training script can be accessed using the link below:

[**Training Code in Google Colab**]: Training Code in Google Colab
This script performs the following tasks:

- Loads and preprocesses the data from the given folder.

- Scales the data and generates sequences.

- Defines and trains the LSTM model.

- Saves the trained model for future use.

4 Model Testing and Backtesting

Once the model is trained, it is used to predict future price movements on new test data. The following steps are performed:

- Test data is preprocessed in the same way as the training data.

- The trained model is used to predict percentage changes.

- Trading signals are generated based on the predictions (buy if predicted change is positive, sell if negative).

- Strategy returns are calculated, and performance metrics such as the Sharpe Ratio are computed.

For a detailed explanation of the backtesting process, please refer to the Google Colab notebook linked above.

5 Model Download

The trained model is saved and can be downloaded to apply on new datasets. Once available, the download link for the model will be provided here.

[**Download Trained Model**]: Download Trained Model

6 Conclusion

The Alpha Strategy is a powerful tool for trend detection and building trading strategies based on machine learning. By leveraging historical price data and LSTM networks, this model can predict future price movements and generate profitable trade signals. The model's performance is evaluated using the Sharpe Ratio, ensuring its robustness for real-world applications.