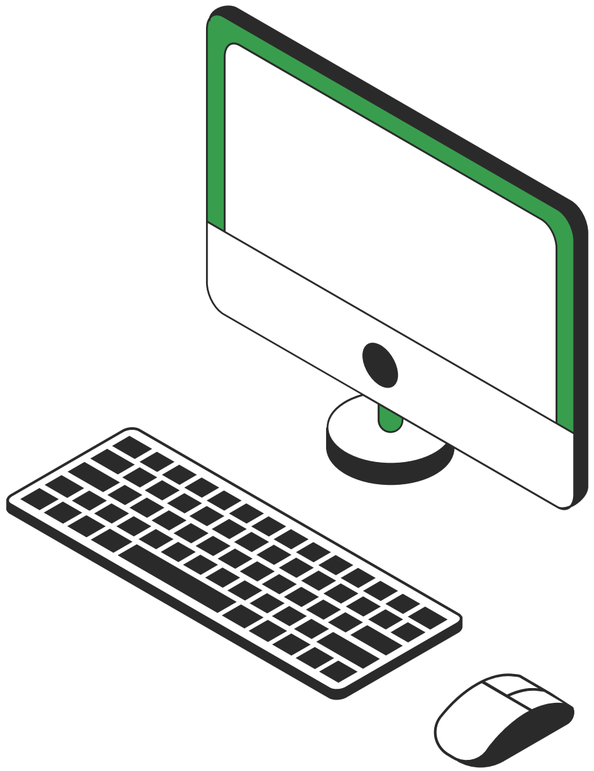
IE UNIVERSITY

Development of an Automated Daily Trading System

Ignacio Amigo
Afonso Dos Santos
Omar Harradi
Lucas Ihnen
Laura Silva Villanueva

Agenda:



- Project Overview
- ETL
- Machine Learning Model
- Backtest Simulation
- Go Live
- Conclusions

Development of an Automated Daily Trading System using Python

1. **Data Analytics Module:** A machine learning model for market movement forecasting of five US companies (Apple Inc., Microsoft Corp., Brown & Brown INC, Fastenal CO, Old Dominion Freight Line Inc.).

2. **Web-Based Application:** A multi-page interactive web application developed with *Streamlit* that allows users to visualize predictive analytics and interact with the trading system.

Data Analytics Module

ETL Pipeline
Machine Learning Model
Predicts market movement
Trading Strategy

Web-Based Trading App

Python API Wrapper
Interactive UI
Predictive Analytics Dashboard
Displays stock price predictions and trading signals
Display Backtesting tool

Project Overview

- Data Collection (ETL Process)
- Feature Engineering & Preprocessing
- Model Selection & Training
- Model Evaluation
- Deployment

SimFin

Historical stock market data. Retrieves Real-time stock market data from SimFin

Python

ETL, Machine Learning Model and API interaction

XGBoost

Python library used for machine learning

Streamlit

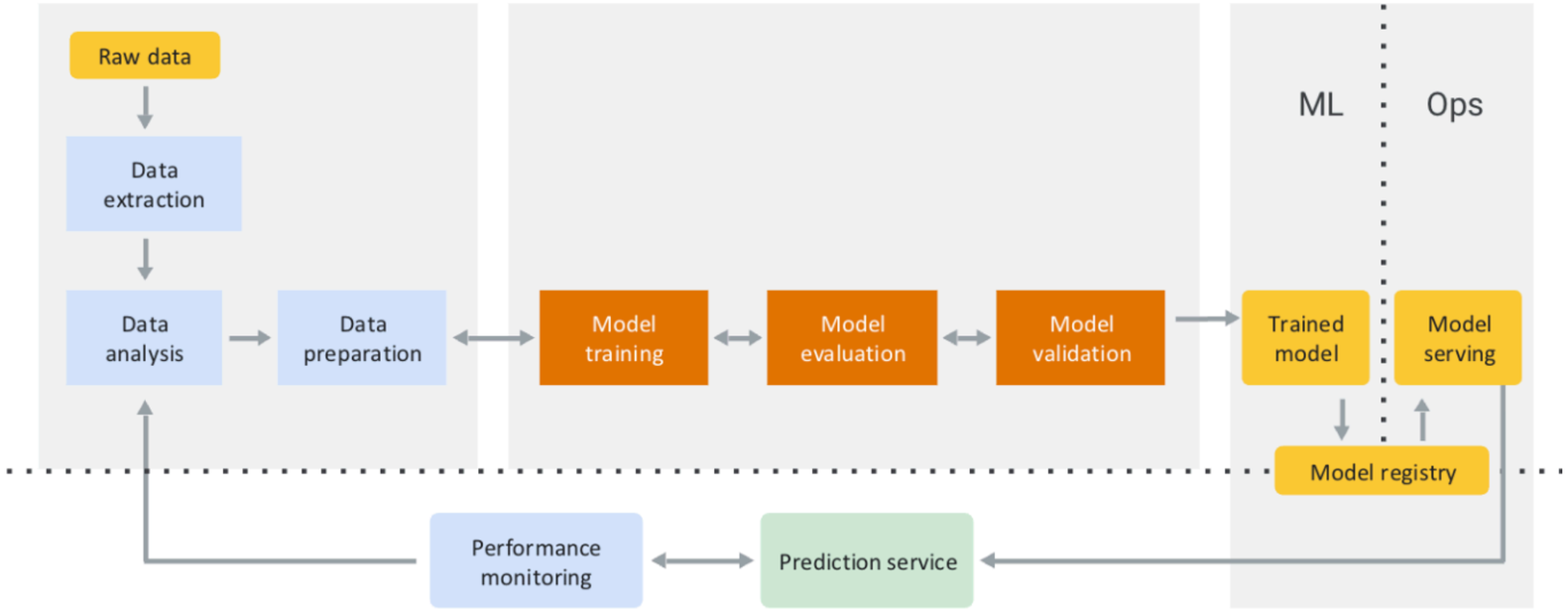
Open-source Python library used for building interactive web applications

Matplotlib / Plotly / SeaBorn

Data visualization

MODEL PIPELINE

Integrating ETL, feature engineering, model training, evaluation, and backtesting to automate daily trading decisions



ETL

Steps

- Read Data from CSV Files
- Stock Correlation Analysis: stocks most correlated with Apple based on daily closing prices.
- Data Transformation
- Filtering Correlations with AAPL
- Selecting the most correlated stocks with AAPL

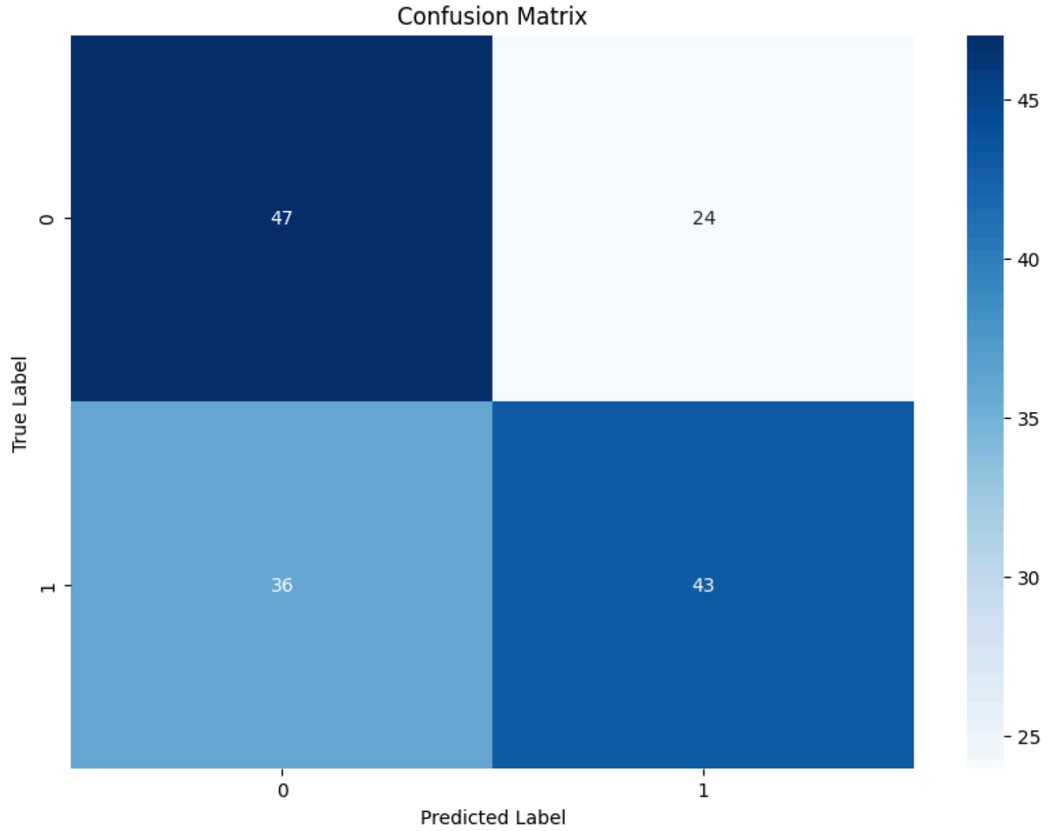
Tickers

Features

	Ticker	Date	Shares Outstanding	Open_AAPL	Open_BRO	Open_FAST	Open_MSFT	Open_ODFL	High_AAPL	High_BRO
0	AAPL	2019-03-29	1.886112e+10	47.46	29.61	32.00	118.07	48.70	47.52	29.66
1	AAPL	2019-04-01	1.842914e+10	47.91	29.69	32.48	118.95	48.67	47.92	29.85
2	AAPL	2019-04-02	1.842914e+10	47.77	29.78	32.89	119.06	49.70	48.62	29.83
3	AAPL	2019-04-03	1.842914e+10	48.31	29.81	33.09	119.86	49.78	49.12	29.81
4	AAPL	2019-04-04	1.842914e+10	48.70	29.81	33.01	120.10	50.08	49.09	29.95
...	...	...	...	...	...	...	...	...	...	...
7315	ODFL	2025-01-16	2.134975e+08	237.35	104.10	74.30	428.69	186.70	238.01	106.01
7316	ODFL	2025-01-17	2.134975e+08	232.12	106.17	76.33	434.08	191.26	232.29	106.32
7317	ODFL	2025-01-21	2.134975e+08	224.00	106.00	76.22	430.20	191.52	224.42	106.74
7318	ODFL	2025-01-22	2.134975e+08	219.79	106.05	76.20	437.56	190.20	224.12	106.05

Machine Learning Model

The accuracy on unseen data is **60%**, it is consistent with the performance of the model

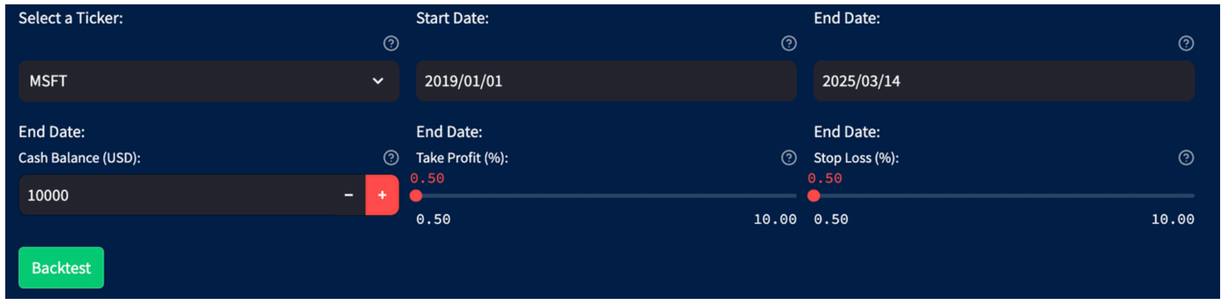


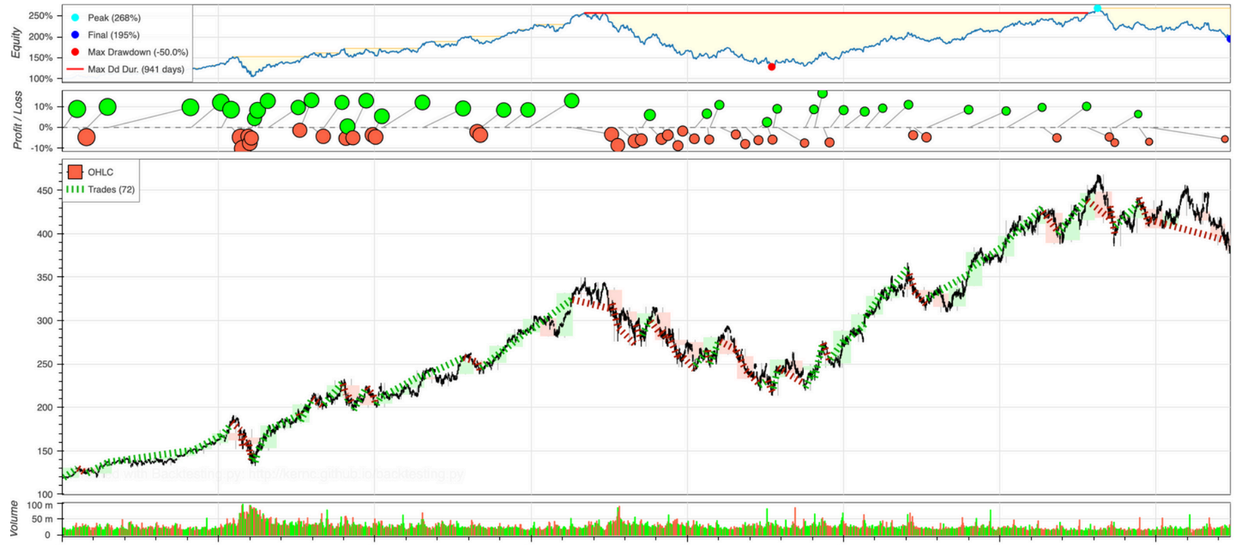

```
Model Accuracy on unseen: 0.6000
              precision    recall  f1-score   support

         0.0       0.57      0.66      0.61        71
         1.0       0.64      0.54      0.59        79

    accuracy                           0.60       150
   macro avg       0.60      0.60      0.60       150
weighted avg       0.61      0.60      0.60       150
```

Final model: XGboost

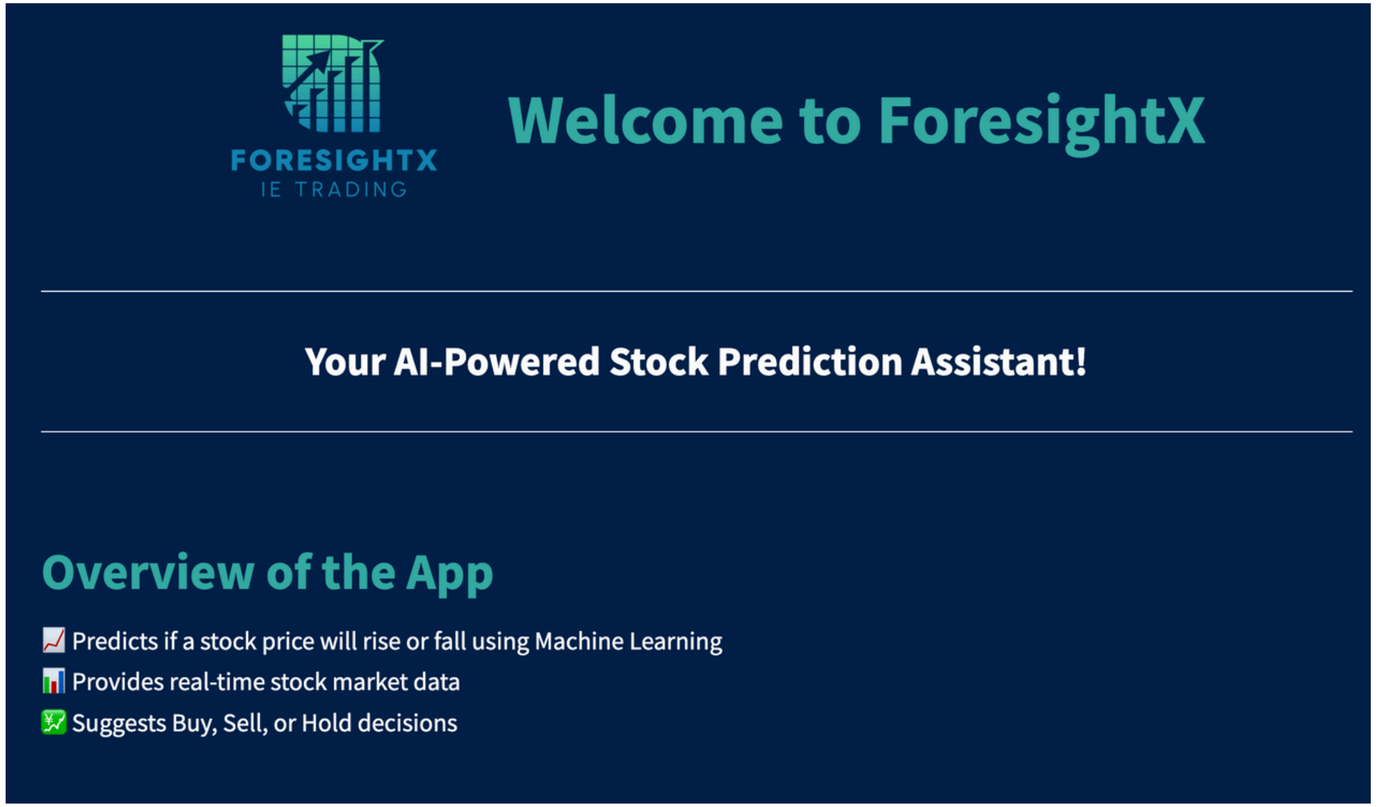
Backtest Simulation

This strategy follows the model's predictions to enter and exit trades. It buys when the model predicts 1 (the stock will go up) and holds the position until take profit or stop loss gets hit or the model predicts 0





Streamlit


FORESIGHTX
IE TRADING
Welcome to ForesightX
Your AI-Powered Stock Prediction Assistant!
Overview of the App
Predicts if a stock price will rise or fall using Machine Learning
Provides real-time stock market data
Suggests Buy, Sell, or Hold decisions

DEMO