UWE- University of West of England

Project Proposal: CSCT Masters Project
Stock Market Forecast using Time Series and determining Influential factors in SM Prediction.

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1 Introduction and Overview

a. Aim and Purpose

Investing in stocks can lead to huge returns, but still, most people are not interested, as it's too risky and unpredictable an investment. Stock Markets are highly volatile, which makes it hard to find a reliable pattern. To model such turbulent data ML algorithm or DL Algorithm is used, they are capable to **find hidden patterns and complex structures in data and predict how they will perform in future**

b. Research Question

The seasonal variance and index flow can help investors to understand and make decisions to invest in the stock market. Generate a trend chart for seasonal variance and index flow using Time series to forecast the stocks, to provide adequate guidance to investors. **The objective of this study is to identify directions for future machine learning stock market prediction research based upon a review of current literature and determine factors influencing Stock Market prediction.**

c. Expected Outcome

Prediction graph for a month for each market indices.
Determining influential factor
Predicting closing value for company tickr (for current date)-(if time permits)

2 Background

World stock market is enormously huge. Investment strategies are complex and rely on an evaluation of vast amounts of data.

> ***Stock market is the aggregation of buyers and sellers of stocks (also called shares), which represent ownership claims on businesses; these may include securities listed on a public stock exchange, as well as stock that is only traded privately, such as shares of private companies which are sold to investors through equity crowdfunding platforms. Investment is usually made with an investment strategy in mind. - Wikipedia***

Stock market works pretty much like auctions, where buyers and sellers negotiate the prices and make trades, but through network of exchanges like SENSEX, and Nasdaq. Supply and demand determine the prices of security. A seller sets the 'bid' of security, while an investor 'offer price' via broker to purchase the share.

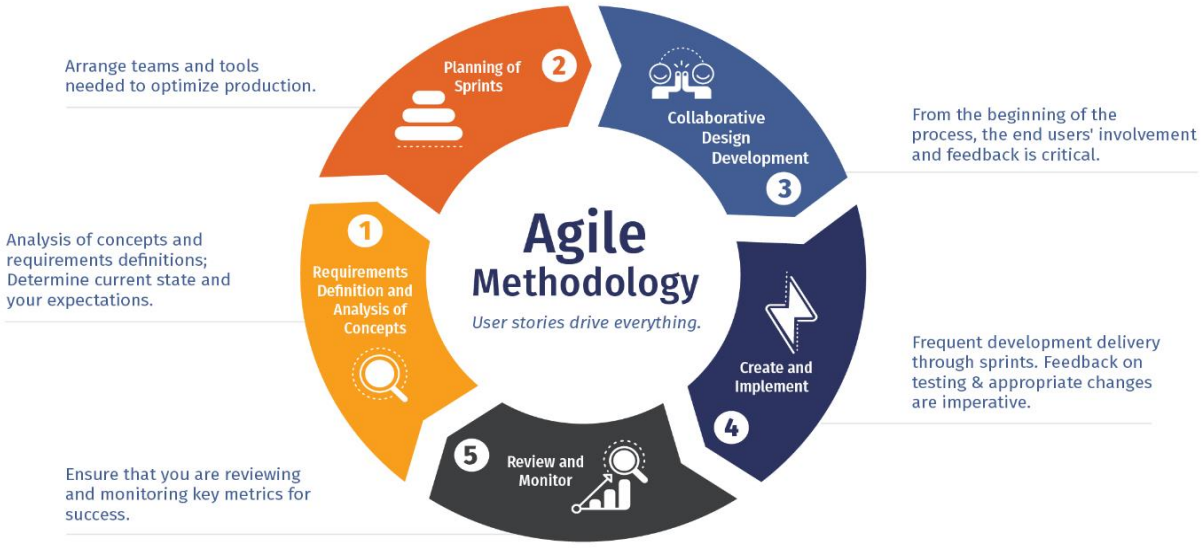
Stock market prediction has been a classical yet challenging problem, with the attention of both economists and computer scientists. The stock market impacts on people as well as country's economy. Therefore, predicting the stock trends in an efficient manner can minimize the risk of loss and maximize profit.

Predicting how a share might perform is the most difficult part, as it includes physical, psychological, rational, as well as irrational criteria.
Share prices can be predicted using fundamental analysis, technical analysis, and technological analysis (Machine learning). Fundamental analysis evaluates the stock price based on its fair value, while technical analysis only relies on the basis of charts and trends, whereas, Machine learning eases the whole process by analyzing large chunks of data, recognizing patterns generating predictive trends that can help traders take decisions. Stock price is not random data but it is well distributed in a set of well-defined numerical data collected at regular timeframe so it can be treated as discrete time series model.

3 Previous related work and Literature [1][2]

In the past few years deep learning as well as new prediction models have undergone rapid changes, which made them easier to implement and enhanced accuracy. Studies were carried out to implement ML for inventory marketplace prediction, e.g., Logistic regression and support vector machines (Alpaydin, 2014).
Deep learning has also accomplished exceptional success within few years, results of which are used by programs such as image classification (Rawat & Wang, 2017; Jiang & Zhang, 2020), object detection (Zhao et al., 2019), time series prediction (Brownlee, 2018; Jiang & Zhang, 2018), etc. these research have inspired marketplace forecast as well. According to Schumaker and Chen (2010), SVM is a machine learning algorithm that can classify a future stock price direction (rise or drop). While Lee and Yeh, Huang (2011) predicted stock market using support vector regression, while dealing with kernel function hyperparameters. They developed two-staged multiple-kernel learning algorithm by incorporating sequential minimal optimization and the gradient projection method. Experimental results showed that the modified method performs better than other methods.

4 Project Methodology [3]



5 Proposed Work

1. Objectives, Scope, Sources, and Deliverables

Project objectives

The stock marketplace may have a big effect at humans and the nation's financial system as a whole and consequently predicting the expenses of inventory can lessen the hazard of loss and maximize profit.
The primary goal of this research is to forecast stock marketplace prices using conventional and advanced algorithms.

- Examine : Key indicators of Europe Stock Market and NIFTY Dataset that contains the daily closing prices

European stock indices: Germany DAX (Ibis), Switzerland SMI, France CAC, and UK FTSE.

- Visualize: Trends of stock price over time, develop time series models to predict future prices.
- Evaluate: Determine accuracy.

Project Scope

- Demographics: for this project, we have focused on major European stock indices data as well as NSEI data(India), but it can be expanded to a specific country all over the world
- Chronology: Since the digital era started there has been a huge set of historical data available which can be used for analysis as well as future predictions.

Data Source

Dataset used is open source dataset available online. This is a multivariate time-series problem with 6 \ variables. Dataset contains the daily closing prices of major European stock indices: Germany DAX (Ibis), Switzerland SMI, France CAC, and UK FTSE. (data range 2020-2022) and NIFTY 50 (2020-2022) The data are sampled in business time, i.e., weekends and holidays are omitted. While yahoo finance is used for individual stock ticker forecast

Data type	Source	Reference
Europe Stock Indices	Wsj.com	https://www.wsj.com/market-data/quotes/index/UK/UKX/historical-prices
Yfinance	Yahoo Finance	https://finance.yahoo.com/
NIFTY 50	Wsj.com	https://www.wsj.com/market-data/quotes/index/IN/NATIONAL%20STOCK%20EXCHANGE%20OF%20INDIA/NIFTY50/historical-prices

Deliverables

- iPython notebook to generate show results
- Markdown file to show detailed data analysis report and key findings
- If time permits would make a web app for individual stock price prediction

2. Project Definition and Approach

Project Definition and scope

Identify field/area to work (Stock prices: create time series prediction model and analyse results)

- Initial literature review
  Explore all the aspects of the project
  Refine approach based on research
- Initial data review
  Identify reliable data source
  Collate metadata

Assess which fields are needed

Define project plan

- Data Cleaning
  Extract the trend, seasonality and random terms from the model.
  Decompose the time series.
  Identify autocorrelation and partial autocorrelation.
  Detrend a time series.
- Methods used
  Holt winter Method
  ARIMA method
  VAR method
  Neural Network method
- Analysis
  Exploratory data analysis: understanding key trends and patterns.
  Generate time series models for Stock price predictions
  Finalize Model

3. Tool and technologies used:

Programming language: Python, R
Libraries used : FitAR, tseries, forecast, neuralnet, yfinance, eurostockmarket
Data Visualization: Tableau
Project Management: Gitlab

6 Ethical Consideration

This proposal doesn't seem to attract any ethical considerations as all data used is available online for analysis.

7 Proposed timetable

Can be found in timeline excel file.

8 Bibliography

1. Machine Learning Stock Market Prediction Studies, (2020) https://scholarworks.lib.csusb.edu/cgi/viewcontent.cgi?article=1435&context=jitim

2. Application of Deep Learning in Stock Market Prediction (2020). https://arxiv.org/pdf/2003.01859.pdf

3. Nvisia Learn, The Agile Process 101: Understanding the Benefits of Using Agile Methodology, 2020, URL: https://www.nvisia.com/insights/agile-methodology