**Research Design 2: Assignment Ismael Ben Daoud**

**Task 1**

**Section 1**

Title: Applying Machine Learning Technique to Forecast Stock Exchange Markets.

Chosen Research:

1. Description of Theme and Topic Rationale.
   1. The main topic of this study is machine learning. ML is a branch of artificial intelligence which focuses on the use of data and algorithms to imitate the way that a user can learn and improve accuracy. The Theme will concentrate on the return-on-investment ROI. In this study supervised learning is used to train algorithms to properly categorize datasets and predict outcomes.
2. Positioning and Research Onion.
   1. Research philosophy: In this study the guided by a positivist philosophy, which emphasizes objectivity and the use of quantitative methods to determine if markets can be forecasted and collect numerical data and select a survey based on the research strategy to gather data from a representative sample of different people with different knowledgebase base weather it’s on artificial intelligence or business oriented which can be proven to be true or false and thus this knowledge is seen as meaningful.
   2. Research approach: The research approach can be reasoned as deductive, as the study aims to test a specific hypothesis related to the use of machine learning techniques to stock exchange markets.
   3. Research Strategy: The research strategy involves conducing a survey and a collection of datasets from existing sources such as yahoo finance APIs in predicting currency exchange markets.
   4. Choices: The data analysis phase will make use of a quantitative approach which will involves the use of historical data through the use of yahoo finance API to extract the required historical data from different stock markets and a statistical method, such as T-Test, Chi-Square, and ANOVA testing through the use of IBM SPSS to analyse the data and assess the accuracy of the machine learning prototype in predicting rates.
   5. Time Horizon: The study will use a cross-sectional study to collect data on the historical prices of the different stock markets. The study would also involve a survey that is administered in relation to the prototype.
   6. Techniques and Procedures: In this research a quantitative approach is being undertaken as the purpose is to forecast the stock exchange market by creating a python script and get historical data and create a survey based on that prototype. Therefore, the use of interviews will not be considered as the purpose is to gain a high-volume numerical data response which survey is far better suited to.
3. Background to this research theme
   1. The researcher has a great interest in both software and business aspects. As a business analytics student, it is a great opportunity to develop a project-based on both software sector and business sector combined together while also using different techniques of analysing the effects of forecasting on the markets through the use of machine learning.
4. Hypothesis
   1. As for the hypothesis it will focus on maximising profits by implementing machine learning to improve decision making from predictions using past data and current exchange rates.
5. Research Aim and Purpose Statement
   1. Research Aim: The research aim is to forecast the forex exchange market by creating a python script and get historical data. This would help better understand the forex market and provide a more refined experience for future trading. The research method will be quantitative, as the data will be collected from existing forex data to monitor and analyse how the market is changing and developing creating a detailed outlook and unique perspective on how the market is moving over a period. The experiment will make use of a past datasets to analyse the factors and types of markets that can be used for predictions. The experiment will be developed using Python to deploy a bot and use it to scrape data for market insight which can be made to establish different datasets per each market.

**Section 2**

**Introduction**

Due to the volatility of the stock market, researchers find it challenging to find a solution to forecast price movement. Before the age of computers, people traded stocks and commodities primarily on intuition. As the level of trading and investing grew, people searched for methods and tools that would increase their gains whilst minimizing their risks. Therefore, traditional stock price prediction methods including a statistical approach has been implemented such as statistics, technical analysis, fundamental analysis, and linear regression, which are all used to attempt to predict and benefit from the market’s direction. However, none of these techniques has proven to be consistently correct prediction tool that is desired, and many analysts argue about the usefulness of many of the approaches. However, machine learning approaches are proven to be more accurate and efficient in predicting price movement than traditional methods [6] and [7]

1. In recent years, there has been a growing interest in the use of artificial intelligence and machine learning techniques for stock market prediction. In the literature review reveals a method have been employed in previous studies, including neural networks and deep learning. Additionally, some studies have incorporated natural language processing to analyse historical data for predicting stock prices.
2. Distinguish between academic and non-academic materials:
   1. Distinguishing between academic and non-academic material is crucial while conducting a comprehensive literature review. While non-academic material such as blog posts and online articles may provide useful insights, academic material such as peer-reviewed journals are more reliable sources of information.
3. Recommend 5 articles from peer reviewed journals.
   1. [1]. Stock price prediction using machine learning: A survey. This survey paper provides a comprehensive overview of the different machine learning techniques used for stock price predication, including their strengths and limitations.
   2. According to the research [2] this book offers an in-depth look at the use of machine learning techniques in finance, with a particular focus on the challenges and opportunities in applying these techniques to the foreign exchange market.
   3. In this study proposed a deep learning framework from predicting financial time series, including foreign exchange rates, using a combination of stacked auto coders and long-short term memory networks [3].
   4. A deep learning-based approach for international currency exchange rate forecasting. Neural computing and applications, [4]. This article describes a deep learning-based approach for forecasting international currency exchange rates, using a convolutional neural network.
   5. A hybrid forecasting model of financial time series based on deep learning and optimization algorithm [5]. Applied soft computing, this study proposes a hybrid forecasting model of financial time series, including foreign exchange rates, based on a combination of deep learning and optimization algorithms.
4. Contextualized literature and research material.
   1. Contextualizing literature and research material involves summarizing and synthesizing the findings from various studies to provide a comprehensive understanding of the research topic. In analysing the existing literature on machine learning for stock market prediction, it can be concluded that while machine learning techniques have shown promise in improving the accuracy of stock price prediction, the effectiveness of these models is influenced by various factors, such as the quality and quantity of data, the choice of algorithm, and the market conditions.
   2. Critical literature arguments involve comparing and contrasting the findings from different studies and identifying knowledge gaps and challenges that need to be addressed in future research. One major challenge in using machine learning for stock market prediction is the tendency of these models to overfit to the training data, resulting in poor performance on unseen data. Additionally, the impact of external factors such as economic, political, and social events on stock prices is often unpredictable and difficult to incorporate into machine learning models. Therefore, the research focuses on developing models that can handle uncertainty and incorporate external factors into their predictions. Moreover, there is a need for more comprehensive and standardized datasets to evaluate the performance of different machine learning models for stock price prediction.
5. By using critical literature arguments into the research, it will provide a balanced perspective and contribute to the identifications of areas where further research and improvements are needed. As stated by [6] this paper critically examines the strengths and weaknesses of artificial neural networks for forecasting, including stock market prediction. It discusses issues such as overfitting, the need for appropriate training data, and the interpretability of ANN models. Another study by [7], compares the performance of various forecasting models, including machine learning techniques for predicting volatility and option prices of the S&P 500 index. It highlights the strengths and weaknesses of different models and identifies knowledge gaps in terms of model selection and performance evaluation. These papers serve as examples of research that critically evaluates the existing methodologies and identifies any limitations and gaps in the field of stock market forecasting through machine learning. The key objective of this research is how to maximises profits by implementing machine learning to improve decision making from predictions using past data and current exchange rates.
6. Construct a Literature Map: Check Xmap

**Section 3**

**Reflection on the chosen Methodology**

1. Define your research questions and define your objectives.
   1. Research Question 1: “*Are movements in rates of stock exchange markets predictable when taking into consideration past datasets with exchange rates?*”

The objective of this research question is to investigate the predictability of stock exchange movements by analysing past datasets. The research aims to access whether historical data can provide insight into future stock movements. Therefore, determining the degree of predictability in stock exchange rates based on past information.

* 1. Research Question 2: “Can machine learning contribute to an optimal decision making when dealing with stock exchange?”

The objective is to explore the potential contribution of machine learning techniques in making the right decisions related to the markets chosen. This research aims to evaluate the effectiveness of machine learning algorithms, models, and methodologies used in analysing the stock market data, by identifying patters and generating predictions to make better decisions. The objective is to determine whether machine learning can enhance decision-making processes in the context of stock exchange and to potentially improve decision-making for investors or traders.