PREDICTING STOCK MARKET TRENDS USING MACHINE LEARNING AND DEEP LEARNING ALGORITHMS VIA CONTINUOUS AND BINARY DATA; A COMPARATIVE ANALYSIS

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ABSTRACT— The nature of stock market movement has always been ambiguous for investors because of various influential factors. This study aims to significantly reduce the risk of trend prediction with machine learning and deep learning algorithms. Four stock market groups, namely diversified financials, petroleum, non-metallic minerals and basic metals from Tehran stock exchange, are chosen for experimental evaluations. This study compares nine machine learning models (Decision Tree, Random Forest, Adaptive Boosting (Adaboost), eXtreme Gradient Boosting (XGBoost), Support Vector Classifier (SVC), Naïve Bayes, K-Nearest Neighbors (KNN), Logistic Regression and Artificial Neural Network (ANN)) and two powerful deep learning methods (Recurrent Neural Network (RNN) and Long short-term memory (LSTM).

Index Terms – Stock market, trends prediction, classification, machine learning, deep learning

I. INTRODUCTION

The task of stock prediction has always been a challenging problem for statistics experts and finance. The main reason behind this prediction is buying stocks that are likely to increase in price and then selling stocks that are probably to fall. Generally, there are two ways for stock market prediction. Fundamental analysis is one of them and relies on a company's technique and

fundamental information like mar-ket position, expenses and annual growth rates. The second one is the technical analysis method, which concentrates on previous stock prices and values. This analysis uses historical charts and patterns to predict future prices. Stock markets were normally predicted by financial experts in the past time. However, data scientists have started solving prediction problems with the progress of learning techniques. Also, computer scientists have begun using machine learning methods to improve the performance of prediction models and enhance the accuracy of predictions. Employing deep learning was the next phase in improving prediction models with better performance . Stock market prediction is full of challenges, and data scientists usually confront some problems when they try to develop a predictive model. Complexity and nonlinearity are two main challenges caused by the instability of stock market and the correlation between investment psychology and market behavior.

II. LITERATURE SURVEY

A. *A local and global event sentiment-based efficient stock exchange forecasting using deep learning*

This study integrates local and global event sentiment analysis with deep learning techniques to enhance stock exchange forecasting. By considering both regional and worldwide economic events, the model achieves more reliable predictions. The approach demonstrates the importance of combining sentiment signals with advanced neural networks for efficient market forecasting.

B. *Deep learning-based feature engineering for stock price movement prediction*

The paper presents a deep learning-based framework for feature engineering in predicting stock price movements. It automatically extracts high-level features from raw financial data and improves prediction performance compared to traditional manual feature engineering.

C. *Evaluation of the effect of investor psychology on an artificial stock market through its degree of efficiency*

This research explores how investor psychology impacts artificial stock markets by examining efficiency levels. Using simulation-based approaches, the study measures how irrational investor behavior influences market trends. The results

provide insights into behavioral finance and its role in explaining inefficiencies in stock markets.

D. *Forecasting stock market movement direction with support vector machine*

This work applies Support Vector Machine (SVM) models to predict stock market movement direction. By utilizing technical indicators and historical market data, the model achieves superior accuracy compared to traditional statistical methods. The study demonstrates the effectiveness of machine learning models in financial forecasting.

E. *Financial distress prediction using support vector machines: Ensemble vs. individual*

The paper compares ensemble and individual SVM-based models for financial distress prediction. Results show that ensemble methods outperform single models by reducing classification errors and improving robustness. This highlights the potential of ensemble machine learning strategies in financial risk management.

III. PROPOSED SYSTEM

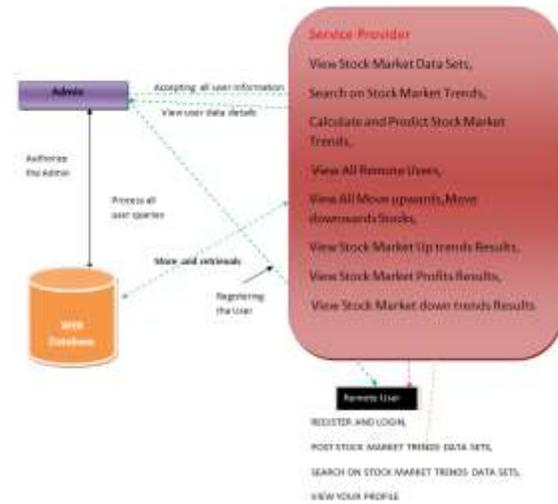The overview of our proposed system is shown in the below figure.

Fig. 1: System Overview

Implementation Modules

Service Provider Module

- ✓ In this module, the Service Provider has to login by using valid user name and password. After login successful he can do some operations such as View Stock Market Data Sets, Search on Stock Market Trends, Calculate and Predict Stock Market Trends, View All Remote Users, View All Move upwards, Move downwards Stocks, View Stock Market Up trends Results, View Stock Market Profits Results, View Stock Market down trends Results.

Train and Test Model

- ✓ In this module, the service provider split the Used dataset into train and test data of ratio 70 % and 30 % respectively.

The 70% of the data is consider as train data which is used to train the model and 30% of the data is consider as test which is used to test the model

Remote User

✓ In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database.   After registration successful, he has to login by using authorized user name and password. Once Login is successful user will do some operations like Post Stock Market Trends Data Sets, Search on Stock Market Trends Data Sets, And View Your Profile.

Graphical Analysis

✓ In this module, display the graphs like accuracy and predicted ratio of the system. Various factors take into consideration for the graph analysis. In this phase plot the charts like bar chart and so others.

IV. RESULTS

Fig.2: Service Provider Login

Fig.3: Post Stock Market Dataset

Fig.4: Search Stock Market Trends

Fig.5: Stock Market Results

V. CONCLUSION

The purpose of this study was the prediction task of stock market movement by machine learning and deep learning algorithms. Four

stock market groups, namely diversied financials, petroleum, non-metallic minerals and basic metals, from Tehran stock exchange were chosen, and the dataset was based on ten years of historical records with ten technical features. Also, nine machine learning models (Decision Tree, Random Forest, Ada boost, XG Boost, SVC, Naïve Bayes, KNN, Logistic Regression and ANN) and two deep learning methods (RNN and LSTM) were employed as predictors. We supposed two approaches for input values to models, continuous data and binary data, and we employedthree classication metrics for evaluations. Our experimental works showed that there was a signicant improvement in the performance of models when they use binary data instead of continuous one. Indeed, deep learning algorithms (RNN and LSTM) were our superior models in both approaches.

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