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Stock Market Prediction Using Prescriptive Analytics

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STOCK MARKET PREDICTOR USING PRESCRIPTIVE ANALYTICS

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ABSTRACT | Stock market prediction is a system used to determine the pattern of flow of stocks. The system implements graphs statistical reports and updates the current news report about every individual stocks. These are made with predictive analytics so far. As of new inheritance of the system, in order to provide real-time solution, the system is newly designed using prescriptive analytics. This system provides suggestions and solutions to the user regarding stock exchange. Stock market plays a vital role in every investor. Each user invest money at their own risk. This risk factor determines the strength and professionalism of the user in stock market. Most of the common people think that stock trading is complicated and risky. The technology in stock market had turned everything into systematized prediction.

Initially, the user's holdings are analyzed and all the loss stocks are sorted out separately. Then these stocks are compared with Global stocks and the system returns the best stocks at the same holdings price. The user is given an option to swap these stocks to the current notch stocks. This process can help a user to stop loss being faced.

To provide real-time effective solution to any stock market user and to take the prediction
analysis to the next level using prescriptive analytics. Even though, the existing systems predicts stock using various methods and algorithm. We can make our system to easily fit into any prediction system.

KEYWORDS | **Deep learning, Decision making algorithm, LSTM, Random Forest.**

I.INTRODUCTION

Stock marketing has become a major platform in investments. Most of the business people target stock marketing as a key platform to boost their turn over. Stock marketing is of various divisions, these are of NSE, BSE and Forex. Machine learning and deep learning algorithms are used to reduce the risk of prediction of stocks [1]. According to a common man perspective stock marketing is of high risk and it requires more knowledge about share companies. But as the technology arises stock marketing has become more easier and lowering the risk factor. The technology had made even a common man to invest in stock

market. This era boomed when small trading's and low volume exchange came in. A minimal MSE and RMSE of the given share prediction design displays the effectiveness of the proposed method in share prediction.[2]

In the current scenario, people have entered stock marketing depending on the predicting technologies and without any strong knowledge about stock market. The emerging notch in share prediction technology is use of machine learning algo which creates predictive based on dataset of existing stock market starts by training on the before values.[3] The Predictive analytics has taken over a major contribution in this system. The technology had started to give analysis reports like bar graph, portfolio, candlesticks and statistical reports. [4] This helped the traders to analyse deep into stock market exchange.

II.RELATED WORKS

Tree based Models

As couple of rule used in dividing the predicting area may be concluded in these variety of model's square measure called decision-tree methodology. From the Figure 1, [5] is the custom-made shows the revolution of tree based algorithm in many decades and hence the following sets describes it.[6]

Figure 1. Growth of tree-based methods

The decision tree is well supervising learning method used to regression and classification works [7]. This is used in creating a model that describes a specific price by instruction to direct forward call rules designed from the information gathered. There are multiple uses of implementing the method, like its being direct forward to grasp and explicate or ability to calculate problems with various outputs, on short, making over complex tree that lead to over setting could be fairly a common disadvantage.[8] By adapting from the Figure 1.

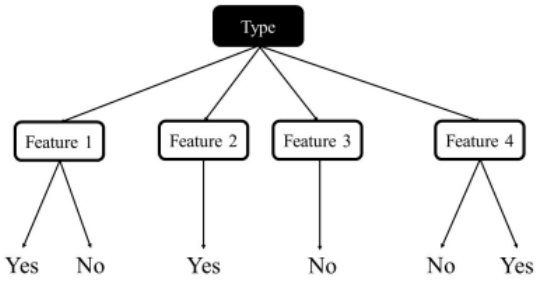

Figure 2: Direct forward call rule

[9]A textile model (to return model) is an Associate in Nursing group reckoner that matches every basic to return on various subsets of data and then penetrate their separate predictions, rather clustering or by round off method.to form final analysed predicting. This technique can be meta estimator and might genuinely be used as Associate in Stock lead to reduce the differentiation of associating in Nursing reckoner like a choice tree by non-treatment organization into its construction procedure then making Associate in Nursing resemble from it. During this technique, sample area unit drawn with the replace and prediction and obtained through a major of votes secretly mechanized.[10]

The random forest design algorithm is made by an excellent variety of decision treess. This methodology merely clusters in

prediction solutions of the trees subset, that is stated as a forests. As so, this model has three various algorithm concept-arbitrarily selecting coaching information once creating tree and choosing some subsets options when the dividing nodes, taking in account of the whole set of entire options for separating every node in each straight-forward decision tree. Through training resources during the random forest, every tree trains from a sample of the information point. A random forest has a schematic illustration.[11]

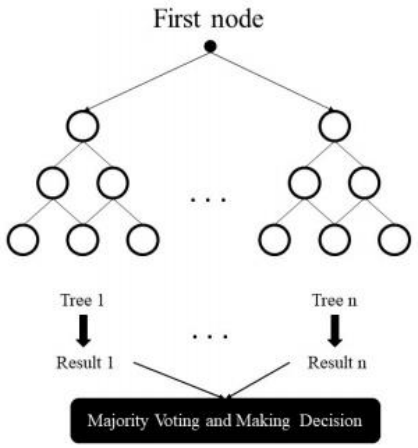

Figure 3. Describing the random forest

The energetic algorithm refers to a collection of methods that converts into slow learners to a fast track. The method is an associative for development of the model describing of any learning strategies[12].The purpose of enhancing is to consecutively train the weak-learners to rectify their previous action. Ada Boost might be a meta-estimator that begins by developing of a model on the most dataset then sets more copies of the model on the same dataset. Throughout the technique, the sample weights square measure custom-made supported this prediction error, therefore subsequent models concentrate a lot of on tough things.[13] Gradient Boosting method is similar or is associate analogous or is comparable to AdaBoost once it consecutively puts predictors to an assembled model, every prediction correcting its previous performance. In relative with ada-Boost gradient boosting fits a brand-new predictor of the residual mistakes made by the previous predictor by using the gradient to search the drawbacks within predictions of the previous learns.

XG-Boost is an Associate ensemble tree method and therefore the algorithm applies the principle of enhancing for weak track. Overall, the model is capable of using the bottom model to decreases errors over time. However, XG-Boost was implemented for faster performance.[14] In-built cross-validation method, strong handling of missing data, regularization for omitting oversetting, catch awareness, tree pruning, and parallelized tree-building are the advantages of the XG-Boost rule.

Historical Stock market Dataset: This dataset is utilized for descriptive analysis and to predict the future outcomes.

XG-Boost is also an decision tree. It was presented for better performance. Using Machine learning and Deep learning, the Prediction of Stock Market Trends[15] was very fast while comparing with the other tree-based models. Benefits of XGBoost method is used for preventing overfitting, cross-validation capability, used to hand the missing data's and for the parallelized tree building and tree pruning are significant [16]

III.Divided RF algorithm

Divided RF or also known as decision forests is a method for regression and other

mission done by multiple of decision tree. Random Forest is also called as ensemble model made of many decision trees.

So far, the previous related papers regarding stock market prediction were done by using random forest for predictive analytics whereas we are going to implement the random forest in prescriptive analytics. Even though, the existing systems predicts stock using various methods and algorithm. We can make our system to easily fit into any prediction system.

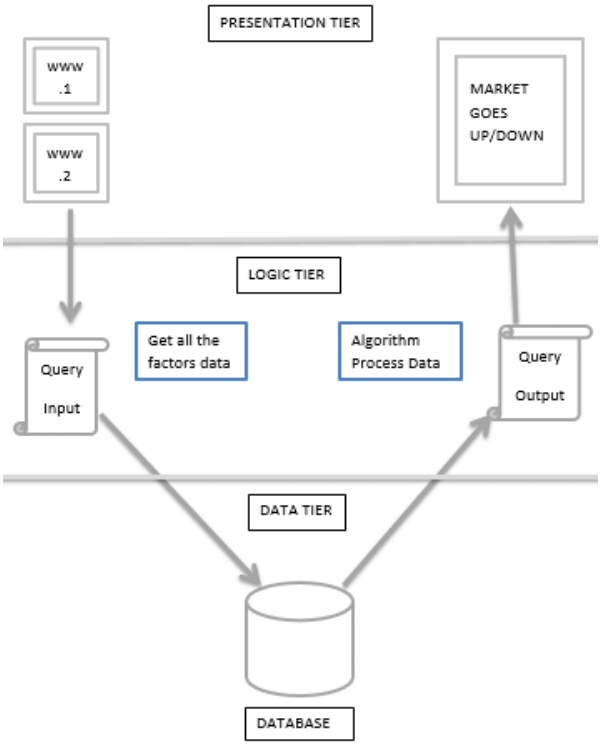

Figure 4: Overview of the system

In this system, we are taking this analysis to a new analytics process. By using prescriptive analytics, we can give real-time solutions and let the user operate the solution quickly. Prescriptive analytics is the combination of predictive and descriptive analytics. So, thereby we get more precise solutions and we can let a new trader to easily understand stock exchange

Prescriptive analytics targets on searching the best method of action in a situation, given in the existing data. Prescriptive analytics is collection of both descriptive and prescriptive analytics, but it sees the actionable insights instead of monitoring of data.[17]

The system initially starts to retrieve datasets from the user like the user's holdings stock data which is considered as the raw dataset. As the second stage of the process, the system collects the historical stock data from the cloud and using machine learning the system sort the various predictions categorized as the user request [18]. After the predictive analysis process, the user has an ability to request the system for graphical representation of stocks to compare as the user wish to compare and analyze.

The prescriptive analyzing is the final stage in our system. The system will analyse all the global stocks and suggests the user to invest on niching stocks. If the user is having stocks which makes the user to face loss, the system gives an option to swap all the low moving stocks to top grossing stocks for the same price, which ultimately helps the user to stop loss. This gives the user to easily operate and swap their holdings to top moving stocks[19]. By these swapping processes, the users can frequently update to the current market.

In the proposed system, we are taking the analysis to new analytics process i.e., Prescriptive analytics. By using these prescriptive analytics, we can give a real time solution and let the user operate the solutions quickly. [20] So, thereby we get more precise solutions and we can let a new

trader ton easily understand the stock exchange. Our proposed system analyses stocks graph movement every day and updates the user.

This system also analyses the user's holdings stocks and compares with the global stocks and returns the user about the top gross stock at the same price. Then, the user is given an option to swap his holding stocks to the top gross stocks. The user can swap all lots or a specific quantity. Our proposed system is more efficient and useful for intraday and short traders.

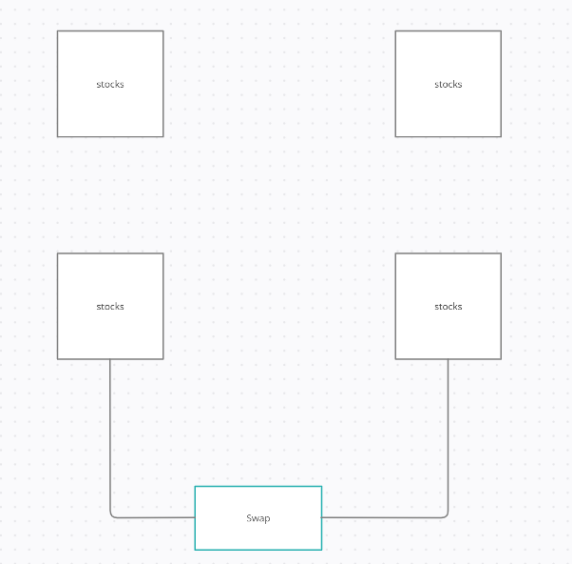

Figure 5: Swapping process

More precise graph and news about each stock helps the users to learn and understand this stock marketing process. New traders can easily go with the flow on current market moving.

We are implementing the comparison of essential stocks convenient to the user of in our system. Our proposed system compares and correlates with the users holding and inherits the solutions from predicting both global and holding stocks.[21] Therefore, we'll be implementing the real time solutions and assistance in our system

IV. Stimulation and Analysis:

4.1 Datasets: The datasets are raw historical stock data. The data are clustered into tabular form which is inherited from global database. The data are initially processed in the descriptive analyzing phase.

4.2 Design: The design is developed using Sublime Text editor. We have taken Sublime text editor since its light weight and can process faster. The design was inspired from various stock market platforms and was pulled out using GitHub.

4.3 Database: The Primary database was developed in PostgreSQL for running the system in local host. When the system is pushed to web, we use AWS for cloud database. All the queries are made with simple rules to enhance the systems performance.

V.Pseudo Code:

Training the dataset and implementing random-foresting algorithm

```
testdata=scaleddata[training_data_len -
 60:, :]
xtest = []
```

```
ytest =dataset[training_data_len:, :]
for i in range(60,len(test_data)):
xtest.append(test_data[i-60:i,0])
xtest=np.array(xtest)
xtest=np.reshape(xtest,(xtest.shape[0],xtest.s
hape[1],1))
predictions = model.predict(xtest)
predictions = scaler.inverse_transform(predi
ctions)
routemean = np.sqrt( np.mean (predictions -
 ytest) ** 2)
routemean
```

V.a Dividing RF Algorithm:

Input: Raw Data from Database.

Output: The data is processed and returned as a Visual Representation such as graphs and table.

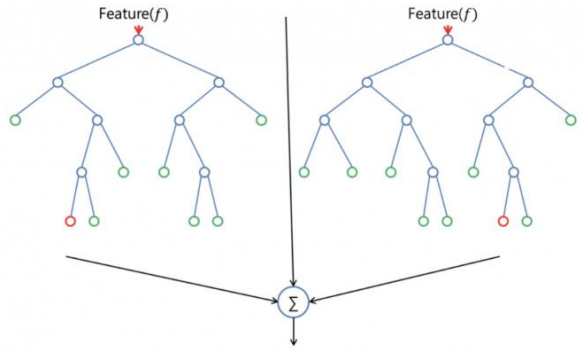

Figure 6: Divided RF algorithm

The usual Random Forest algorithm is slightly modified in our proposed system. The data foresting is split up into two phases.[22] This is because the algorithm plays a major role in two modules. So in order to make it into the flow along with the system the algorithm is slightly modified and taken 0.

In the proposed algorithm, as seen figure 6 we can see the algorithm split up as feature(f) and feature(j). This represents the feature(f) as the future stock prediction algorithm and feature(j) Bearer holding stock analyzing algorithm. At last, both the algorithm results are merged and processed to the final phase.[23]

VI.Model Simulation Graph:

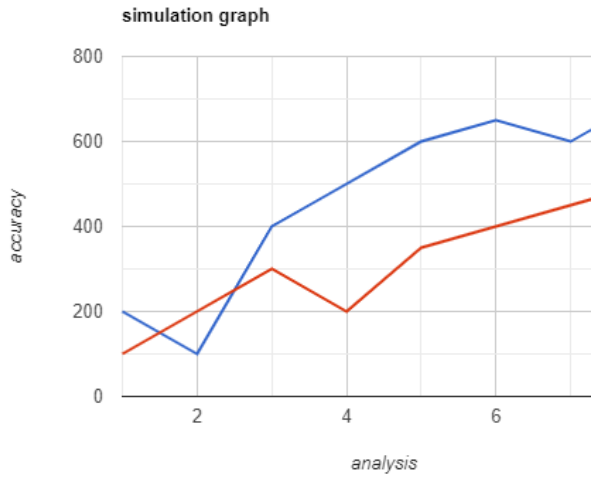

Figure 7: Simulation graph

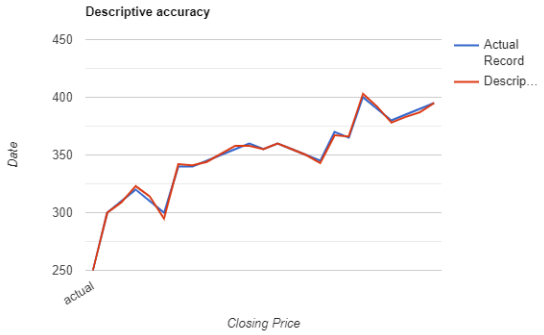

Figure 8: Descriptive accuracy

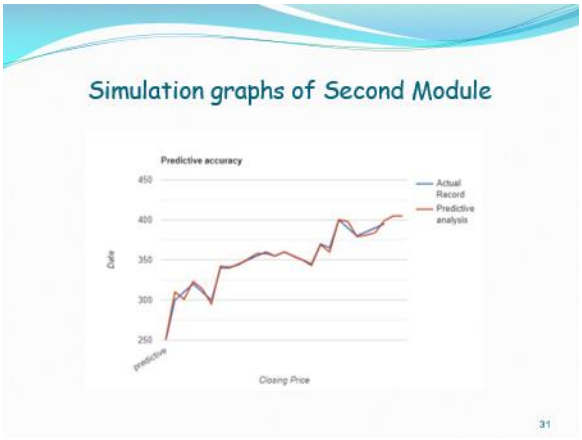

Figure 9: Predicitive accuracy

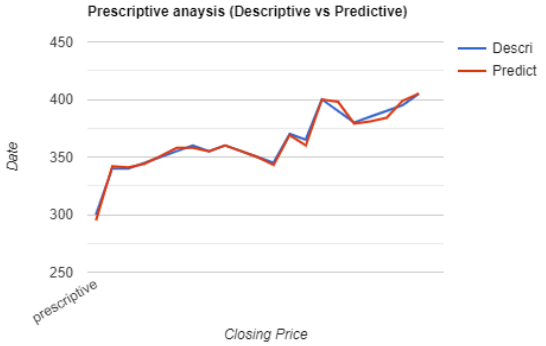

Figure 10: Prescriptive accuracy

VII. Output screenshot:

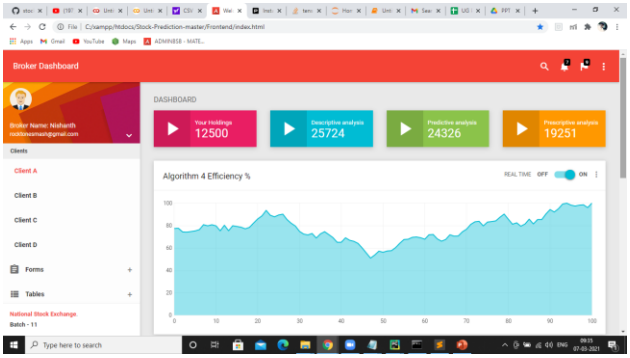

Figure 11: dashboard

Figure 12 : Visualization

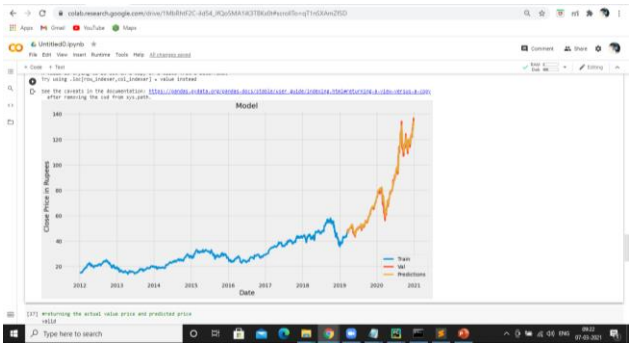

Figure 13: Prediction graph

VIII. Conclusion:

This system helps any new stock broker to effectively invest in the stock platform with minimal risk. This system is split into three analyzing methods (Descriptive, Predictive and Prescriptive). This system deals with the real time dataset which is forked out from yahoo finance. Yahoo finance provides forex dataset which is of free of cost with 15 minutes delay with real time dataset. However, the prediction methodology used in our proposed system has successfully improved the accuracy difference with maximum of 0.93%.

We have also designed and developed a frontend web application for the user better convenience which runs the pre defined datasets pushed by us. We have implemented the algorithm with the sample datasets (which is not the real-time data) for users understanding.

IX. REFERENCES

[1] Nabipour, M.; Nayyeri, P.; Jabani, H.; Mosavi, A. Deep learning for Stock Market Prediction. arXiv 2020, arXiv:2004.01497

[2] Kelotra, A. and P. Pandey, ''Stock market prediction using opti- mized deep-convLSTM model,'' Big Data, vol. 8, no. 1, pp. 5–24, 2020.

[3] Lu, Ning, A Machine Learning Approach to Automated Trading. Boston, MA, USA: Boston College Computer Science Senior, 2016

[4] Murphy, K.P. Machine Learning: A Probabilistic Perspective; MIT Press: Cambridge, MA, USA, 2012.

[5]J.Long,Z.Chen,W.He,T.Wu,andJ.Ren,''Anintegrated framework nof deep learning and knowledge graph for prediction of stock price trend: An application in chinese stock exchange market,'' Appl. Soft Comput., vol. 91, Jun. 2020, Art. no. 106205.

[6] H. Maqsood, I. Mehmood, M. Maqsood, M. Yasir, S. Afzal, F. Aadil, M. M. Selim, and K. Muhammad, ''A local and global event sentiment based efficient stock exchange forecasting using deep learning,'' Int. J. Inf. Manage., vol. 50, pp. 432–451, Feb. 2020.

[7]X.Pang,Y.Zhou,P.Wang,W.Lin,and V.Chang,''An innovative neural network approach for stock market prediction,'' J. Supercomput., vol. 76, no. 3, pp. 2098–2118, Mar. 2020.

[8] W. Long, Z. Lu, and L. Cui, ''Deep learning-based feature engineering for stock price movement prediction,'' Knowl.-Based Syst., vol. 164, pp. 163–173, Jan. 2019.

[9] G. Rekha, D. Bhanu Sravanthi, S. Ramasubbareddy, and K. Govinda, ''Prediction of stock market using neural network strategies,'' J. Comput. Theory. Nanoscience, vol. 16, no. 5, pp.2333–2336, May 2019.

[10] P. Ou and H. Wang, ''Prediction of stock market index movement by ten data mining techniques,'' Modern Appl. Sci., vol. 3, no. 12, pp. 28–42, Nov. 2009.

[11] C.-F. Tsai, Y.-C. Lin, D. C. Yen, and Y.-M. Chen, ''Predicting stock returns by classifier ensembles,'' Appl. Soft Comput., vol. 11, no. 2, pp. 2452–2459, Mar. 2011.

[12] Y. Kara, M. Acar Boyacioglu, and Ö. K. Baykan, ''Predicting direction of stock price index movement using artificial neural net- works and support vector machines: The sample of the istanbul stock exchange,'' Expert Syst. Appl., vol. 38, no. 5, pp. 5311–5319, May 2011.

[13] W. Huang, Y. Nakamori, and S.-Y. Wang, ''Forecasting stock market movement direction with support vector machine,'' Comput. Oper. Res., vol. 32, no. 10, pp. 2513–2522, Oct. 2005.

[14]T.Turner,ABeginner'sGuideToDayTradingOnline,2nded.NewYork, NY, USA: Simon and Schuster, 2007. .

[15] M. R. Hassan, B. Nath, and M. Kirley, ''A fusion model of HMM, ANN and GA for stock market forecasting,'' Expert Syst. Appl., vol. 33, no. 1, pp. 171–180, Jul. 2007

[16] R. Majhi, G. Panda, B. Majhi, and G. Sahoo, ''Efficient prediction of stock market indices using adaptive bacterial foraging optimization (ABFO) and BFO based techniques,'' Expert Syst. Appl., vol. 36, no. 6, pp. 10097–10104, Aug. 2009

[17] Y. Chen and Y. Hao, ''A feature weighted support vector machine and K- nearest neighbor algorithm for stock market indices prediction,'' Expert Syst. Appl., vol. 80, pp. 340–355, Sep. 2017.

[18] J. B. Duarte Duarte, L. H. Talero Sarmiento, and K. J. Sierra Juárez, ''Evaluation of the effect of investor efficiency,'' Contaduría y Administración, vol. 62, no. 4, pp. 1361–1376, Oct. 2017.

[19] H. Chung and K.-S. Shin, ''Genetic algorithm-optimized long short-term memory network for stock market prediction,'' Sustainability, vol. 10, no. 10, p. 3765, 2018.

[20] B. Weng, W. Martinez, Y.-T. Tsai, C. Li, L. Lu, J. R. Barth, and F. M. Megahed, ''Macroeconomic indicators alone can predict the monthly closing price of major U.S. indices: Insights from artificial intelligence, time-series analysis and hybrid models,'' Appl. Soft Computing ., vol. 71, pp. 685–697, Oct. 2018.

[21] S.G.Gino Sophia, V. Ceronmani Sharmila, "Zadeh max–min composition fuzzy
rule for dominated pixel values in iris localization", Soft Computing, Springer
Journal, November 2018, Vol. 23, Issue-6, ISSN:1432-7643, 1873-1889.

[22]Kiran Kumar Pulamolu, Dr.D. Venkata Subramanian, Dr.V. Ceronmani Sharmila
and Dr.C. Emilin Shyni"Design of Enhanced Combined Regression Ranking
Algorithm for Resource Sharing in YARN", Journal of Advanced Research in
Dynamical and Control Systems, Issue No. 15, ISSN : 1943-023X, pp. 268-276,
2017.

[23]Sujatha, Ceronmani Sharmila, &quote ;Efficient mutual user authentication protocol to share files using id in cloud storage & quo Journal of Theoretical and Applied Information Technology, Vol.8645, pp. 3301-3319, October 2020.