VALUE OF PURCHASE PREDICTION USING MACHINE LEARNING ALGORITHMS

Fidelis Egbuna[1] and Chukwuemeka Omerenna[2]

[1]Department of Computer Science, IBLT University, Lome. Togo
[2]MasteryHive, United Kingdom

ABSTRACT

The aim is to analyze the sales of a supermarket as well as predict the impact of future sales on profit increase andcustomers satisfaction in the organization. The technique used for value of purchase is Linear Regression Algorithm,a widely acclaimed Algorithm in the field of Machine Learning. Linear Regression was compared with K- Nearest Neighbors Algorithm as well as with Gradient Descent and Random Forest. The actual data of the year, 2019, was compared to the predicted value and the accuracy of prediction calculated. The results testify to the trustworthiness and accuracy of the different prediction algorithms used. The study showed Random Forest as the best model with the prediction's highest accuracy. Random forests accuracy rate based on multiple decision trees and prediction taken from average output from various trees; generalized well and achieved a higher accuracy of 94% than other models

KEYWORDS

Data Visualization, Prediction, Machine Learning, Linear Regression and K-Nearest Neighbors , Random forest and Gradient Descent and Radio Frequency Identification Tag.

1. INTRODUCTION

Information technology boasts of a huge number of data that are generated daily and stored for use by researchers [1,8]. The data can be big or small.Multinational corporations are always associated with big data because of their huge monthly budgets[2]. One of the superstores that works with big data is TwinsFaja in Lagos, Nigeria. It has shopping complexes with lots of data to work with. The company's supply chain management includes receiving, handling of stocks, customers services; it makes purchases, receives quarterly and yearly inventories, advertisement research, sales, among others. The main objective of the company is to generate profit, promote customers satisfaction and goodwill. A lot of informationabounds in the dataset for analysis and prediction. This study will check the present position of sales and come out with future expected sales to know if there is decline or not.This is done through research and evaluation of the trends of the market to increase customer's base and also maintain proper inventory and discount or update. This could be applied for future customer's satisfaction. This study will predict the sales of superstores for next year from the available tools. Machine learning (ML) is one the most advanced tools in data analysis, data visualization and techniques such as clustering and regression which help to obtain information about the dataset [1,8]. Data are recorded in the world; once collected, they can be studied andanalyzed. They help us to understand the nature of the problem and make prediction possible. Data can be divided into two definite categories:

- Categorical- normal, ordinal
- Numerical- discrete and continuous [1].

David C. Wyld et al. (Eds): AIBD, MLSC, ACSTY, NATP, CCCIoT, SVC, SOFE, ITCSS -2024
pp. 137-151, 2024. CS & IT - CSCP 2024 DOI: 10.5121/csit.2024.140411

Data analysis is the process of analyzing data to deduce useful information from thedataset [3]. The process involves different steps from organization, cleansing to obtaining result and, finally, data visualization [4]. Available dataset is visualized using graphs and plots. This is also called Data Analytics [5, 8]. A detailed analysis of the process will be explained later.

Finally, this study aims to predict the accuracy of the predicted dataset of different years to generate the accuracy rate.

ML subset of AI can aid in recognition of customer favorites and behaviors, allowing and enable increase in sales. Furthermore, AI-powered pricing algorithms help retailers with dynamism and set prices based on real-time supply and demand data, improving cost-effectiveness motivation and upskilling employees [15].

1.1. Research Structure

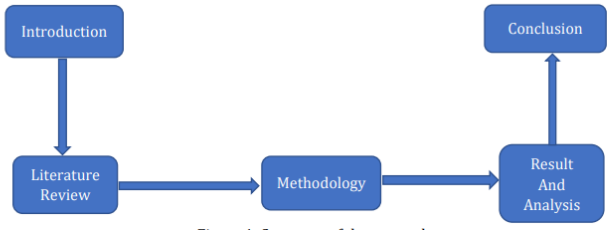


Figure 1. Research structure

2. LITERATURE REVIEW

Numerous statistical models and techniques such as Regression, (ARIMA) Auto Regression Integrated Moving Average have been adapted for generating multiple sales forecasting concept problem and are affected both by external and internal factors. These constitute the problems of the statistical approach [9]. A novel method using ML algorithms to facilitate accurate predictions in a comparative study is examined and presented by Arif A.I. etal. 2019 [10]. ML algorithms are needed and best suited for product sales forecasting unlike traditional statistical approach that is susceptible to noise, bias and laboriousness [9].There are predictions that evaluate sales value based on Linear Regression. Performance measuring techniques such as accuracy scores, precision, recall, f1 score, and ROC-AUC Curve are well suited for this study and measure very well because of the different models to be used. Classification algorithms [1], [2], &[5] use Dataset for Linear Regression. This study uses Regression model which compares L.R, KNN and Random Forest as well as Gradient Descent algorithms. Nevertheless, a method using ML [10] also helps with accurate predictions in a comparative investigation and analysis of different algorithms such as KNN, Gaussian, Naïve Bayes, and Decision Tree classifier. A detailed analysis shows that Gaussian has the best accuracy for the historical data [11]. Yet, another study conducted recently based on the MLperspective produced accuracy predictions; the research concentrated on finding the most effective algorithms that could help estimate demand with high precision and less error. Further works on artificial intelligence in retail sectorsexamine the Impact of AI on employee training andupskilling and showed the Importance of customers choices which enhances the sustainability in market [13], as described by [14] which shows how application of artificial intelligence into companies business can enhance processes based on their distinctive data captured through new smart device, RFID, robots, chat bots, conversational bots, Big data, Facial expressions of consumers, their choices, IoT and many else smart and innovative technologies which supports machine learning, deep learning, artificial augmentation and

intelligence ,virtual reality. [15] Showanalyses of artificial intelligence and deep learning provision onfeatures like sentiment analysis on exact customer thinking and what they really want and features like demand forecasting can be really helpful to manage from factory stock in/out. [16]Examine the extent to which AI features within academic research in retail industry and aims to consolidate existing knowledge, analyse the development on this topic, clarify key trends and highlight gaps in the scientific literature concerning the role of AI in retail.

However, three algorithms were used for forecasting and classifiers; they include the following: KNN, Gaussian and Decision Tree [9]. A comparative analysis of four ML algorithms(Decision Tree, Deep Learning ANN Random Forest and Naïve Bayes) using different classifications of ML algorithms and data mining techniques showed that Random Forest was the most effective with a high accuracy rate. The research was conducted using the CRISP-DM methodology. An original dataset was created to define the problem in this study.

3. RESEARCH METHODOLOGY

The use of RFID tags was for data collection and helped in customers' behavior identification etc. The RFID tag analyses purchases by customers' purchase and buying behavior. Also, this system makes data collection not only accurate but faster. The RFID tag helps to replace the traditional barcodes. It is attached to the shopping carts to track the assets, inventory and movement of customers, identify thefts, time spent in a busy area, among others. The tags also help to advertise the products the customers would like and helps to boost sales. The tags also help to avoid overstocking. To understand how ML works, data will be studied while the best model would be selected, tested and predictions made on the new cases.

ML algorithms a subset AI is wonderful and response to customer shopping online or in-store. As they can make choices of various products which suits them the best, get to know the physical location of products in-stores and compare different brand.

Afterword, the response is made-to-order into systematic dataset based on visual, textual and facial expressions to perform predictive analysis, and to forecast the demand and behavior of consumer. The in-store behavior of customer by Beacon, Closed-circuit television (CCTV), Radio Frequency Identification (RFID), and Near Field Communication (NFC) are used in related fashion clickstream behavior as used in online tracing [14].RFID is widely used in retails and logistic and is the base technology for internet of thing (IoT).

The approach consists of different steps and involves transformation and processing of data in order to produce datavisualization which can make prediction to a mathematical model. Based on the analysis, a process chain consists of the following data.

The data stages:

- Problem definition.
- Data Extraction
- Data Cleansing.
- Data Exploration
- Predictive Modeling
- Model Validation/Test
- Visualization and Interpretation of result
- Deployment of the solution. [1]

A. **Problem Definition:** - Research problem. The study analyses the sales of a superstore and predicts its future sales to guarantee customers satisfaction and increase their profit.

B. **Data Extraction:** This was chosen with the basic purpose of building the predictive Model and analysis as well. Data are collected from various departments and organized in a single file and thereafter cleansing was applied. Also, various noises within the data were removed to enable the analyses perform well on the data.

C. **Data Preparation**: The prepared data weregot, cleansed, normalized and transformed into optimized dataset in tabular format.

D. **Data Exploration/Visualization:** Data in graphical or statistical presentation is the best tool to highlight possible patterns. Exploration consists of a preliminary examination of the data to understand the type of information that is most suitable for a model definition.

E. **Predictive Modeling**: After exploring data, the needed information was developed to mathematical model that encodes the relationship between the data model and make prediction about the data value produced by the system. This is regression model obtained with numerical type. A simple method is used to generate it, including linear Regression technique.

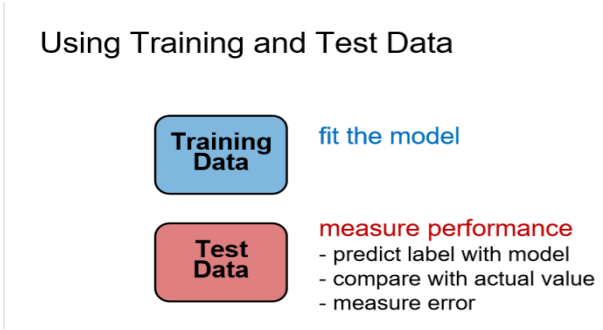
F. **Model Validation:** This is a test phase that allows one to validate the model built on the basis of starting data. It also allows one to test validity of the data produced by the model by comparing them with the actual system.It enables one to confirm solution of the problem of research.

G. **Deployment:** It consists of implementation of the results obtained from data analysis. This report should be directed to managers, who should be able to make decisions for the future sales for their profit and customers satisfaction.

H. **Model Building Using Linear Regression:** This Predictive modeling was achieved by Machine Learning technique [6]. It is a computer ability to learn without being explicitly programmed. There are four types of ML Algorithms namely Supervised, Semi-supervised, Unsupervised and reinforcement.Outof which, I will use supervised and Unsupervised algorithms in this study. Supervised Learning has a known outcome and label while Unsupervised Learning does not have label and outcome.

Training and Test Splits

Model Generalization:
The model generalization was carried out to get the fitting training and test data from the dataset. The training data was split into 2 sets: the training set and test set. The best way to do this is by splitting your data into two sets: training and test set. We split 70% of data for the training set and 30% of data for the test set. By evaluating your model based on the data, how well your model will perform. The error rate (generalization error or test error), is an indicator of how well the model generalizes.



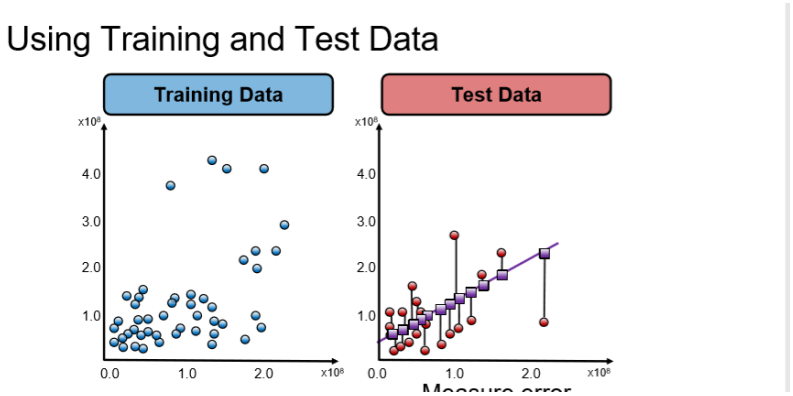
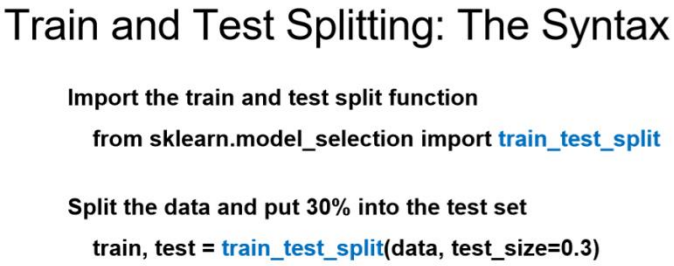


Figure 2. Training and Test Data



Popular ML algorithms are:

- Naïve Bayes Classifier Algorithm (Supervised Learning - Classification}
- K-Means Clustering Algorithms(Supervised Learning – Classification)
- Support Victor Machine Algorithms (Supervised Learning Classification)
- Learner Regression (Supervised Learning /Regression)
- Logistic Regression (Supervised Learning-Classification)
- Decision Tree (Supervised Learning –Classification/Regression
- Random Forest (Supervised Learning-Classification/Regression)
- K-Nearest Neighbor (Supervised Learning)

Linear Regression:
It means linearly combination of features. Linear regression model prediction is shown in the figure 2 and 3 below.

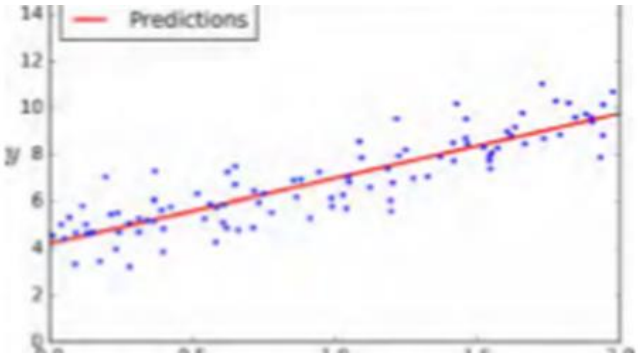


Figure 3. Linear regression model prediction

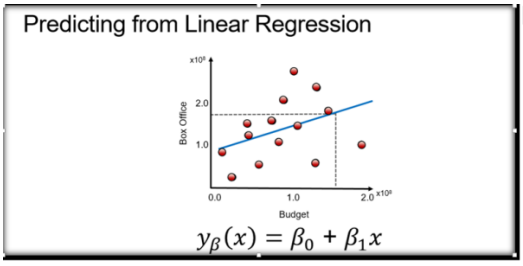


Figure4. Linear regression model prediction

3.1. K-Nearest Neighbor

KNN is a supervised ML algorithm based on classification for predictions.
As shown in the figure below, the flower a customer is most likely to purchase is similar to a previous purchase.
Therefore, classification needed for the prediction includes:
Model data with:
• Features that can be quantitated
• Labels that are known
• Method to measure similarity

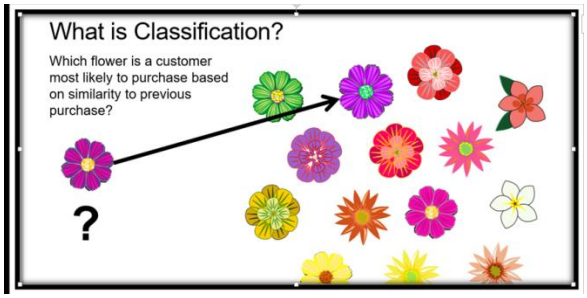


Figure5. K-Nearest Neighbor Classification

Table 1. Comparing LR and KNN

Linear Regression	KNN
Fitting involves minimizing cost function (slow)	Fitting involves storing training data (faster)
Model has fewer parameters (memory	Model has many parameter

efficient)	s(memory intensive)
Prediction involves calculation (faster)	Prediction involves finding closest neighbors (slower)

The predictive analytics in this study was achieved using Linear Regression [7].
LR is a type of regressionanalysis where the number of independent variable is one and there is a linear relationship between the Independent (x) variable and dependent (y) variable [3].
Introducing Learner Regression Equation shown below

$\gamma_\beta(X) = \beta_0 + \beta_1 X$

The motive of the L.R algorithm is to find the value for value β_0 and β_1. One important concept that one must know to better understand linear regression is cost function, It helps to get possible values for β_0 and β_1 which provide the best fit line for the data points. Cost function also minimize the error between predicted value and the actual value.

Min $= \frac{1}{m}\sum_{i=1}^{n}((\beta_0 + \beta_1 X) - \gamma_{obs} i)^2$

$j(\beta_0 , \beta_1 X = \frac{1}{2m}\sum_{i=1}^{n}((\beta_0 + \beta_1 X) - \gamma_{obs} i)^2$

3.2. Minimization of Cost Function

The above is chosen to be minimized. The difference between the predicted value and the actual value.It measures the error differencealso called residual error. The error difference is the squared and summed over all data points. It provides the average squared error on the points. The cost function is also known as the means squared Error (MSE) [7].

3.3. Gradient Descent With Linear Regression

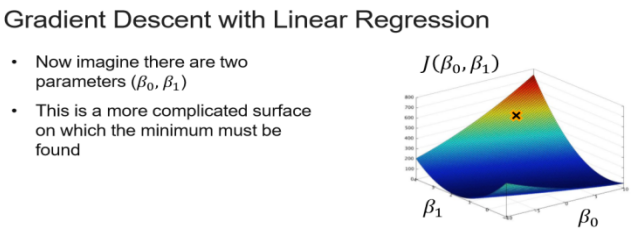


Figure 6. Gradient descent with linear regression

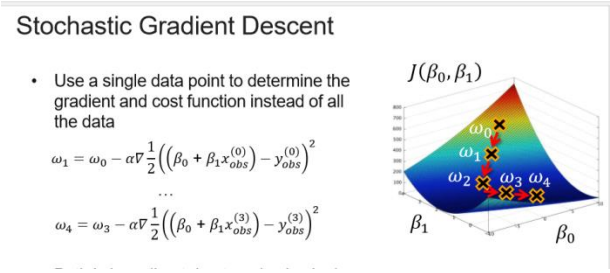


Figure 7. Stochastic Gradient Decent

Stochastic Gradient Descent Regression: Syntax

```
Import the class containing the regression model
  from sklearn.linear_model import SGDRegressor

Create an instance of the class
  SGDreg = SGDRregressor(loss='squared_loss',
                alpha=0.1, penalty='l2')

Fit the instance on the data and then transform the data
  SGDreg = SGDreg.fit(X_train, y_train)
  y_pred = SGDreg.predict(X_test)
```

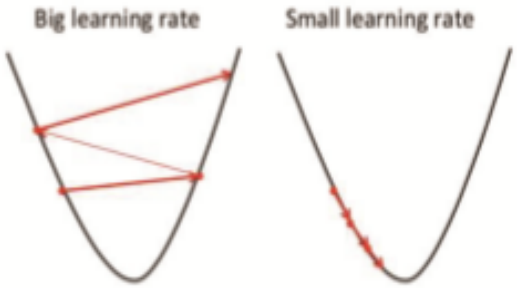


Figure 8. Big learning rate and small learning rate

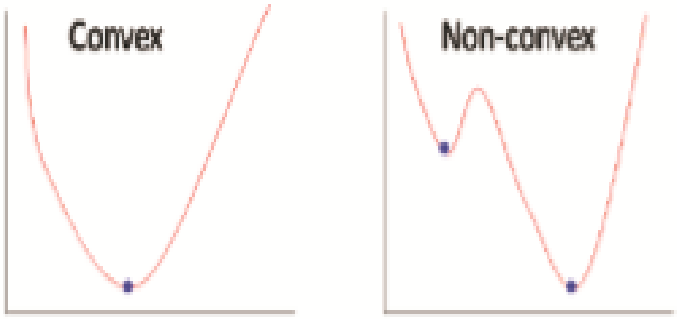


Figure 9. Convex and non-convex

Linear regression is gradient descent. Gradient descent is optimization algorithm and a method of updating β0 and 81 that changed the parameters iteratively to reduce the cost function. In figures 5 and 6 above,assuming someone is standing at the topmost point of a U-shaped pit and his objective is to get to the bottom of the pit by taking a distinct number of steps. If he decides to take one step at time he would get to the bottom eventually but would take a longer time. If he chooses to take longer step at a time, he would also get to the bottom but there is chance that he could overshoot the bottom pit, the number of steps he takes is the learning rate. This determines how the algorithm converges on the minima. The figure 7 above shows that cost function can be a non-convex function where it tends to settle at local minima; however, for linear regression, it is always convex function. To update β0 and β1, cost function is used. To find gradients, partial derivative with respect to β0, β1 is used.

$$W1=w0-\alpha\nabla\text{-}\frac{1}{2}\sum_{i=1}^{m}(\ (\beta_0+\beta_1 X)\ \text{-}\gamma_{obs}i)^2$$

$$W2=w1-\alpha\nabla\text{-}\frac{1}{2}\sum_{i=1}^{m}(\ (\beta_0+\beta_1 X)\ \text{-}\gamma_{obs}i)^2$$

$$W3=w2-\alpha\nabla\text{-}\frac{1}{2}\sum_{i=1}^{m}(\ (\beta_0+\beta_1 X)\ \text{-}\gamma_{obs}i)^2$$

The partial derivatives are gradients that are used to update β0 and β1. Alpha is the learning rate which is the hype parameter that must be stated. The smaller the learning rateleads, the closer it gets to the minima. However, ittakes more time to reach the minima than the learning rate and converges faster with credible chances that it can overshoot.

3.4. Random Forest

Random forestresembles a tree. A very popular and successful ML algorithm, it randomly selects subset of features on training set. It makes predictions of individual trees, before predicting the class with the most votes. The voting classier results is of higher accuracy. A Random Forests is normally identified with the Bagging method, and usually set the maxsamples as the size of the training set. A more optimal way to do this is by using the RandomForestClassifier, and use of RandomForestRegressor for regression. RandomForestClassifier has almost all of the hyperparameters of a DecisionTreeClassifier (to control how trees are grown), along with all the hyperparameters of a BaggingClassifier (to control the ensemble). The Random Forest algorithm has extra randomness, so instead of looking for the very best feature when splitting a node, it looks for the best feature among a random subset of features. This gives a greater tree diversity, which gets a higher bias, but a lower variance, and results in an overall better model. Random forest classifier for classifying malware and benign processes are good processes and ensure up to 95% accuracy.

We can have maximum of 100 trees which is an improvement our metrics. The figure below shown bagging and Random number of trees for further decorrelation [12].

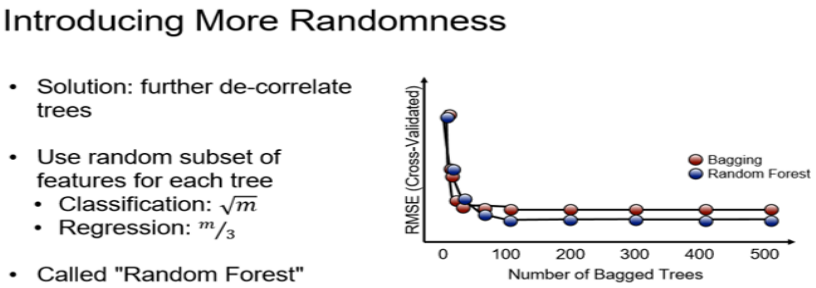


Figure 10. Introducing more randomness

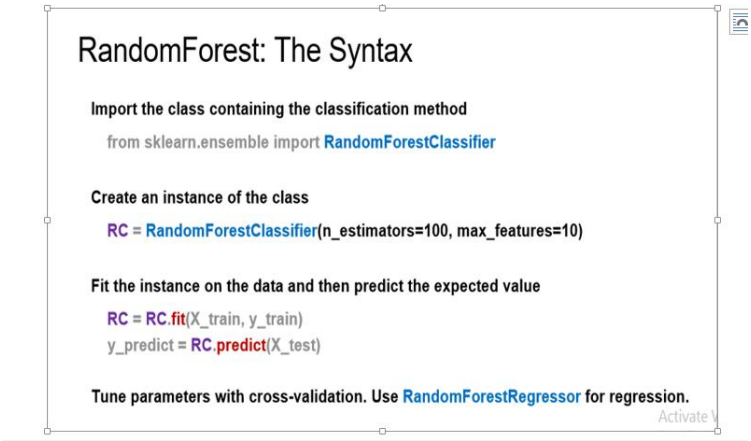


Figure 11. Random Forest Syntax

4. ANALYSIS AND RESULTS

4.1. Dataset Information/Experimental Set-Up

In this study, the dataset is collected from theFinance, Marketing, Sales, and Human Resources departments of TwinsFaja Superstore in Lagos, Nigeria. All of the above-mentioned departments were very useful in the provision of the dataset. The data collected were processed, using Microsoft Excel. The complete dataset was processed and stored in a xlsx file. This was loaded and imported in Jupiter Notebook data for visualization and exploration. Correlation and multiple regression analyses were conducted to examine the relationship between sales and various potential predictors

Table 2. Summary of the descriptive statistics the dataset

	Employees	Advertisement	Research	Sales
Count	**20.000000**	**20.000000**	**20.000000**	**2.000000e+01**
Mean	**51.800000**	**60504.250000**	**80735.500000**	**6.998508e+06**
Std	**7.743248**	**10033.500338**	**14868.553398**	**1.341547e+06**
Min	**38.000000**	**46288.000000**	**47583.000000**	**4.865372e+06**
25%	**47.000000**	**51902.750000**	**74761.500000**	**5.953569e+06**
50%	**52.000000**	**61029.500000**	**84724.000000**	**6.902520e+06**
75%	**56.500000**	**68690.000000**	**89669.500000**	**8.219482e+06**
Max	**67.000000**	**75947.000000**	**108678.000000**	**9.032762e+06**

As can be seen, each of the variables has 20 observations (count). Employees variable has a mean number of employee to be 51.8 and a standard deviation of 7.74, Advertisement has a mean of 60504.250000 and a standard deviation of 10033.500338.The research has a mean of 80735.500000 and a standard deviation of 14868.553398, while sales has a mean 6.998508e+06 and a standard deviation of 1.341547e+06.

Table 3. Shows the correlation of the variables.

	Employees	Advertisement	Research	Sales
Employees	1.000000	-0.042469	-0.094954	0.733508
Advertisement	-0.042469	1.000000	0.191807	-0.061120
Research	-0.094954	0.191807	1.000000	-0.131187
Sales	0.733508	-0.061120	-0.131187	1.000000

In other to perform multiple regression on the data, the 'Manager' variable with male and female values needs to be converted into a dummy variable (0 and 1). To perform the conversion on the variable, we make use of the dummies function in pandas.

The multiple regression model with all five predictors (Employees, Advertisement, Research, Manager_ M, Manager_ F produced) produced a R^2 = 0.550701452005418, Intercept = 1807737.78, and Regression coefficients = 1.21826966e+05, -7.74116595e+00, -8.24725674e+00, -1.43535401e+05, 1.43535401e+05
Regression equation is given below:

$$Sale = 1807737.78 + 1.21826966(\text{Employees}) - 7.74116595(\text{Ad}) - 8.24725674(\text{Res.}) - 1.43535401(\text{Male}_{\text{Manager}}) + 1.43535401\text{e}+05(\text{Female}_{\text{Manager}})$$

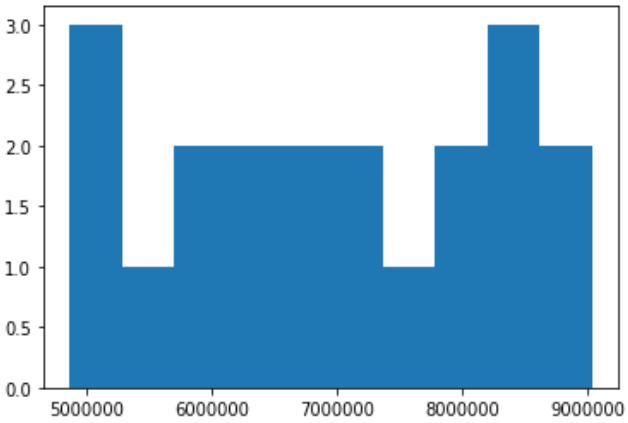


Figure 12. The distribution of sales from year 2000-2019

4.2. Results

Graphical Representation of Experimental Results.

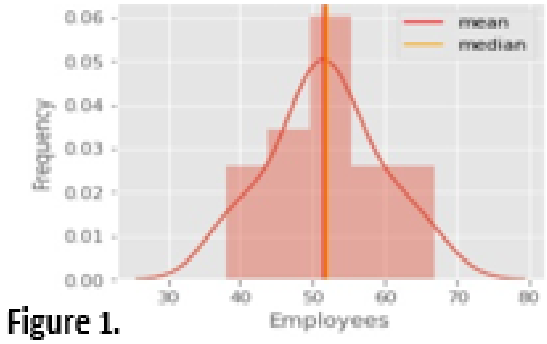


Figure 1.

Figure 13. Histogram of employees

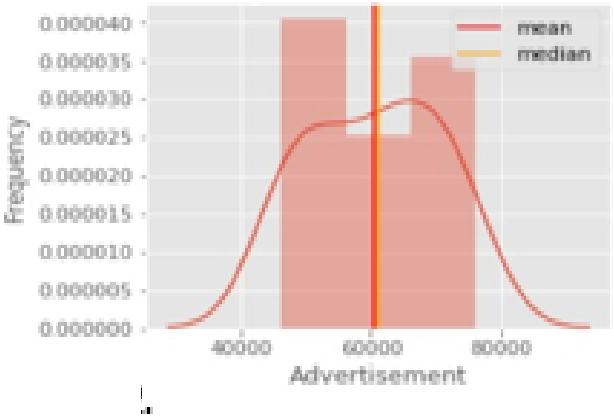


Figure 14. Histogram of advertisement

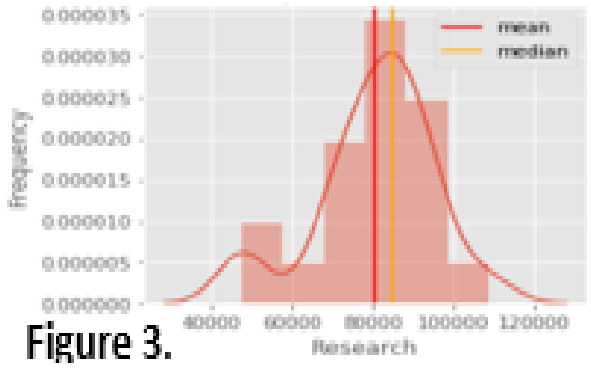


Figure 15. Histogram of research

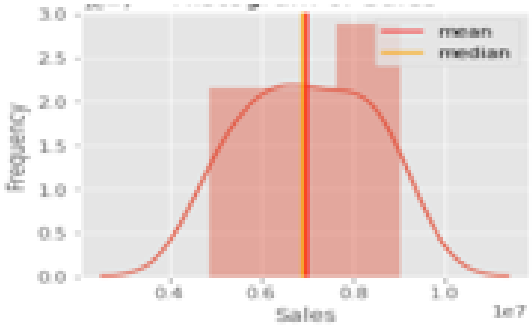


Figure 16. Histogram of sales

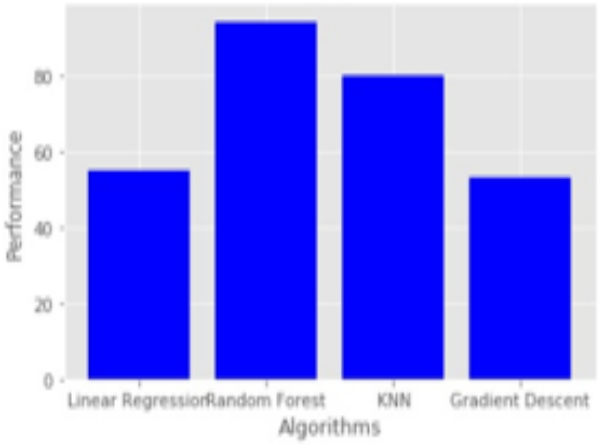


Figure 17. Summary of the performance metrics Algorithms

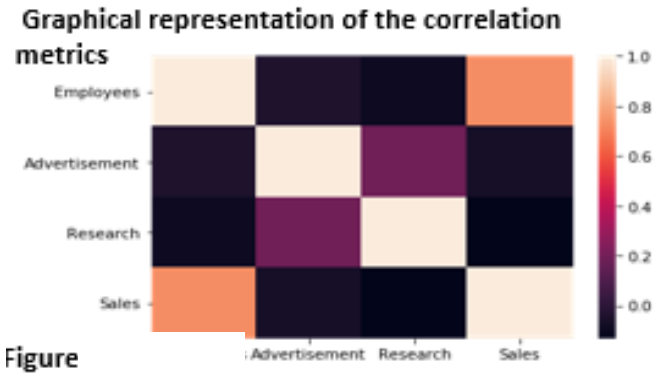


Figure 18. Graphical representation of the correction metrics

KNN

R^2 for KNN is 0.17705559175802177 which is less than that of multiple regression (R^2 = 0.550701452005418).

- Accuracy rate LR is 55% compared Random Forest is 94%., KNN, 80% and GD 53%

LR Coefficient. 1.21826966e+05, -7.74116595e+00, -8.24725674e+00, -1.43535401e+05, 1.43535401e+05]).

Table 4. Actual sales predicted from zero to four

	Sales (Actual)	Sales (Predicted)
0	6487529	6344978.0
1	5074224	5269279.0
2	6406837	7017289.0
3	6005347	5134817.0
4	4865372	5538204.0

Table 5. Actual sales predicted from fifteen (15) to nineteen (19)

	Sales (Actual)	Sales (Predicted)
15	5348477	7151752.0
16	9032762	8496375.0
17	8323740	6882827.0
18	8957388	9034224.0
19	8376463	7017289.0

LRintercept_1807737.776924489.

R Squared (Correlation Coefficient= 55.07014520054182)

5. CONCLUSION

The objective of the study was achieved by comparing all the algorithms from sales for year 2019, based on data collected between 2018 and 2000. This research examined and compared the accuracy rate of sales from the actual year 2019 to the predicted year2019.

- L.R accuracy rate, 55%,fits slowly and minimizes cost function
- KNN accuracy ratewas 80%, better than LR but smaller than RF-fitting, and involved storing training data to make itfaster.
- GD was 53%–an optimization algorithm, was added to LR to minimize cost function. The accuracy rate was slower than LR.

- Random forests accuracy rate based on multiple decision trees and prediction taken from average output from various trees;generalized well and achieved a higher accuracy of 94% than other models, unlike the Single Tree, Random forests does not have high variance and over-fitting.Correlatedcoefficient factors also were calculated.

5.1. Future Work

The result can be used to predict 2020 and future years, given addition of more features and application of featureengineering. The prediction can refine methodologies and strategies to increase sale of products.

5.2. Limitations

Data collection was a major drawback to this study; the recent lockdown in almost all countries of the world due to the COVID-19 pandemic hindered businesses from opening, some of which have remained closed till date. Another limitation to this research was the computer's computational power to run the python codes.

REFERENCES

[1] Python Data Analytics, the Expert Voice in Python,Author by Fabio Newi.
[2] “Prediction of Sales Value in Online Shopping Using Linear Regression” GopalakriahanT . et al2018 4th International Conference on Computing Communication and Automation (ICCA)
[3] “A Comparison of Regression models for of Graduate Admissions”. Moham S. Achaya eta elSecond International Conference on Computational Intelligence in Data Science (ICCIDS-2019).
[4] ”Applied Linear Statistical model” Fifth Edition Kutner Nacitsheim. Neter and L. McGraw Hill India. 2013. Paperback, 978129064746
[5] Lugi Da, Immanuel &Setiawan,Johan (2017). Data Visualization Indicator Disease (Malaria, Dengue Fever, and Measles) in the year 2012-2015.
[6] https://www.sas.com/en_gb/insights/articles/analystics/machine-learning-algorithms. html.
[7] https://towardsdatascience.com/imtroduction-to-machine-learning-algorithms-linear-regression-14c4e325882a.
[8] https://towardsdatascience.com/imtroduction-to-machine-learning-algorithms-linear-regression-14c4e325882a
[9] Kenneth Ofoegbue 2022 A Comparative Analysis of Four Machine Learning Algorithms to Predict Product Sales for a Retail Store.
[10] Arif A I, Sany S I, Nahin F.I, Shahariar A K M and Rabby A 2019 Comparison Study:Product Demand Forecasting with Machine Learning for Shop
[11] Arif MA I, Sany S I, Nahin F I and Rabby A S A 2020 Comparison Study: Product Demand Forecasting with Machine Learning for Shop 171–6.
[12] Aurélien Géron “Hands-On Machine Learning with Scikit Learn &Tensorflow (O’Reilly)”.
[13] Akshaya. V and Dr. L.R.K. Krishnan. Volume - 9, Issue - 2, February - 2023. Impact of AI on Retail Operation andProfitability Moderated by Employee Motivation and Upskilling INTERNATIONAL JOURNAL FOR INNOVATIVE RESEARCH IN MULTIDISCIPLINARY FIELD ISSN (O): 2455-0620
[14] Venus Kaur, Vasvi Khullar and Neha Verma Review of Artificial Intelligence with Retailing Sector Journal of Computer Science Research | Volume 02 | Issue 01 | January 2020
[15] Siddharth Varsani and Chhaya Patel . Comprehensive Analysis of Deep Learning in the Indian Retail Sector. International Conference on Science, Engineering and Technology (ICSET 2022)
[16] C Heins-Foresight, 2022 emerald.com Artificial intelligence in retail – a systematic literature review

AUTHORS

I hold a Bachelor of Engineering Degree in Computer Science and Engineering at Enugu State University of Science and Technology, Enugu, Nigeria. Also, I hold a Master's Degree in Electrical/Electronic Engineering with specialization in Electronics and Telecommunications from the University of Port-Harcourt, Nigeria.
I had ten years meritorious service experience with Exon Mobil Nigeria, and was recognized with an award of excellence for my phenomenal contribution to the Warehouse Revamp Project as a Network Analyst and Materials Field Engineer. Professionally, I am a Certified Cisco Network Associate, (CCNA), a Certified E-Business Professional (CEP ID. ECC972569) in Supply Chain Management by EC-Council and a registered Engineer with the Council for Regulation of Engineering in Nigeria (COREN.R.22,464); Member, Nigeria Society of Engineers (R.19,464) and a recipient of C/CT Cybersecurity Scholarship from EC – COUNCIL, 2023.
I have about 20 years' experience in both the IT Industry and academia, as well as possess the ability for System repairs and maintenance, installation and configuration of Cisco switches and routers in multi-protocol Internet works using LAN & WAN interfaces, C++ Programming language, Python language, IPES/SAP and JAVA.
Presently, I am an IT manager with ABC Express Courier Ltd, Lagos, Nigeria. Also, I am an AssociateLecturer with IBLT University, Lome, Togo.

Omerenna Kelvin Chukwuemeka holds a National Diploma and Higher National Diploma in Industrial Maintenance Engineering from the Yaba College of Technology respectively in 2008. He proceeded to study for his Bachelors of Engineering degree in Mechatronics at the Bells University of Technology in 2019. Later, he obtained his Master of Science Degree in Intelligent Vision from the University of Lincoln, 2023.
As part of his industry experience, he became involved in an independent study titled "Impact of Stress-Related Muscles for the Packing Line Operators" at Nestle Nigeria PLC. In this project, he assessed the muscle function for a task including male and female employees with a hand grip dynamometer to measure their maximum voluntary contraction (MVC) and endurance time (ET) taking their anthropometric parameters into consideration.He also, investigated the performance of task-oriented trajectories on a Baxter humanoid robot that is equipped with a haptic device. Furthermore, he developed a haptic shared autonomy approach in an effort to enhance the human and robot capabilities, which included analyzing and evaluating the trajectories of the end-effector information during the pick-and-place task.Presently, he is working as a Data Engineering Intern at MasteryHive, United Kingdom.