WILEY | Hindawi

Research Article

Prediction of Quality Food Sale in Mart Using the AI-Based TOR Method

Daniyal Irfan [iD],[1] **Xuan Tang** [iD],[1] **Vipul Narayan** [iD],[2] **Pawan Kumar Mall** [iD],[2] **Swapnita Srivastava** [iD],[2] **and V. Saravanan** [iD][3]

[1]*School of Management, Guangzhou University, Guangzhou, China*
[2]*Department of Computer Science and Engineering, Madan Mohan Malaviya University of Technology, Gorakhpur, U.P, India*
[3]*Dambi Dollo University, Oromiya, Ethiopia*

Correspondence should be addressed to Daniyal Irfan; daniyalirfan3420@yahoo.com and V. Saravanan; saravanan@dadu.edu.et

"The golden highways of the technological route serve as the ultimate metaphor for the society of artificial intelligence," explains the author of this present excursion. Unsupervised predictor is a technique that is used in all upbringings and algometry computations, and it is the foundation of all of them. The accuracy-based artificial intelligence and genetic algorithm-based prediction are becoming more important in business intelligence, with the crossover revealing the highest percentage of interest-based profit in the food industry. Our suggested approach aims to determine the utmost amplification of the food business profit with the help of food sale prediction. Hence, owners of outlet sale, supermarket sale, grocery store, and so on can maintain the stock. Therefore, our study strives to elucidate the relationship between food business intelligence and artificial intelligence in the context of soft computing. The study combines the previous data with the record of the current data and compares the existing development of business management in order to create the topic of the TOR method, which will be the artificial intelligence buzzword in the town-based food business intelligence. This paper uses artificial intelligence, business intelligence, and neural networks to forecast the food sale prediction by evaluating the data of each individual client. Consider the situation in which this technology is applied in every grocery store in the country. Our suggested model has achieved low mean squared error and low variance. Food mart owners will have a far better grasp of their clientele and will be able to categorise them in this situation, enabling them to proceed with future sales forecasting.

1. Introduction

Artificial intelligence (AI) has a distinct position in the rapidly evolving world of technology. AI is the term used to refer to the intelligence imparted to machines by humans via the creation of artificial intelligence. When it comes to expressing AI's full potential, it is best shown by its capacity to not only optimise current processes and increase automation, information, and transformation impacts but also its ability to recognise, anticipate, and interact with people [1]. Machine learning and artificial intelligence are based on a variety of mathematical algorithms, computations, and predictions, among other things. However, we cannot relate any computer to the human brain since the latter is far more complicated and varied. Despite this, we may not be able to completely comprehend how this new and fast evolving technology drives food business model innovation [2].

Detect patterns in data are classified as unsupervised learning techniques. When unsupervised methods are used, the data are not labelled, meaning that just the input variables (x) are provided and there are no matching output variables provided. These learning problems may be further subdivided into two categories: clustering challenges and association issues. We can evaluate the numerous equations with the assistance of current computers known as supercomputers, which make use of machine learning, artificial intelligence, big data, and a variety of other complicated circuits to do so. Deep aspects combine the long-term shell

of learning the data with emergent domains that are increasing at an exponential pace, as shown in Figure 1. Machine learning is now being considered in every industry, whether it be industry or aeronautical science and technology. The primary goal of our study is to anticipate the business of the food sale prediction moment. With the use of artificial intelligence, business intelligence, and neural networks, a model will be developed that will categorise all of the food sale prediction into various categories. In addition, the model will forecast the future demand of food items. Employees may now be assessed and guided in real time by delivering instance learning and feedback in real time, thanks to the usage of AI-powered autonomous micro-learning in conjunction with machine learning. This helps enhance food sale prediction [3]. The present study combines the previous data with the record of the current data and compares the existing development of business management in order to create the topic of the TOR method, which will be the artificial intelligence buzzword in the town-based business intelligence. The current evolution of business management will serve as the basis for the TOR method's topic, which will be the artificial intelligence buzzword for the town-based business intelligence.

The demand and supply chain principle underpins the operation of the majority of businesses. The food industry is also involved in this process. As we all know, the majority of food goods have a limited shelf life, which means that bulk manufacturing of food items may pose a risk in business. It is essential in order to accurately forecast demand for food goods. Industrial automation is the most effective method for overcoming the challenges faced by the food manufacturing industry. Automation is totally based on artificial intelligence (AI), deep learning (DL), and machine learning (ML) algorithms, among other technologies. Food production and distribution procedures may be managed more effectively with the help of an AI-based system, which also helps improve operational competency. The usage of artificial intelligence-based systems is becoming more widespread, and low-level activities such as surveying employees for product requests from the society are becoming obsolete. Because of the presence of humans in this process, it is very time-consuming to complete. Artificial intelligence (AI) is based on prior records (history), and on the basis of these historical facts, predictions of future demand are generated. Figure 1 shows the role of AI in the food industry.

Let us take a closer look into neural networks to get a better understanding of how things function in general. A neural network is a computer programme that acts on a set of algorithms and attempts to replicate the human brain. The neurons of the brain are represented by the hidden layers of the neural network. The use of neural networks allows you to solve a broad variety of inputs with the same set of code in a short period of time. It makes an attempt to assess the information and create a variety of correct outputs for additional data collection. As well as remembering and examining the present logic and the input for future reference, the built model provides high efficiency. Artificial intelligence is at the heart of neural networking, and it is now generally acknowledged in the business profit. In addition to this, neural networking is used in weather forecasting, fraud detection, and risk management, among other applications. The neural network identifies the opportunities for the greatest possible profit while making trading decisions on the basis of data analysis.

The following is the equation for the formation of neural networks:

$$\oint_{\text{initial}}^{\text{unique}} D = \exists\, \text{Str} \times \sqrt{\text{supr}_{\text{variable}}} \div e^{-\text{tor}} \in \text{interd}_D,$$

$$\prod_{\text{encapsul}_{\text{data}}} \text{tor} \pm \text{base}^2 + 4 \times \text{acc} \times \text{const}_{\text{value}} \qquad (1)$$

$$\times \frac{\text{array}}{4.0} \sim \text{InD}_{\text{acc}} = 100.$$

In summary, major contributions are the following:

(i) We proposed AI-based food sale prediction and improved the performance in terms of the mean square error and variance

(ii) We collected sale data from different food marts throughout the country

(iii) The proposed model opened the path for the other AI-based applications

The paper is organised as follows: Section 2 provides information about the literature survey. Sections 3 and 4 provide the detail about methodology and results, respectively, and in the last section, we have discussed the conclusion of the work.

2. Literature Survey

John McCarthy invented the term artificial intelligence (AI) in 1956, defining it as "the science and engineering of creating artificial intelligence machines." That which we refer to as the simulation of human intelligence that is processed by machines is what we are talking about today. Cortana, Siri, and Google Assistant are the most prevalent artificial intelligence systems that we encounter in our daily lives. Since its inception, AI has undergone a significant transformation. Previously, AI has been able to do this through developing robots and machines that have been employed in a variety of disciplines, including robotics, space exploration, marketing, and healthcare. AI is also involved in the development of business analytics software, among other things. We often think of artificial intelligence as a robot or machine that performs our daily tasks, but we do not realise that it has always been present in our lives. For example, the Google search engine that we use is an example of AI that provides accurate search results even if we input something that is related to our desired output. Because they share a common application, AI, ML, and DL are frequently confused as being the same thing. AI is the science of teaching machines to mimic human behaviors, ML is the subset of AI that makes decisions based on the data fed into it, and DL is the subset of ML that uses neural networks to solve difficult problems.
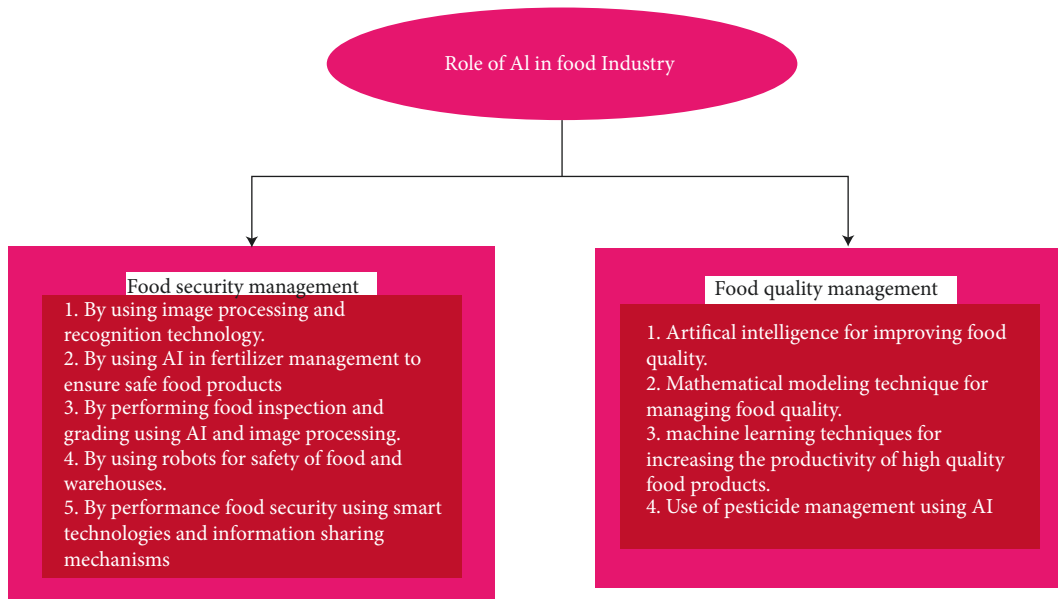
FIGURE 1: The role of AI in the food industry.

These three are frequently seen working together to solve algorithmic and data-driven problems. AI has a variety of beneficial effects on a company's overall operations, and management and business investment in AI will improve the company's long-term viability and market leadership [4]. In their existence, artificial intelligence (AI) poses new hazards, which must be minimised to an acceptable degree in order to preserve their overall well-being [5]. Artificial intelligence encompasses a wide range of topics such as object identification, natural language processing, expert systems, and robotics. There are three categories of artificial intelligence, which are artificial narrow intelligence, artificial general intelligence, and artificial superintelligence. From a commercial standpoint, artificial intelligence (AI) allows us to automate human decision-making. As a result, we can reduce expenses and waiting times while simultaneously increasing revenue and profit margins [6].

In 1980, a Japanese AI-based drone was utilised for agricultural dusting. Nowadays, most firms use agricultural AI and aerial technologies to monitor crop health [7]. The company's main goal is to reduce expenses and increase the agricultural yield. Users preprogram the drone's path and then connect it. Then, the computer vision will take photographs for analysis.

Artificial intelligence (AI) leverages information from previous records to analyze it using AI-enabled techniques, allowing trade outcomes to be anticipated for a given period of time. AI primarily benefits food producers and merchants by assisting them in greater understanding of their clients. Organizations will discover the likes and preferences of their customers, which will aid them in forecasting potential sales patterns for their goods. With supply chain management proving to be a big challenge for many food and beverage (F&B) businesses, AI can help deliver insight into the way businesses operate by successfully managing inventory. By

increasing the productivity and using different algorithms for sales projections, artificial intelligence combined with data science can enhance the efficiency of cafes, delivery service restaurant chains, hoteliers, and dining establishments [8]. They make smart managerial decisions and deliver products without excess inventory by studying how consumers react to digital marketing activities and incentives [9].

AI is taking care of recruitment, training and development, pay and benefits, compliance, sales, consumer behaviour forecasts, customer support, and a slew of other tasks and responsibilities. The use of artificial intelligence in corporate management is very beneficial since it makes it possible to assess and forecast crucial factors with more efficiency and lower cost in a timely manner [10]. AI admissions in digital data help in this coordination, resulting in company benefits throughout the course of the phase. In this food business model, the company will be in charge of retaining a recurring subscription [11].

With the rise of artificial intelligence, low-level employment will undoubtedly become obsolete, since AI can complete a task in a couple of seconds and provide the most precise results. Nevertheless, more jobs will be introduced to humans for the design of artificial intelligence as a programmer in the future, which will benefit the education sector by increasing the number of AI educators. At the same time, food industries will be developed that provide artificial intelligence applications that compete against one another to see who can complete the task the fastest. Currently, we cannot truly state that artificial intelligence is intelligent since no AI can have intelligence comparable to that of a person. When developing artificial intelligence software, it is still necessary to include education and safeguards [12, 13]. There is still plenty of time for humans to develop artificial intelligence that is much more powerful than humans.

Superior and useful analysis may be completed in a short period of time with the necessary understanding of procedures and a plan of action for processing massive volumes of data. The visualisation and structuring of data in a more intuitive and reasonable pattern are the major focuses of business intelligence. There are many specialists that are working on this specific feature, and the strategy of replacing it from a choice to a must is well known in this industry. The BI has developed over a period of time that has been quite fruitful. The IBM researcher "Hans Peter Luhn," who was subsequently regarded as the "Father of Business Intelligence," produced a paper in 1958 that is considered to be a critical tool that should be employed in the twenty-first century.

It has been discovered in numerous businesses that artificial intelligence is not only aiding food-processing industries in generating various flavour amalgamations, but it is also guiding buyers in selecting novel essences [14]. Sales forecasts are created using artificial intelligence [15] and may be generated by using several fitting algorithms. In the food sector, finding an appropriate fitting algorithm for the sales forecast, whether it is for a five-month sales prediction or a fourteen-month sales prediction, takes a significant amount of time and consistent work to complete. In [16], the data acquired from a retail shop are examined and predictions of future store management strategies are made based on the information gathered from the business. The impacts of numerous sequences of events, such as weather conditions and vacations, may really affect the status of various departments, and so, they also analyse these effects and assess their influence on the bottom line of the company. The purpose of this study [17] is to get appropriate findings for forecasting future sales or needs of a company by using approaches such as clustering models and metrics for sales forecasts. The potential of algorithmic approaches is assessed, and the results are employed in future study. In [18], a sales forecast system and a product suggestion system are described, which were both implemented for the benefit of a group of retail outlets in the United Kingdom. Consumer demographic information has been utilised to tailor the sales of each person to their own needs and requirements.

3. Methodology

The search-based optimization approach known as the genetic algorithm (GA) is used. In order to tackle difficult issues with a larger number of variables and alternative outcomes/solutions, a genetic algorithm is applied. Online meal delivery services such as Zomato, Swiggy, and Uber Eats have a vast quantity of data based on the ordering habits of their clients and the dishes that they like to purchase. Data science and artificial intelligence (AI) may be used by the food-based professional to develop ways of providing the product that are easier, more cost-effective, and less time-consuming. This fundamental knowledge also enables artificial intelligence-based algorithms to propose alternative sorts of component combinations to chefs, which will undoubtedly result in the expansion of the food industry's menu as well as the increase in its profit margins over time.

Multidetection of food business data has been performed using TOR. We have employed a genetic algorithm, and Algorithm 1 is the fundamental template of a genetic algorithm that we have utilised.

In this context, the suggested method signifies the clustering of data that results in the creation of a relational food business model that takes into consideration the encapsulation of integrated data. The sensor's long-term accuracy is distanced from the sensor in order to stabilise the artificial intelligence phrase:

(i) Read the unique value

(ii) Add the equation to

$$\frac{1}{10}\oint_{\text{initial}}^{\text{unique}} D = \oint_{1}^{4}\left(\exists\,\text{str}\,\times\,\sqrt{\text{supr}_{\text{variable}}}\,\right) \div e^{-\text{tor}} \in \text{integrd}_D,$$

$$\prod \text{encapsul}_D \times \text{tor} \pm \text{base}^2 + 4 \times \text{acc} \times \text{const}_{\text{value}} \times \frac{\text{array}}{4.0} \sim \text{InD}_{\text{acc}} + \text{maximum acc} + \text{minimum acc} = 100. \tag{2}$$

Utilizing the use of artificial intelligence in the production and distribution process helps F&B firms to reach the peak of their respective business graphs [19]. By adopting a history-friendly perspective, the present contribution traces a stylized history of the AI technological domain in order to highlight moments in time, places, and sectoral domains that fostered its diffusion and transformative potential [20]. We are aware of data visualisation. The present contribution, which uses a history-friendly approach, follows a simplified history of the artificial intelligence technology domain in order to highlight particular times in time, regions, and sectors that assisted its propagation and revolutionary potential, especially, in F&B business sectors, where the graph of a firm is calling out for someone to look at it. Companies, on the other hand, are making significant concessions with this choice, and the average looker has no idea what a company's daily graph looks like [21–23].

The data are collected from different food marts throughout the country, and the following details are collected such as Item_Identifier, Item_Weight, Item_Fat_Content, Item_Visibility, Item_Type, Item_MRP, Outlet_Identifier, Outlet_Establishment_Year, Outlet_Size, Outlet_Location_Type, Outlet_Type, and

```
(1) Start;
(2) Input tor value, data size, encapsulation size;
(3) Provide the variables declare in step 2;
(4) Read the all values from step 3;
(5) Declare the constructor;
(6) Put the equation declare in introduction section;
(7) Compare with step 8;
(8) ± E.D + I.D∑Data;
(9) Make a crossover;
(10) Generate 3 pickles;
(11) Compare each pickle with the value of step 7;
(12) Set the generation by dividing the value of step 7 and 8;
(13) Integrate step 7,8, and12;
(14) Access the value of step 13;
(15) Repeat step 4;
(16) Print the value of step 14;
(17) End.
```

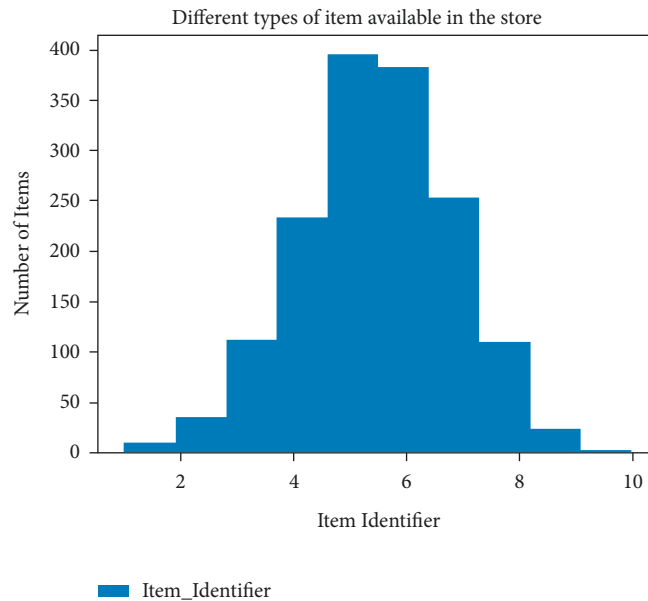ALGORITHM 1: Fundamental template of genetic algorithm utilized.

FIGURE 2: Different types of items available in the store.

Item_Outlet_Sales. A total of 8523 data are collected for the training set and 5681 data for the test set. Table 1 provides the details of the sample dataset for food sale collected.

The univariate data analysis is performed on the training dataset. Figure 2 provides the item outlet sales as target variables. Figure 3 provides the details regarding different types of items available in the store. Figure 4 provides the details regarding different varieties of fats in items in the store. Figure 5 provides the details regarding different types of outlets in the store.

4. Results

The proposed TOR AI approach is compared with several machine-learning approaches, such as linear regression (LR), AdaBoost regression (AR), XGBoost regression (XR), random forest regression (RFR), decision tree regression (DTR), and support vector machine (SVM). The implementation of above-mentioned machine learning models and the proposed TOR AI model is performed on python3. Table 2 denotes the mean squared error and the variance report. Figures 6 and 7 show that the proposed TOR AI low mean squared error and variance are the best technique. High-variance models learn quickly and perform well on the training dataset, but they do not transfer well to the unknown dataset since they do not have enough volatility to learn from. The consequence is that although this model produces excellent results on the training set, it produces significant error rates on the test set as well. As a performance metric for an estimator, the idea of MSE is important

TABLE 1: Sample dataset for food sale.

| Item_Identifier	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier	Outlet_Establishment_Year	Outlet_Size	Outlet_Location_Type	Outlet_Type
FDW58	20.75	Low fat	0.007565	Snack foods	107.8622	OUT049	1999	Medium	Tier 1	Supermarket type1
FDY38		Regular	0.118599	Dairy	234.23	OUT027	1985	Medium	Tier 3	Supermarket type3
FDH56	9.8	Regular	0.063817	Fruits and vegetables	117.1492	OUT046	1997	Small	Tier 1	Supermarket type1
FDL48	19.35	Regular	0.082602	Baking goods	50.1034	OUT018	2009	Medium	Tier 3	Supermarket type2
FDC48		Low fat	0.015782	Baking goods	81.0592	OUT027	1985	Medium	Tier 3	Supermarket type3
NCC54		Low fat	0.171079	Health and hygiene	240.4196	OUT019	1985	Small	Tier 1	Grocery store
FDU11	4.785	Low fat	0.092738	Bread	122.3098	OUT049	1999	Medium	Tier 1	Supermarket type1
DRL59	16.75	Low fat	0.021206	Hard drinks	52.0298	OUT013	1987	High	Tier 3	Supermarket type1
FDM24	6.135	Regular	0.079451	Baking goods	151.6366	OUT049	1999	Medium	Tier 1	Supermarket type1
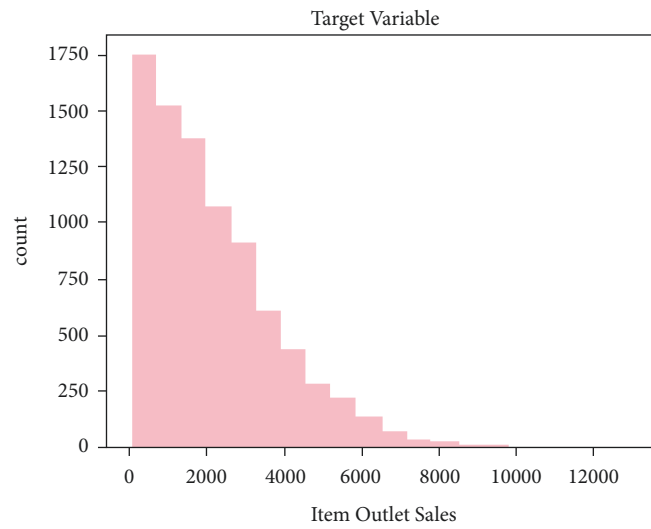
FIGURE 3: Target variables.
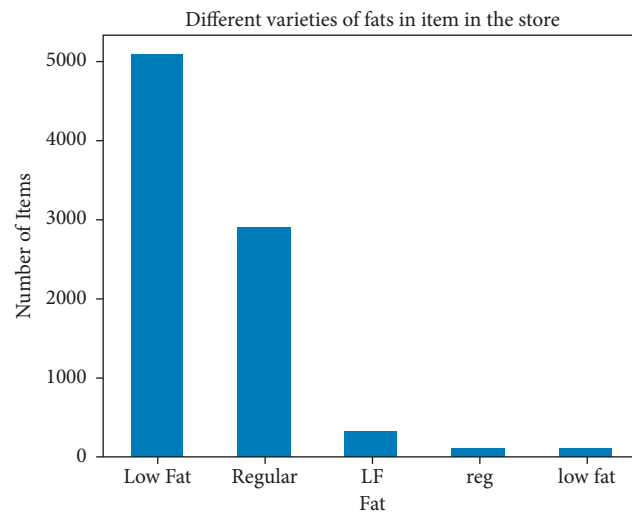
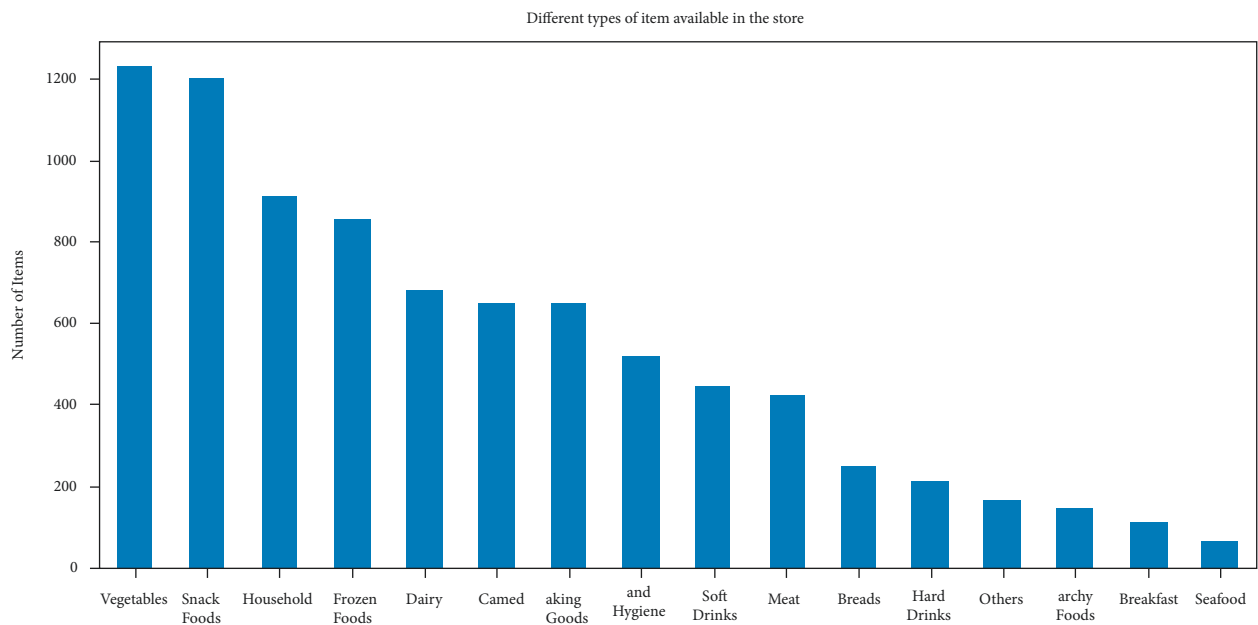FIGURE 4: Different varieties of fats in items in the store.

FIGURE 5: The number of items in different types of outlets.

Table 2: The mean squared error and the variance report.

Algorithm	Mean squared error	Variance
Linear regression	1260.78	0.288
AdaBoost regression	1325.45	0.228
XGBoost regression	1250.17	0.291
Random forest regression	1305.91	0.233
Decision tree regression	1748.89	0.413
Support vector machine	1662.46	0.382
TOR AI	1032.38	0.184

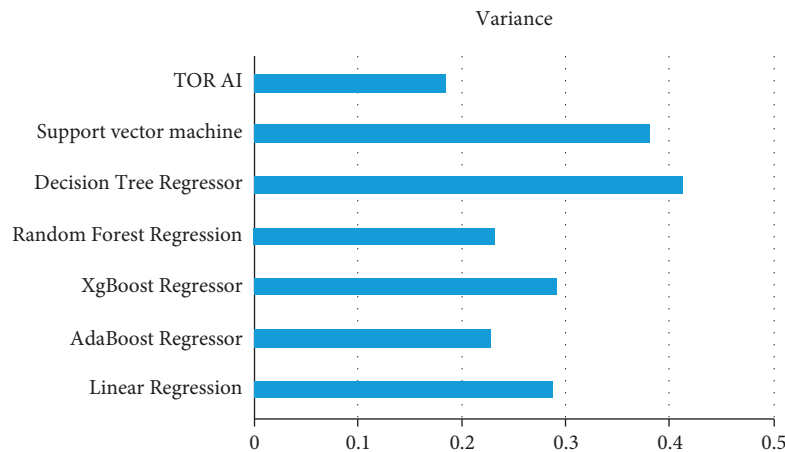
Figure 6: Mean squared report.

Figure 7: Variance report.

in statistics. It is used to assess the accuracy of an estimate. So, in this article, we have used these two parameters to evaluate our model.

5. Conclusion

Our suggested approach, which analyses the data of food mart business, uses artificial intelligence, business intelligence, and neural networks to predict the future food sale. Consider the scenario in which this technology is implemented at every food mart. In such instance, food mart owners have a far better understanding of their clients and classify them, allowing them to continue with the future sale

prediction. We have employed artificial intelligence, business intelligence, and neural networks because AI and business intelligence are the lifelines of today's world and they are just becoming stronger. The development of new technology has allowed for the solution of food business growth and its conversion into profitable solution. In the future, artificial intelligence and sophisticated analytics will provide a lot of information on each individual shopper, including their meal preferences, food allergies, and the reasons for their purchases. Retailers obtain a comprehensive understanding of the people who travel along their aisles by using artificial intelligence into supermarket personalisation. Retailers may use this strategy to create tailored

promos that will attract customers and enhance their sales. This technique can be implemented for the other services such as banking sector, farming sector, medical sector, and e-business sector.

Data Availability

The data are available upon request to the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

[1] S. L. Wamba-Taguimdje, S. F. Wamba, J. R. K. Kamdjoug, and C. E. T. Wanko, "Influence of artificial intelligence (AI) on firm performance: the business value of AI-based transformation projects," *Business Process Management Journal*, vol. 26, 2020.

[2] J. Lee, T. Suh, D. Roy, and M. Baucus, "Emerging technology and business model innovation: the case of artificial intelligence," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 5, no. 3, p. 44, 2019.

[3] M. Singh, "Improve IT business process performance using AI and deep learning," *Research in Economics and Management*, vol. 5, no. 2, pp. 57–62, 2020.

[4] A. Al-Zahrani and A. Marghalani, A., How artificial intelligent transform business, available at SSRN 3226264, 2018.

[5] G. Barta and G. Görcsi, "Assessing and managing business risks for artificial intelligence based business process automation," in *Proceedings of the International Scientific Conference, Contemporary Issues in Business, Management and Economics Engineering*, Vilnius Gediminas Technical University, May 2019.

[6] V. Hemamalini, S. Rajarajeswari, S. Nachiyappan et al., "Food quality inspection and grading using efficient image segmentation and machine learning-based system," *Journal of Food Quality*, vol. 20226 pages, 2022.

[7] J. Palti and Y. Cohen, "Downy mildew of cucurbits (Pseudoperonospora cubensis): the fungus and its hosts, distribution, epidemiology and control," *Phytoparasitica*, vol. 8, no. 2, pp. 109–147, 1980.

[8] I. Kumar, J. Rawat, N. Mohd, and S. Husain, "Opportunities of artificial intelligence and machine learning in the food industry," *Journal of Food Quality*, vol. 202110 pages, 2021.

[9] Y. Kaneko and K. Yada, "A deep learning approach for the prediction of retail store sales," in *Proceedings of the 2016 IEEE 16th International conference on data mining workshops (ICDMW)*, pp. 531–537, Barcelona, Spain, December 2016.

[10] C. Bartneck, C. Lütge, A. Wagner, and S. Welsh, "Risks in the business of AI," in *An Introduction to Ethics in Robotics and AI*, pp. 45–53, Springer, Cham, 2021.

[11] P. K. Mall and P. K. Singh, "BoostNet: a method to enhance the performance of deep learning model on musculoskeletal radiographs X-ray images," *International Journal of System Assurance Engineering and Management*, vol. 13, no. S1, pp. 658–672, 2022.

[12] V. Narayan and A. K. Daniel, "RBCHS: region-based cluster head selection protocol in wireless sensor network," in *Proceedings of Integrated Intelligence Enable Networks and Computing*, pp. 863–869, Springer, Singapore, 2021.

[13] V. Narayan and A. K. Daniel, "IOT based sensor monitoring system for smart complex and shopping malls," in *Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, Springer International Publishing*, pp. 344–354, October 2021.

[14] S. Dehghan-Dehnavi, M. Fotuhi-Firuzabad, M. Moeini-Aghtaie, P. Dehghanian, and F. Wang, "Estimating participation abilities of industrial customers in demand response programs: a two-level decision-making tree analysis," in *Proceedings of the 2020 IEEE/IAS 56th Industrial and Commercial Power Systems Technical Conference (I&CPS)*, pp. 1–8, Las Vegas, NV, USA, June 2020.

[15] G. P. Sanjana Rao, K. Aditya Shastry, S. R. Sathyashree, and S. Sahu, "Machine learning based restaurant revenue prediction," in *Evolutionary Computing and Mobile Sustainable Networks*, pp. 363–371, Springer, Singapore, 2021.

[16] M. Singh, B. Ghutla, R. L. Jnr, A. F. Mohammed, and M. A. Rashid, "Walmart's sales data analysis-A big data analytics perspective," in *Proceedings of the 2017 4th Asia-Pacific World Congress on Computer Science and Engineering (APWC on CSE)*, pp. 114–119, Mana Island, Fiji, December 2017.

[17] K. Saraswathi, N. T. Renukadevi, S. Nandhinidevi, S. Gayathridevi, and P. Naveen, "Sales prediction using machine learning approaches," in *Proceedings of the 4th National Conference on Current and Emerging Process Technologies E-Concept-2021*.

[18] M. Giering, "Retail sales prediction and item recommendations using customer demographics at store level," *ACM SIGKDD Explorations Newsletter*, vol. 10, no. 2, pp. 84–89, 2008.

[19] V. Paul and M. Tresita, "Artificial intelligence: pertinence in supply chain and logistics management. Uma devi," *Xi'an Jianzhu Keji Daxue Xuebao/Journal of Xi'an University of Architecture & Technology*, vol. 12, pp. 701–709, 2020.

[20] A. Gupta, "Securing the future of the Indian IT industry," *Industry and Higher Education*, vol. 19, no. 6, pp. 423–431, 2005.

[21] M. Obschonka and D. B. Audretsch, "Artificial intelligence and big data in entrepreneurship: a new era has begun," *Small Business Economics*, vol. 55, no. 3, pp. 529–539, 2019.

[22] P. K. Mall, P. K. Singh, and D. Yadav, "GLCM based feature extraction and medical X-RAY image classification using machine learning techniques," in *Proceedings of the 2019 IEEE Conference on Information and Communication Technology*, pp. 1–6, Allahabad, India, December 2019.

[23] V. Narayan, R. K. Mehta, M. Rai et al., "E-Commerce recommendation method based on collaborative filtering technology," *International Journal of Current Engineering and Technology*, vol. 7, no. 3, pp. 974–982, 2017.