

# Efficient Prediction of Demand for Electronics Items in a Retail Store During Festive Seasons Adopting Novel Resnet Algorithm and its Performance Comparison Over Deep Belief Network

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## Abstract

**Aim:** The aim of this paper is the efficient prediction of demand for Electronics Items in a Retail Store during festive seasons by adopting Novel ResNet Algorithm and its performance comparison over Deep Belief Network. **Materials and Methods:** At different stages, the Deep Belief Network and Novel ResNet algorithms were iterated in order to predict the accuracy percentage of accidents that occurred. Two sample groups are considered and tested, and G-power is a computation that includes two groups, alpha (0.05), and Power (80%). **Results:** It was observed that the Novel ResNet algorithm obtains an accuracy of 83.16% and the Deep Belief Network has 77.24%. This DBN appears to have a better significance of  $P=0.016$  than the Novel ResNet, that is  $p<0.05$  using the independent T-test sample for the analysis. **Conclusion:** This study contains analyses that target the sparsity in the income facts with the aid of converting a wide variety of product attributes. The result proves that the Novel ResNet Algorithm approaches predicting the retail store prediction during the festival season.

**Keywords:** Retail store, Prediction, Trade Website, Sales Forecasting, DBN, Novel ResNet.

DOI: 10.47750/pnr.2022.13.S04.207

## INTRODUCTION

This work investigates consumer online surfing and shopping behaviors and predicts shopping movements in the course of a massive shopping festival (Thomas 1993). To enhance the online buying experience for consumers, increase income for traders, and gain effective warehousing and delivery, here first examine various online buying ("Website," n.d.; Sethna, Hazari, and Bergiel 2017). Based on the received consumer behaviors and huge data, the practice of collaborative filtering is primarily based totally on the approach to suggesting gadgets for exclusive consumers and are expecting whether buy will happen (Yu, Jian-hong, and Xiao-juan 2016). We approach one method of validation to assess the collaborative filtering primarily based totally on the advice approach, and in addition pick out the important buying behaviors that decide the precursors of purchases. As online buying will become an international phenomenon, findings on this observation have implications on each buying revel in and income enhancement (Wallace and Stahl 2002).

In IEEE Xplore, almost 80 relevant publications were published, while in Google Scholar, 57 related articles were published (Cheriyana et al. 2018). They analyzed and tested the model using four different classifiers before deciding on the optimal model to use. They took 2 (DBN, Novel ResNet ) for predicting the retail store prediction search. For static systems, the Novel ResNet algorithm is best for sales prediction (Kim et al. 2016). In comparison to individual learners, an ensemble learner technique was proposed, and the performance of four real-world datasets was evaluated (Han, n.d.). The greatest results come via experimental examination using Deep Belief Network as a classifier, with an accuracy of 70%. According to my study, most of the research takes accuracy into consideration, In much of the time high accuracy value gives The best model, but due to the way the model is trained in our scenario, an item that is predicted as true but is actually untrue (false positive)

might have negative consequences. comparatively, If an item was predicted to be fraudulent yet included verifiable material, trust difficulties may arise (Schwetz 2006).

Our institution is passionate about high quality evidence based research and has excelled in various fields (Parakh *et al.* 2020; Pham *et al.* 2021; Perumal, Antony, and Muthuramalingam 2021; Sathiyamoorthi *et al.* 2021; Devarajan *et al.* 2021; Dhanraj and Rajeshkumar 2021; Uganya, Radhika, and Vijayaraj 2021; Tesfaye Jule *et al.* 2021; Nandhini, Ezhilarasan, and Rajeshkumar 2020; Kamath *et al.* 2020). The existing system has issues and major parts (Zhu *et al.* 2021). Although the deep learning method is presently being utilized by information era companies there have been no reviews of its powerful use or examples of its creation for advertising and marketing in retail store groups. The greater the income is, it's miles greater hard for traders to put together the right stock, to assure that the eCommerce platform will now no longer be out of enterprise with heavy burst traffic, and for specific corporations, it's miles greater hard to set up powerful deliveries. This allows for increasing the sales and popularity of each trader, specific corporations, and e-trade structures along with Alibaba and JD. Nevertheless, customers' online purchasing behaviors are manifold (Saylı, Ozturk, and Ustunel 2016). To suggest objects to their latent buyers precisely brought to extract customers' desire for objects and the temporal traits in their online purchasing behaviors that are primarily based totally on the evaluation of the logs generated whilst customers are browsing the e-trade websites or the use of purchasing apps (Kaneko and Yada 2016).

## MATERIALS AND METHODS

The Open Source laboratory for research work, Department of Computer Science and Engineering, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Chennai. Has considered that two groups of classifiers are used, namely Deep Belief Network and Novel ResNet algorithms, During festival seasons, they are frequently used to forecast retail sales. The Deep Belief Network has a sample size of 10 in group 1, while the Novel ResNet algorithm in group 2 has a sample size of 10. Algorithms that have greater accuracy and precision score values from independent T-test, making it easier to choose the best algorithm. Before the analysis was conducted using retail classifiers with a G power of 80% and a threshold of 0.05 %, and 95% confidence interval, and a standard deviation of 5%. This dataset was taken from the kaggle open-source web which has many trade website details. The Novel ResNet algorithm was chosen for implementation in this study, and it was compared to the DBN algorithm.

### Deep Belief Network

The main step for the Deep Belief Network is to study a layer of functions from the seen devices, the use of the Contrastive Divergence (CD) algorithm. Then, the following step is to deal with the activations of formerly educated functions as seen devices and study functions in a 2nd hidden layer. Finally, the entire DBN is educated whilst getting to know the very last hidden layer is achieved.

### Algorithm

1. Datasets to be Imported
2. Datasets to be examined and imported for facts
3. Pre Examine the facts
4. The attributes and labels or split by facts
5. Divide the information into two categories: education and borrowing sets.
6. Deep Belief Network trained from trade website
7. Make some inputs if needed to the program

### Novel ResNet

It's an algorithm that uses internal memory to recall its input, making it ideal for machine learning problems involving sequential data. Using identity mapping, novel ResNets can help solve the vanishing gradient problem.

### Algorithm

1. Input the data into the application.
2. Examine the facts and the dataset in its current situation.
3. Facts should be gathered before the surgery.
4. Organize the information into characteristics and labels.
5. Divide the information into two subgroups: education and borrowing sets.
6. A study using the Novel ResNet algorithm.

7. Make a few suggestions.

### Statistical Analysis

The evaluation is finished using the IBM SPSS model 21. Actually, the statistical software application that is used to evaluate data. In each proposed and current approach, ten iterations with a maximum of 20 samples were completed, and the expected accuracy was used to analyze accuracy for each generation. The independent variables are education, borrowing, and sales and the dependent is Retail Forecasting. The charge was calculated based on the Independent Sample T-test iterations that were completed using this tool.

## RESULT

The sample size  $N=10$  per group, and the Novel ResNet and comparison of the innovative Deep Belief Network are used as accuracy. The approach surpasses Novel ResNet because of its efficient categorization feature based on the Deep Belief Network.

Table 1 comparison of groups namely Novel Resnet and Deep Belief Network for the sample 10, achieved 83.16% and 77.24% accuracies respectively.

Table 2 tells about the Independent T-test Sample, the frequency of 3.34 at the time of 18 the significance received as 0.016 for the alpha 0.05, and the confidence interval is 95%.

Figure 1 tells about the performance accuracy of Deep Belief Network and Novel ResNet, where the X-axis scales the accuracy and Y-axis scales the algorithms used. The Error bar is classified for the CI as 95 % and SD +/- 1.

## DISCUSSIONS

The significance was  $p=0.016$ , with a  $p<0.05$ , depending on the independent sample t-test. This data shows that the groups in this experiment had a significant difference. According to the group's investigation, an independent test, Deep Belief Network, and Novel ResNet had a mean accuracy of 77.24 % and 83.16 %, respectively. Deep Belief Network is lesser than Novel ResNet.

Consumer behavior modeling then changed to conduct for predicting the reputation of e-trade and suitable items stocking (Blessington 2015). More recently, surfing, ordering, and repeat ordering behaviors of clients are investigated to be expecting income and advocate objects to their latent buyers. Research on purchaser behavior modeling in e-trade may want to date back to the early prevalence of e-trade websites (Bolliger 2021). Different from present literature, our paintings investigate the common surfing instances earlier than one consumer provides an object to a cart and makes an order earlier than, on, and after the massive purchasing festival (Schafer et al., n.d.). Collaborative filtering primarily based totally processes is similarly categorized into reminiscence primarily based on total and model primarily based on totally. Memory primarily based totally collaborative filtering may be realized with consumer-primarily based total algorithms or object-primarily based total algorithms (Abernathy et al. 1999). Although the deep learning method is presently being utilized by information era companies there have been no reviews of its powerful use or examples of its creation for advertising and marketing in retail store groups.

The proposed approach performed well, despite certain limitations. For example, when it comes to inflation in the consumers' country, the prediction is inaccurate owing to market pricing fluctuation. This can be combined with price forecasts in the future, as well as economic money supply and interest rate data in the dataset. Since height site visitors continually arise 1/2 of an hour after the massive reductions start, to relieve the load of logistics and internet site servers, it's far higher to set more than one cut price time all through a day (Carlberg 2016). Our insightful findings in this text ought to provide many optimistic hints for merchants, logistics agencies, and e-begin agencies to grow their incomes and running efficiency.

## CONCLUSION

In this paper recommended the best method for massive reductions and promotions presented to have an impact on the income of e-trade websites, consumers' online purchasing behaviors, and the recognition of objects primarily based totally on the logs wiped clean from the DPI dataset. For retail store shop sales prediction, Novel ResNet and Deep Belief Network were used in the experiment. Various statistical methods are used to compare the results. Finally, it is concluded that Novel ResNet (83.16%) accuracy is more than Deep Belief Network (77.24%) and performs better.

## DECLARATION

### Conflicts of Interest

No conflict of interest in this manuscript.

### Authors' Contributions

Author BR was involved in data collection, data analysis, and manuscript writing. Author SPC was involved in the conceptualization, guidance, and critical review of the manuscript.

### Acknowledgments

The authors would like to express their gratitude to Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences (Formerly known as Saveetha University) for providing the necessary infrastructure to carry out this work successfully.

### Funding

I thank the following organizations for providing financial support that enabled us to complete the study.

1. Reliance Industries Ltd.
2. Saveetha University.
3. Saveetha Institute of Medical and Technical Sciences.
4. Saveetha School of Engineering.

## REFERENCES

1. Abernathy, Frederick H., John T. Dunlop, Janice H. Hammond, and David Weil. 1999. *A Stitch in Time: Lean Retailing and the Transformation of Manufacturing--Lessons from the Apparel and Textile Industries*. Oxford University Press.
2. Blessington, Mark. 2015. *Sales Forecasting: A Practical Guide*. Createspace Independent Publishing Platform.
3. Bolliger, Audry. 2021. *Sales Forecasting Techniques: Discover 16 Fast And Effective Sales Forecasting Techniques: Sales Forecasting Definition*. Independently Published.
4. Carlberg, Conrad. 2016. *Excel Sales Forecasting For Dummies*. John Wiley & Sons.
5. Cheriyan, Sunitha, Shaniba Ibrahim, Saju Mohanan, and Susan Treesa. 2018. "Intelligent Sales Prediction Using Machine Learning Techniques." *2018 International Conference on Computing, Electronics & Communications Engineering (iCCECE)*. <https://doi.org/10.1109/iccecome.2018.8659115>.
6. Devarajan, Yuvarajan, Beemkumar Nagappan, Gautam Choubey, Suresh Vellaiyan, and Kulmani Mehar. 2021. "Renewable Pathway and Twin Fueling Approach on Ignition Analysis of a Dual-Fuelled Compression Ignition Engine." *Energy & Fuels: An American Chemical Society Journal* 35 (12): 9930–36.
7. Dhanraj, Ganapathy, and Shanmugam Rajeshkumar. 2021. "Anticariogenic Effect of Selenium Nanoparticles Synthesized Using Brassica Oleracea." *Journal of Nanomaterials* 2021 (July). <https://doi.org/10.1155/2021/8115585>.
8. Han, Jing. n.d. "FORECAST ELECTRICITY RETAIL SALES IN THE US BY END-USE SECTORS." <https://doi.org/10.37099/mtu.dc.etr/85>.
9. Kamath, S. Manjunath, K. Sridhar, D. Jaison, V. Gopinath, B. K. Mohamed Ibrahim, Nilkantha Gupta, A. Sundaram, P. Sivaperumal, S. Padmapriya, and S. Shantanu Patil. 2020. "Fabrication of Tri-Layered Electrospun Polycaprolactone Mats with Improved Sustained Drug Release Profile." *Scientific Reports* 10 (1): 18179.
10. Kaneko, Yuta, and Katsutoshi Yada. 2016. "A Deep Learning Approach for the Prediction of Retail Store Sales." *2016 IEEE 16th International Conference on Data Mining Workshops (ICDMW)*. <https://doi.org/10.1109/icdmw.2016.0082>.
11. Kim, Sungchul, Jinyoung Yeo, Eunyeek Koh, and Nedim Lipka. 2016. "Purchase Influence Mining." *Proceedings of the 25th International Conference Companion on World Wide Web - WWW '16 Companion*. <https://doi.org/10.1145/2872518.2889364>.
12. Nandhini, Joseph T., Devaraj Ezhilarasan, and Shanmugam Rajeshkumar. 2020. "An Ecofriendly Synthesized Gold Nanoparticles Induces Cytotoxicity via Apoptosis in HepG2 Cells." *Environmental Toxicology*, August. <https://doi.org/10.1002/tox.23007>.
13. Parakh, Mayank K., Shriram Ulaganambi, Nisha Ashifa, Reshma Premkumar, and Amit L. Jain. 2020. "Oral Potentially Malignant Disorders: Clinical Diagnosis and Current Screening Aids: A Narrative Review." *European Journal of Cancer Prevention: The Official Journal of the European Cancer Prevention Organisation* 29 (1): 65–72.
14. Perumal, Karthikeyan, Joseph Antony, and Subaganasekar Muthuramalingam. 2021. "Heavy Metal Pollutants and Their Spatial Distribution in Surface Sediments from Thondi Coast, Palk Bay, South India." *Environmental Sciences Europe* 33 (1). <https://doi.org/10.1186/s12302-021-00501-2>.
15. Pham, Quoc Hoa, Supat Chupradit, Gunawan Widjaja, Muataz S. Alhassan, Rustem Magizov, Yasser Fakri Mustafa, Aravindhan Surendar, Amirzhan Kassenov, Zeinab Arzehgar, and Wanich Suksatan. 2021. "The Effects of Ni or Nb Additions on the Relaxation Behavior of Zr55Cu35Al10 Metallic Glass." *Materials Today Communications* 29 (December): 102909.
16. Sathiyamoorthi, Ramalingam, Gomathinayakam Sankaranarayanan, Dinesh Babu Munuswamy, and Yuvarajan Devarajan. 2021. "Experimental Study of Spray Analysis for Palmarosa Biodiesel-diesel Blends in a Constant Volume Chamber." *Environmental Progress & Sustainable Energy* 40 (6). <https://doi.org/10.1002/ep.13696>.
17. Sayli, Ayla, Isil Ozturk, and Merve Ustunel. 2016. "Brand Loyalty Analysis System Using K-Means Algorithm." *Journal of Engineering Technology and Applied Sciences*. <https://doi.org/10.30931/jetas.287786>.
18. Schafer, J. Ben, J. Ben Schafer, Dan Frankowski, Jon Herlocker, and Shilad Sen. n.d. "Collaborative Filtering Recommender Systems." *The Adaptive Web*. [https://doi.org/10.1007/978-3-540-72079-9\\_9](https://doi.org/10.1007/978-3-540-72079-9_9).
19. Schwetz, Wolfgang. 2006. "Forecast Planen Mit Methode." *Sales Business*. <https://doi.org/10.1007/bf03225882>.
20. Sethna, Beheruz N., Sunil Hazari, and Blaise Bergiel. 2017. "Influence of User Generated Content in Online Shopping: Impact of Gender on Purchase Behaviour, Trust, and Intention to Purchase." *International Journal of Electronic Marketing and Retailing*. <https://doi.org/10.1504/ijemr.2017.10008550>.
21. Tesfaye Jule, Leta, Krishnaraj Ramaswamy, Nagaraj Nagaprasad, Vigneshwaran Shanmugam, and Venkataraman Vignesh. 2021. "Design and Analysis of Serial Drilled Hole in Composite Material." *Materials Today: Proceedings* 45 (January): 5759–63.
22. Thomas, Robert J. 1993. "Method and Situational Factors in Sales Forecast Accuracy." *Journal of Forecasting*. <https://doi.org/10.1002/for.3980120107>.
23. Uganya, G., Radhika, and N. Vijayaraj. 2021. "A Survey on Internet of Things: Applications, Recent Issues, Attacks, and Security Mechanisms." *Journal of Circuits Systems and Computers* 30 (05): 2130006.
24. Wallace, Thomas F., and Robert A. Stahl. 2002. *Sales Forecasting: A New Approach : Why and How to Emphasize Teamwork, Not*

- Formulas, Forecast Less, Not More, Focus on Process Improvement, Not Forecast Accuracy. T. F. Wallace & CO.  
 25. "Website." n.d. <https://doi.org/10.1007/s12525-018-0311-8>.  
 26. Yu, Jian-Hong, Y. U. Jian-hong, and L. E. Xiao-juan. 2016. "Sales Forecast for Amazon Sales Based on Different Statistics Methodologies." *DEStech Transactions on Economics and Management*. <https://doi.org/10.12783/dtem/iceme-ebm2016/4132>.  
 27. Zhu, Siyao, Cassandra Mitsinikos, Lisa Poirier, Takeru Igusa, and Joel Gittelsohn. 2021. "Development of a System Dynamics Model to Guide Retail Food Store Policies in Baltimore City." *Nutrients* 13 (9). <https://doi.org/10.3390/nu13093055>.

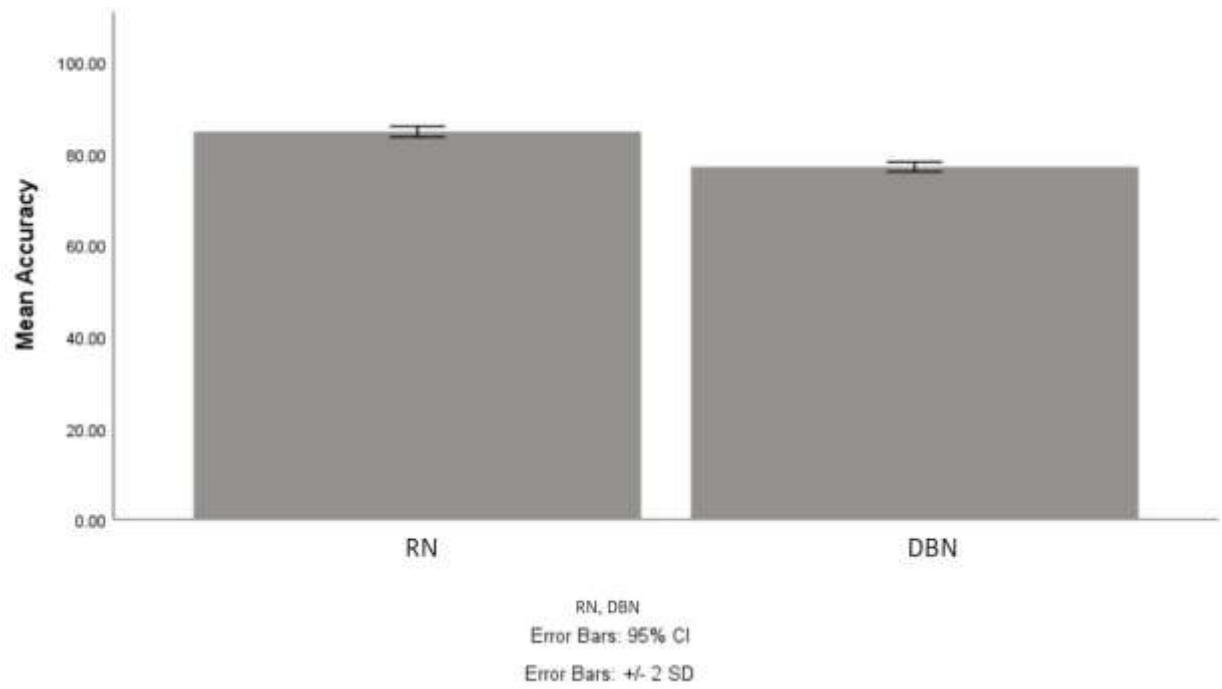
**TABLES & FIGURES**

**Table 1.** Statistical analysis of Novel ResNet and DBN. Mean data transmission speed value, Standard deviation, and Error Mean for Novel ResNet and DBN algorithm. It shows the Novel ResNet algorithm has a better data transmission speed than the DBN algorithm

	Algorithm	N	Mean	Std. Deviation	Std. Error Mean
Accuracy	ResNet	10	83.1690	.57332	.18315
	DBN	10	77.2490	.36638	.11586

**Table 2** The Independent sample T-test for significance and standard error determination was  $p=0.016$  and were  $p<0.05$  considered to be statistically significant and 95% confidence intervals are calculated.

Leven's Test for Equality of Variances				t-test for Equality of Mean					95% Confidence Interval of the Difference	
		F	Sig	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Accuracy	Equal Variance assumed	3.346	0.016	16	36	.000	10.62000	.21655	10.16505	11.07495
	Equal Variance not assumed			16	37.23	.000	10.62000	.21655	10.16505	11.07495



**Fig. 1.** Comparison of DBN algorithm and Novel ResNet in mean data transmission speed. The mean data transmission speed of Novel ResNet is better than Deep Belief Network. The X-axis is NRN vs DBN Y-axis is Mean Accuracy. Error bars: +/- 1 SD