IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 5, May 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105184 |

Supply chain Management Using Machine Learning on Cloud

Chaitrali Chandane, Prof. G.M. Bhandari

PG Student, Dept of computer Bhivarabai Sawant Institute of Technology &Research Pune University, India

Head of Department of Computer Engineering, Bhivarabai Sawant Institute of Technology and Research College of Engineering, Pune, India

ABSTRACT: Supply chain management plays a crucial role in the success of businesses by ensuring the smooth flow of goods and services from suppliers to customers. However, the increasing complexity and globalization of supply chains have posed significant challenges for organizations to effectively manage and optimize their operations. In recent years, machine learning techniques combined with cloud computing have emerged as powerful tools to address these challenges and enhance supply chain management processes.This paper presents a comprehensive review of the application of machine learning in supply chain management, with a particular focus on leveraging cloud computing infrastructure. The integration of machine learning algorithms and cloud-based platforms enables organizations to leverage large volumes of data, optimize decision-making processes, and improve operational efficiency

KEYWORDS: Supply Chain Management, prediction, machine learning, Cloud Computing.

I. INTRODUCTION

Supply Chain Management is essential in making the right decisions for various areas of business such as finance, marketing, inventory management, labor, and pricing, among others. Knowing what a product demand will be in the future has an impact on customer satisfaction and helps prevent money losses and problems caused by high inventory costs, lockouts, or spoilage.

Traditionally, forecasting requires a deep level of knowledge and understanding of different models and methods. Most of the time, forecasting is done based on historical data which might not be easily available. Even when the data is available the process of predicting customer demand requires testing different methods, variables and distinguishing good from bad forecasts which can be time-consuming.

When companies face all these challenges, they often decide to take a more simplified approach which can lead to inaccurate predictions and misinformed decisions. For this reason everyone want to forecast demand using Azure Machine Learning based on historical data.

We picked Azure Machine Learning due to the flexibility it provides since it is a fully managed cloud service that can easily scale up or down the resources to train Machine Learning (ML) models as needed. Additionally, it has a variety of options accessible to different skill levels

II. RELATED WORK

Supply chain management is a complex field that involves the coordination of various activities, including procurement, production, transportation, and distribution, to ensure the smooth flow of goods and services from suppliers to end customers. Machine learning and cloud computing have emerged as powerful technologies that can enhance supply chain management by providing better visibility, predictive analytics, optimization, and decision support.

There are several research papers and projects that have explored the application of machine learning on the cloud in the context of supply chain management. Here are a few examples:

"Predictive Analytics for Supply Chain Risk Management Using Machine Learning" by Wang et al. (2018): This paper discusses the use of machine learning techniques, such as random forest and support vector machines, for predicting supply chain risks. The authors propose a cloud-based framework that integrates data from various sources and applies machine learning algorithms to identify and mitigate potential risks.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105184 |

"Cloud-Based Demand Forecasting for Supply Chain Management" by Chen et al. (2019): This study focuses on demand forecasting, a critical aspect of supply chain management. The authors propose a cloud-based demand forecasting system that utilizes machine learning algorithms, including recurrent neural networks and deep learning models, to improve the accuracy of demand predictions.

"Optimization of Supply Chain Networks Using Cloud-Based Machine Learning" by Li et al. (2020): This research explores the optimization of supply chain networks using a combination of cloud computing and machine learning. The authors develop a cloud-based optimization framework that leverages machine learning algorithms, such as genetic algorithms and particle swarm optimization, to optimize various aspects of the supply chain, such as inventory management and transportation routing.

"Real-Time Supply Chain Visibility Using Machine Learning on the Cloud" by Gupta et al. (2021): This paper presents a cloud-based system that utilizes machine learning techniques, such as clustering and anomaly detection, to provide real-time visibility into supply chain operations. The system integrates data from multiple sources, such as IoT sensors and enterprise systems, and applies machine learning algorithms to detect patterns, anomalies, and potential bottlenecks in the supply chain.

These are just a few examples of the related work on supply chain management using machine learning on the cloud. The field is rapidly evolving, and there are ongoing research efforts and industry applications that explore different aspects of supply chain management with the integration of machine learning and cloud technologies.

III. PROPOSED ALGORITHM

Random Forest is a popular machine learning algorithm that can be effectively used for domain forecasting. Domain forecasting involves predicting future values or trends within a specific domain or industry. Here's how Random Forest can be applied in this context:

Data Preparation: Collect historical data related to the domain you want to forecast. This data should include relevant features or variables that can impact the forecasted outcome. Ensure the data is properly formatted and cleaned.

Feature Selection: Identify the most important features from the available data that can significantly influence the forecasting task. This step helps reduce noise and focus on the most relevant information for accurate predictions.

Data Partitioning: Split the historical data into training and testing sets. The training set is used to train the Random Forest model, while the testing set is used to evaluate its performance.

Model Training: Apply the Random Forest algorithm to the training data. Random Forest is an ensemble learning method that combines multiple decision trees. Each decision tree is trained on a random subset of the features and data samples. This randomness helps reduce overfitting and improves the model's generalization ability.

Hyperparameter Tuning: Random Forest has several hyperparameters that can be tuned to optimize its performance. These include the number of trees, maximum depth of each tree, and the number of features considered at each split. Conduct experiments with different parameter settings to find the optimal configuration.

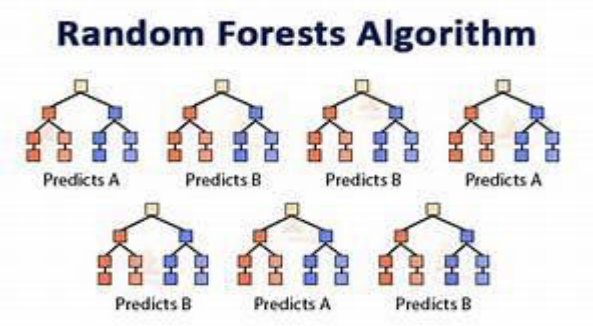


Fig.1.Random Forest algorithm

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105184 |

Model Evaluation: Use the testing set to assess the performance of the trained Random Forest model. Common evaluation metrics for regression forecasting tasks include mean absolute error (MAE), mean squared error (MSE), and root mean squared error (RMSE). Compare the predicted values with the actual values to measure the accuracy of the forecasts.

Forecasting: Once the Random Forest model is trained and evaluated, it can be used to make forecasts on new or unseen data. Provide the relevant features for the desired forecast period, and the model will predict the outcome based on the learned patterns from the training data.

Remember that Random Forest is just one of the many machine learning algorithms that can be used for domain forecasting. Depending on the characteristics of your data and the specific requirements of your domain, other algorithms like gradient boosting, support vector regression, or neural networks may also be worth considering.

IV. SIMULATION RESULTS

Machine learning can be used in supply chain management to analyze and optimize various aspects of the supply chain, such as demand forecasting, inventory management, logistics planning, and supplier selection. By leveraging historical data and applying advanced algorithms, machine learning models can identify patterns, make predictions, and provide recommendations to improve decision-making processes.

Here are some potential benefits of using machine learning in supply chain management:

Demand forecasting: Machine learning models can analyze historical sales data, market trends, weather patterns, and other relevant factors to generate accurate demand forecasts. This helps optimize inventory levels, production planning, and reduce stockouts or overstock situations.

Inventory management: By analyzing real-time data on sales, supplier performance, and production capacity, machine learning algorithms can optimize inventory levels, determine reorder points, and identify slow-moving or obsolete items. This helps reduce carrying costs while ensuring sufficient stock availability.

Logistics optimization: Machine learning can optimize transportation and logistics operations by analyzing factors such as shipping routes, delivery schedules, carrier performance, and real-time traffic data. This enables efficient route planning, load optimization, and improved on-time delivery.

Supplier management: Machine learning can assist in evaluating and selecting suppliers based on criteria such as price, quality, reliability, and performance history. It can also identify potential risks and disruptions in the supply chain, allowing proactive measures to be taken.

Risk management: By analyzing data from various sources, including weather forecasts, geopolitical events, and market trends, machine learning can help identify potential risks and disruptions in the supply chain. This allows companies to develop contingency plans and mitigate the impact of unforeseen events.

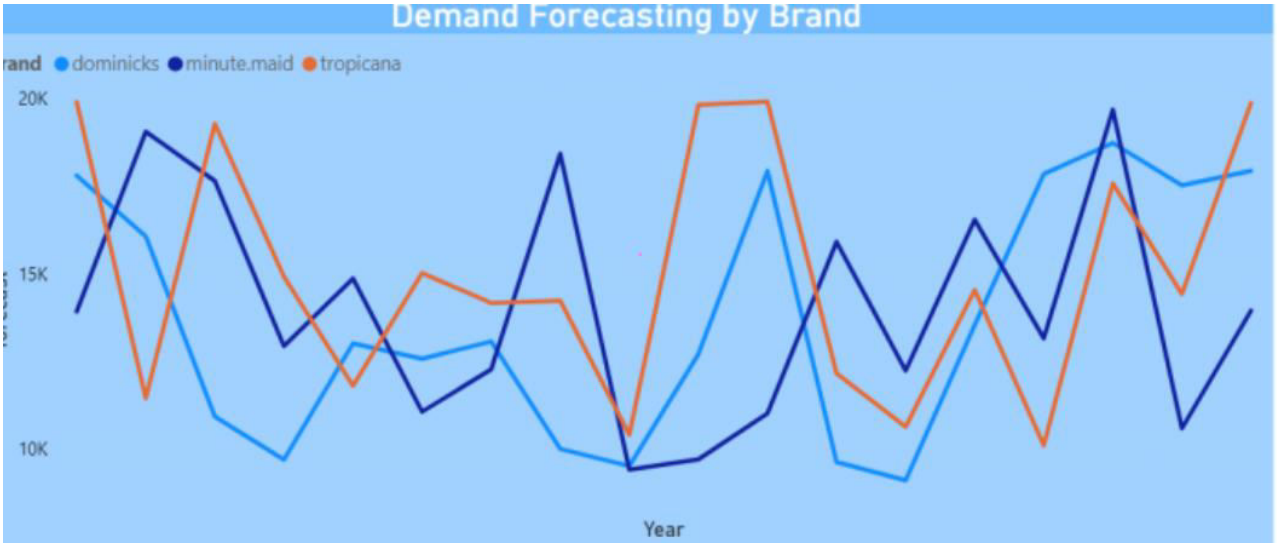
Regarding the use of the cloud, leveraging cloud computing platforms allows for scalability, flexibility, and cost-effectiveness in implementing machine learning solutions. Cloud-based machine learning platforms provide the computational power and infrastructure required to train and deploy complex models, enabling organizations to analyze large datasets and derive valuable insights.

It's important to note that the specific results of using machine learning for supply chain management will depend on factors such as the quality of the data, the algorithms and models used, and the specific challenges and requirements of the supply chain in question. Actual simulation results would require conducting a detailed analysis and implementation specific to the supply chain being studied.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105184 |



Fig,2. Demand Forcasting by Brand

V. CONCLUSION AND FUTURE WORK

Future scope and further enhancement of "Supply Chain Management Using Machine Learning on Cloud" lie in leveraging advanced techniques such as deep learning, real-time analytics, blockchain, AR/VR, and reinforcement learning. By embracing these advancements, organizations can achieve higher levels of automation, agility, and optimization in their supply chain operations, leading to improved efficiency, customer satisfaction, and competitive advantage in the ever-evolving business landscape...

REFERENCES

[1] Planet Together. (2019). The Advantages of Effective Demand Forecasting
[2] L. Luce, ‘‘Deep learning and demand forecasting,’’ in Artificial Intelligence for Fashion. Berkeley, CA, USA: Après, 2019, pp. 155–166.
[3] H. Steller and H. Symington, ‘‘Evaluating qualitative forecasts: The FOMC minutes, 2006–2010,’’ Int. J. Forecasting, vol. 32, no. 2,pp. 559–570, Apr. 2016.
[4] V. M. Eguíluz, J. Fernández-Gracia, X. Irigoien, and C. M. Duarte,‘‘A quantitative assessment of arctic shipping in 2010–2014,’’ Sci. Rep.,vol. 6, no. 1, pp. 1–6, Aug. 2016.
[5] C. Catal, K. Ece, B. Arslan, and A. Akbulut, ‘‘Benchmarking of regressionalgorithms and time series analysis techniques for sales forecasting,’’Balkan J. Electr. Comput. Eng., vol. 7, no. 1, pp. 20–26, 2019.
[6] R. J. Kuo, ‘‘A sales forecasting system based on fuzzy neural network withinitial weights generated by genetic algorithm,’’ Eur. J. Oper. Res., vol. 129, no. 3, pp. 496–517, Mar. 2001.
[7] F. L. Chen and T. Y. Ou, ‘‘Sales forecasting system based on gray extreme learning machine with taguchi method in retail industry,’’ Expert Syst. Appl., vol. 38, no. 3, pp. 1336–1345, Mar. 2011.
[8] J. Zhao, W. Tang, X. Fang, and J. Wang, ‘‘A novel electricity sales fore-casting method based on clustering, regression and time-series analysis,’’in Proc. 5th Int. Conf. Comput. Eng. Netw., vol. 259, Oct. 2015, p. 15.
[9] Y. Tian, Y. Liu, D. Xu, T. Yao, M. Zhang, and S. Ma, ‘‘Incorporating seasonal time series analysis with search behavior information in salesforecasting,’’ in Proc. 21st Int. Conf. Companion World Wide Web, 2012,pp. 615–616.
[10] G. P. Zhang, ‘‘Time series forecasting using a hybrid ARIMA and neural network model,’’ Neurocomputing, vol. 50, pp. 159–175, Jan. 2003

INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.379

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details