TECHNICAL ANALYSIS
TO REAL WORLD PROBLEM

ENHANCING THE SUPPLY CHAIN IN INDIA USING BLOCKCHAIN

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TO REAL WORLD PROBLEM

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INTRODUCTION

In today’s world a lot of times people face the problem of lack of availability of goods in their nearby shops. This is not only an issue for the customers but for the local retailers also, as they lose their daily customers.In a supply at the top of the hierarchy there is the Manufacturer- who produces new items ,then there is the wholesaler who purchases the items in bulk from the manufacturer, then finally we have retailers who buy goods from wholesalers.

CONTINUED

To support this observation,the project has conducted a study on a supply chain management dataset.The dataset was taken from Kaggle.In additional to that we have also worked on a case study of Walmart.The case study describes how Walmart adapted blockchain to their supply chain management system and how it improved their efficiency.

STATISTICAL ANALYSIS OF EXISTING MODEL

ABOUT DATASET

The dataset has 53 columns that are attributed to various aspects of the supply chain management system.
Type, Days of shipping, Days for shipment,Delivery status,Sales,Order status, Shipping date & Shipment mode are a few of the columns to mention.Studying these attributes will help the study visualize how delays in delivery,shipping can affect the customer sales.

To compare the performance of the shipping performance of the different shipping modes available,we have plotted a pie chart.

RESULTS

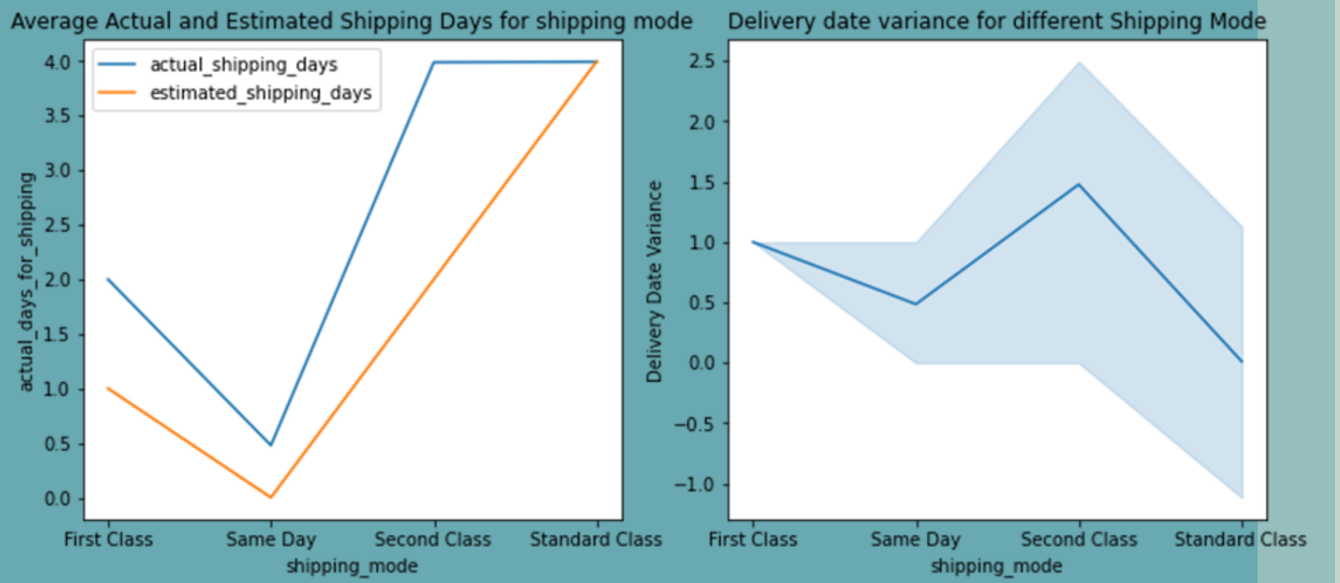
Firsty, the study analyzed a generic supply chain management system using an appropriate dataset of a product based company.The company offered 4 modes of shipping the product namely- standard, same, first and second class. However, every mode of delivery shows some level of inefficiency. Therefore, there is a delivery data variance associated for all the modes of shipping.The study also analyzed the best model for prediction for the given dataset,the model was found out to be XGBoost with an accuracy of 99.65%. Using this model forecasting was done between predicted and actual sales.

FIGURES & TABLES

Bar chart for Percentage delay in delivery modes.

Inference

As the stacked bar chart in which x axis is taken as different modes of shipping and y axis percentage of deliveries it shows that the performance of all shipping modes is not so good. In general, 40% of the orders are late delivery .Almost 95% of First Class shipping mode is late delivery. As a result, First Class and Second Class shipping modes require improvements in terms of supply chain to deliver orders on time.



Graphs showing variance in actual vs estimated delivery.

Inference

From the line graph on the left-hand side, it is clear that the actual shipping days are larger than the estimated one for First Class, Same Day, and Second Class shipping modes. Only Standard Class can complete the delivery as estimated.It shows that First Class, Second Class, Same Day takes longer to be completed as expected.However, Standard Class normally deliver on time.From the line graph on the right-hand side, it is more clear about the delivery date variance.

PERFORMANCE COMPARISON OF ALL SHIPPING MODES

MODE OF SHIPPING	ANALYSIS
FIRST CLASS	Takes longer time for shipping than estimated
SECOND CLASS	Takes longer time for shipping than estimated
SAME DAY	Takes longer time for shipping than estimated
STANDARD	Delivers on time.

Inference

ALGORITHM	ACCURACY
LINEAR REGRESSION	0.7852
RANDOM FOREST	0.9954
XG BOOST	0.9965

In order to identify which model best fits the dataset, we analyze the accuracies of various algorithms.

The table shows that the accuracy of XG Boost is the maximum ,hence this model can be used for making predictions of the actual and predicted sales.

Line chart for actual vs predicted sales.

Inference

The graph depicts line plots for actual and predicted sales of different products. From the graph,it can be seen that there are few discrepancies in the actual and predicted sales.

EXPLAINATION

From the first barchart it is clear that all shipping days take more time for shipping than expected.From the line chart it is clear that . Only Standard Class can complete the delivery as estimated.The shadows present in the line graph indicate the Delivery date variance,. To conclude we can say that Delivery Date Variance = Actual Shipping Days - Estimated Shipping Days.It indicates that ,First Class is very stable, which is always one day behind the schedule.The performance of Same Day shipping mode is not bad as it has an average 0.5 days longer than expected.Second Class has the most poor performance as it usually takes 1.5 days longer to complete the delivery, which is the longest among others. Besides, it has the largest maximum delivery date variance, which indicates that it has the longest delay.Standard Class has the best performance as it usually delivers on time. Besides, it sometimes delivers earlier than expected.

EXPLAINATION

Next, in order to predict the sales of various products,we need to first find which model is best suited for the dataset.Firstly, appropriate parameters will be selected for the model based on their p and f values.After applying various ML algorithms, the study found out that XG Boost has the maximum accuracy.As the accuracy of XG boost is maximum,the work will use this model for making predictions of the actual and predicted sales. The study found out that there are discrepancies in the graph obtained for actual vs predicted sales using XG boost model.These are mainly caused by late deliveries and fraud orders of products.

EXPLAINATION

Delays on delivery of products can have adverse effects on the customers, delays in shipping can hinder the customers-seller relationship,ultimately leading to the retailer losing their daily customers.If a business fails to deliver products or services on time, it can lead to customer dissatisfaction. Customers may become frustrated and angry if they do not receive their orders when expected, which can harm the business's reputation and lead to negative reviews.A delay in delivery can result in lost revenue, especially if customers decide to cancel their orders or take their business elsewhere. This can be particularly damaging for businesses that rely on repeat business or have a high level of competition.

CONCLUSION

It is clear that in a generic supply chain system in India, there are a lot of issues including late deliveries of orders, improper payment schemes, fraudulent orders etc. These issues create hindrance in any business in aspects of management as well as analysis. Implementation of blockchain has the potential to transform supply chain management systems by providing an immutable and decentralized ledger that allows for secure and transparent tracking of goods. Blockchain can be used to provide end-to-end visibility of the supply chain, allowing all parties involved to trace the origin of a product or service, track its movement through the supply chain, and verify its authenticity.

CONCLUSION

This can help prevent fraud, counterfeiting, and other types of supply chain risks. Blockchain can be used to automate supply chain processes through the use of smart contracts, which are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. This can help to eliminate manual processes, reduce administrative costs, and improve efficiency. This smart contract can be implemented in the Digital Rupee network which would be a revolutionary game changer in terms of the supply chain. The stakeholders can work on their own and within a set of rules and guidelines. Blockchain can also be used to streamline payment processing in the supply chain by enabling secure, instant, and low-cost transactions between buyers and sellers. This can help reduce the risk of fraud, eliminate the need for intermediaries, and improve cash flow for all parties involved.Overall, the use of blockchain technology in supply chain management has the potential to improve efficiency, reduce costs, increase transparency, and enhance trust and collaboration between all parties involved in the supply chain.

REFERENCES

- https://ieeexplore.ieee.org/document/8662573
- https://www.mdpi.com/2078-2489/11/1/21
- https://www.sciencedirect.com/science/article/abs/pii/S0924224418309178
- https://www.sciencedirect.com/science/article/abs/pii/S036083521930372 9
- https://ieeexplore.ieee.org/abstract/document/8684204
- https://hbr.org/2022/01/how-walmart-canada-uses-blockchain-to-solve-supply-chain-challenges
- https://www.ibm.com/blogs/think/2018/11/tradelens-how-ibm-and-maersk-are-sharing-blockchain-to-build-a-global-trade-platform/
- https://www.debeersgroup.com/media/company-news/2022/de-beers-group-introduces-worlds-first-blockchain-backed-diamond-source-platform-at-scale
- https://www.nestle.com/media/news/carrefour-consumers-blockchain-mousline-puree-france