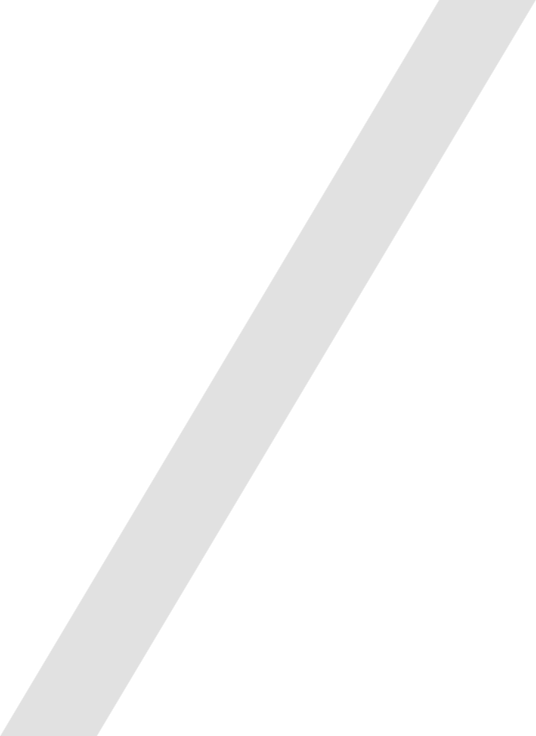
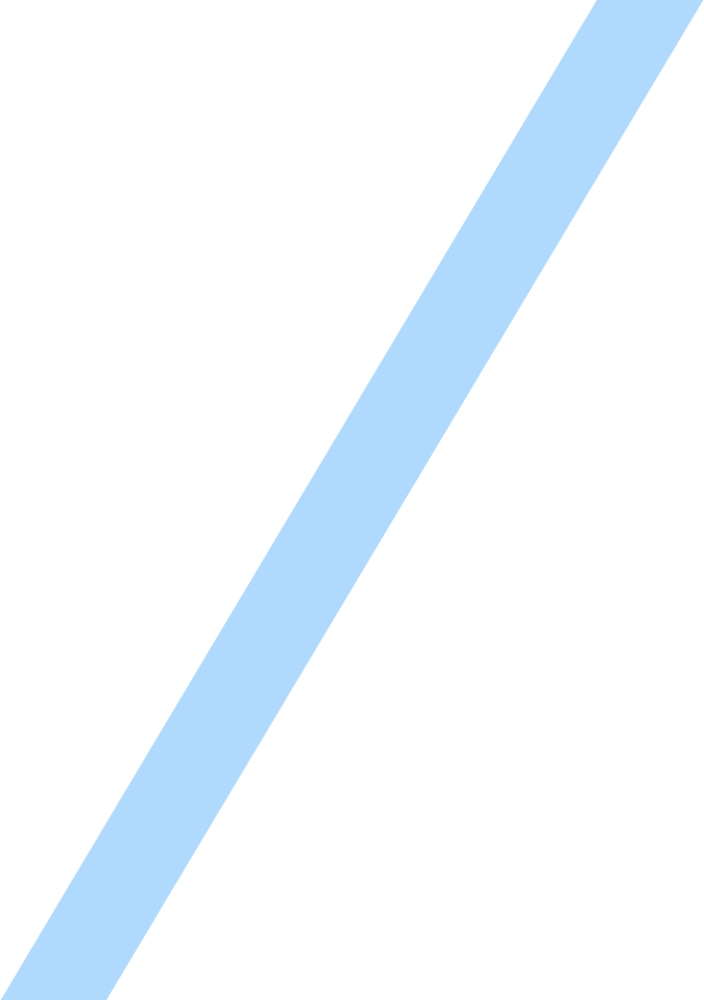
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| Technical Report of Data Science Project  On  Retail Inventory Management Analysis |

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| Retail Inventory Management Analysis |

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| Executive Summary By leveraging artificial intelligence (AI) and machine learning (ML) technologies can help in improving the inventory forecasting, planning, buying, pricing, sales history, market trends and generate insights and recommendations that can help optimising inventory decisions. | | |
| person at a table writing in a notebook with people around | | |
| **Team Members:**  **Ganesh Kavali**  **Adithya Sai Reddy**  **Ganga Vamsik**  **Brahma Vamsi** | **Questions?**  Contact : gsani@unh.newhaven.edu |  |

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| Technical Report |

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| Retail Inventory Management Analysis |  |
| Retail inventory management plays a pivotal role in the success of any retail business. Efficiently managing inventory ensures that products are readily available for customers, reduces the risk of stockouts, minimizes overstock situations, and ultimately improves overall operational efficiency. To address the challenges and opportunities in retail inventory management, a comprehensive project has been initiated to develop and implement an advanced inventory management system tailored for the specific needs of the retail industry.Submitted on: |

Building a collaborative network with suppliers is essential for efficient inventory management. The project will implement features that facilitate communication and data sharing between retailers and suppliers. This collaboration will enhance supply chain visibility, reduce lead times, and improve overall inventory accuracy.

SUBMITTED ON : 06-12-2023

## Abstract

This data science project focuses on revolutionizing retail inventory management through the application of advanced data analytics and predictive modeling. In the ever-evolving landscape of retail, maintaining optimal inventory levels while meeting customer demand is a complex challenge. The project aims to address this challenge by developing a sophisticated system that integrates seamlessly with existing retail infrastructure, harnesses historical sales data, and employs cutting-edge data science techniques to provide actionable insights.

**Key Objectives:**

**Predictive Analytics for Demand Forecasting:**

Employing machine learning algorithms to analyze historical sales data, market trends, and external factors, the project aims to create a robust predictive model for demand forecasting.

**Real-time Monitoring and Dynamic Adjustments:**

Implementing real-time monitoring capabilities to track inventory levels, sales patterns, and product movements.

**Integration with Point of Sale (POS) Systems:**

Seamless integration with POS systems will enable automatic and accurate updates of inventory levels with each transaction.

**User-Friendly Data Visualization and Reporting:**

Developing an intuitive and user-friendly interface that presents actionable insights through data visualizations and comprehensive reports.

Introductory Section:

The intersection of data science and retail inventory management is a realm of immense promise, promising to unveil insights that were previously elusive. Through this report, we aim to uncover the critical insights that data analytics can provide, offering a roadmap for retailers to navigate the intricacies of inventory management successfully.

Review of available research

## The journey began with a foundational understanding of historical data, progressed towards the development of advanced forecasting models, and expanded to embrace the potential of big data analytics. The integration of predictive analytics with POS systems and the emphasis on supplier collaboration further enhance the efficacy of these models.

## As the retail industry continues to embrace a data-driven approach, predictive analytics stands out as a pivotal tool for navigating the complexities of demand forecasting and inventory optimization. While challenges remain, the overarching theme is one of optimism and potential. The integration of predictive analytics with emerging technologies is expected to redefine how retailers operate, empowering them to not only meet current market demands but also anticipate and shape future trends in an increasingly competitive retail landscape. This literature review serves as a comprehensive exploration of the current state of predictive analytics in retail inventory management, offering valuable insights for academics, practitioners, and industry leaders alike.

## Methodology

we started understanding about the business and its data in different ways.

Taking the investors goals into consideration and by conducting surveys, to develop a recommendation system to suggest products to consumers based on their preferences which further enhancing their shopping experience.Data is being analysed with proper vizualizations for sales, stock levels

And in Data Preparation we can see the transformative power of data science in revolutionizing retail inventory management and driving business success, involving sorting, cleaning, Integration and transformation. After data is prepared, we used a linear regression to built a model on weekly sales for high accuracies. To continuously improve our solution, we plan to incorporate real-time data, enhance the recommendation engine, and expand our predictive models.

Every model needs an evolution, we trained the model using 70% of our data and tested it using the other 30% of data. and got an accuracy of 97% which means the tested model is very accurate.

## Results Section

This is the workflow we followed for analysing inventory management. As of now we didnt have a real retail store data, so we managed to download from internet. And then trains the model with perfect algorithm to obtain maximum accuracy. After integration of the model with web interface, we can have the insights of stock ratios that helps a warehouse retailer on balancing stock levels to meet demand while minimizing holding costs. We collected how many orders are there in particular month so that we can modify the goods according to monthly sales. Through the graph, we can forecast the values in coming months. Also the accuracy of model is high which results in best regression model.

A screenshot of a computer

Description automatically generatedA screenshot of a computer

Description automatically generatedA screen shot of a graph

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## Discussion:

Lets take a case study,

Walmart serves as an exemplary case study in retail inventory management analysis. The company's success is underpinned by a data-driven approach, technological integration, and a commitment to supply chain efficiency. By leveraging advanced analytics, embracing technology, collaborating with suppliers, and practicing just-in-time inventory strategies, Walmart has set industry standards for effective inventory management. The lessons learned from Walmart's practices offer valuable insights for other retailers seeking to enhance their inventory management capabilities and navigate the complexities of the modern retail landscape.

## 

## Conclusion

This model enables you to meet and forecast demand and it provides good customer experience. It values retailers and consumers money. With these model user can track all product information and discounts. Retailers don’t suffer from a product surplus or a product shortage and it is a huge beneficial in today's market.

## Contributions/References:

<https://www.kaggle.com/datasets/mehmettahiraslan/customer-shopping-dataset>