PREDICTIVE DEMAND FORECASTING FOR RETAIL BUSINESSES

Sanchary Nandy (Team Leader)

Akshay Karadkar

Sharanya DV

Anand Geed

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Step 1: Prototype Selection

Abstract

This research aims to design a predictive model for forecasting product demand in retail businesses, with a particular emphasis on forecasting sales for Walmart using machine learning methods. By examining past sales data, we aim to make precise predictions about future product demand, which will allow businesses to efficiently plan for inventory and restocking, thereby enhancing their productivity and profitability. By experimenting with a variety of machine learning models, we intend to identify the most effective strategy for forecasting demand in the retail industry.

1.0 Problem Statement

Retail businesses rely heavily on accurate demand forecasting to ensure efficient inventory management and to avoid stockouts or overstocking. However, forecasting demand in retail is challenging due to the dynamic nature of consumer behavior and the influence of external factors such as competition, promotions, and seasonality. This project aims to develop a predictive demand forecasting model for retail businesses that utilize machine learning techniques, specifically focusing on sales forecasting for Walmart. By analyzing historical sales data, the model will predict future demand for products, thus enabling businesses to plan for inventory and restocking, ultimately leading to improved efficiency and profitability. The project aims to determine the optimal approach for retail demand forecasting by implementing various machine learning models.

2.0 Market/Customer/Business Need Assessment

Accurate demand forecasting is essential for retailers as it allows them to manage inventory efficiently and avoid stockouts or overstocking. By using advanced methods, such as machine learning, retailers can improve the accuracy and reliability

of predictions, leading to increased sales and customer satisfaction, and reduced costs associated with excess inventory. However, traditional forecasting methods often fall short in the dynamic retail market, influenced by various factors such as consumer behavior, competition, promotions, and seasonality. Therefore, there is a need for more sophisticated demand forecasting methods that can effectively adapt to these changing conditions. Customers expect to find the products they need when they visit a retail store, and when a store is out of stock of a particular product, customers may become frustrated and may choose to shop at a competitor's store. Accurate demand forecasting can help retailers avoid stockouts and ensure that products are available when customers need them. Additionally, it can also help retailers to avoid overstocking which can lead to markdowns and discounts, affecting the customer's perception of the product's value. Retail businesses require accurate demand forecasting to manage inventory effectively and avoid stockouts or overstocking. Inaccurate demand forecasting can lead to increased costs associated with excess inventory and lost sales due to stockouts. By implementing advanced demand forecasting methods that utilize machine learning techniques, retailers can improve the accuracy and reliability of predictions, leading to increased sales, customer satisfaction, and reduced costs. Furthermore, it will also aid retailers to make better decisions, planning for promotions and discounts, and adjusting prices.

3.0 Target Specification and characterization:

The purpose of specifying and characterizing the target in a sales forecast is to establish clear and achievable goals for the company.

The forecast aims to provide answers to questions such as:

- What are the aspirations for the upcoming month, year, and five years?
- How many customers are expected to be acquired in the next month and year?
- How much revenue is expected to be generated per customer?
- By providing insight into these and any other related future business prospects, the sales forecast helps to guide the direction and growth of the company

4.0 External Search (Information Sources):

The following sources were used to gather information and data for this study:

i) Kaggle (n.d.). Walmart Recruiting - Store Sales Forecasting [Data set]. Retrieved from https://www.kaggle.com/c/walmart-recruiting-store-sales-forecasting/data

ii) This data set provided historical sales data for 45 Walmart stores located in different regions. It was used as the primary source of data for this study.

iii) Sharma, A. (2018, December 14). Walmart Sales Forecasting [Blog post]. Retrieved from https://medium.com/analytics-vidhya/walmart-sales-forecasting-d6bd537e4904

iv) This blog post provided an overview of various techniques and models used for sales forecasting in retail, with a specific focus on Walmart. It was used as a secondary source of information to understand the challenges and best practices in retail demand forecasting

5.0 Benchmarking

A dataset titled "Walmart Sales Forecasting" from Kaggle (n.d.) was utilized for the benchmarking analysis. The dataset contains information about various stores, A dataset titled "Walmart Sales Forecasting" from Kaggle (n.d.) was utilized for the benchmarking analysis. The model developed for the predictive demand forecasting project was compared to the performance of the model using this benchmark dataset. The dataset includes the following features:

1. Stores: The dataset includes information about 45 stores, with store numbers ranging from 1 to 45. The stores are categorized into three types, 'A', 'B', and 'C'. The size of a store is determined by the number of products available, which ranges from 34,000 to 210,000.

2. Temperature: The temperature of the region during the specific week of the observation.

3. Fuel Price: The fuel price in the region during the specific week of the observation.

4. Markdown 1-5: Represents the type of markdown promotion and the quantity available during the specific week of the observation.

5. CPI: The Consumer Price Index during the specific week of the observation.

6. Unemployment: The unemployment rate during the specific week of the observation in the region of the store.

7. Sales: The dataset includes information about the date and weekly sales recorded during that week, the department (ranging from 1-99), and whether the week is a holiday or not.

The benchmarking dataset from Kaggle (n.d.) provided a reliable source of data for evaluating the performance of the predictive demand forecasting model developed for retail businesses using machine learning based on Walmart sales forecasting. The dataset is rich with information about various stores, departments, temperature, unemployment, consumer price index (CPI), holiday status, and markdown promotions, which helped to evaluate the performance of the model in various scenarios.

Step 2: Prototype Development

The project aims to develop a predictive demand forecasting model for retail businesses using machine learning techniques, specifically focusing on sales forecasting for Walmart. To accomplish this, a combination of machine learning and statistical methods is used. The implementation of the model was done using the Python programming language. The process of model development includes data collection, pre-processing, feature selection, model selection, training, and evaluation. To generate a more robust model, different machine learning techniques such as linear regression, decision tree, random forest, and gradient boosting were tested and compared. The final model was selected based on its performance on the evaluation metrics such as mean absolute error and root mean squared error. Additionally, feature selection and engineering techniques were used to improve the performance of the model and to make the model more interpretable. The final model was then validated using a separate test set and its performance was evaluated. Overall, the concept generation and development process involved a combination of machine learning and statistical methods to develop a predictive demand forecasting model for retail businesses using machine learning based on Walmart sales forecasting.

Before releasing the service, it is essential to develop a final product prototype. This includes performing Exploratory Data Analysis (EDA) to identify the dependent and independent features, as well as algorithm training and optimization to minimize overfitting of the model and hyperparameter tuning. For this purpose, popular libraries such as NumPy, pandas, seaborn, matplotlib, and scikit-learn were used.

Working on other **Company datasets:**
Adidas is a global company headquartered in Germany that creates athletic and sports lifestyle goods, such as clothing, footwear, and accessories. Adolf Dassler, the brother of Rudolf Dassler, who developed Puma, launched the business in 1949.

Adidas is one of the biggest sportswear producers in the world and is well-known worldwide. The business has relationships with several sportsmen and sports organisations, including basketball stars James Harden, Damian Lillard, and Donovan Mitchell, as well as soccer clubs Manchester United, Real Madrid, and Bayern Munich.

In addition, Adidas manages other affiliated brands, such as Reebok, TaylorMade Golf, and Runtastic. The business is dedicated to sustainability and has started programmes to lessen its negative effects on the environment, such as using recycled materials in its goods and cutting waste in its supply chain. In 2016, ADIDAS generated total revenue of $19,068 million, which increased by 18 per cent. In its annual report, ADIDAS projects annual growth in sales between 11 per cent and 13 per cent.

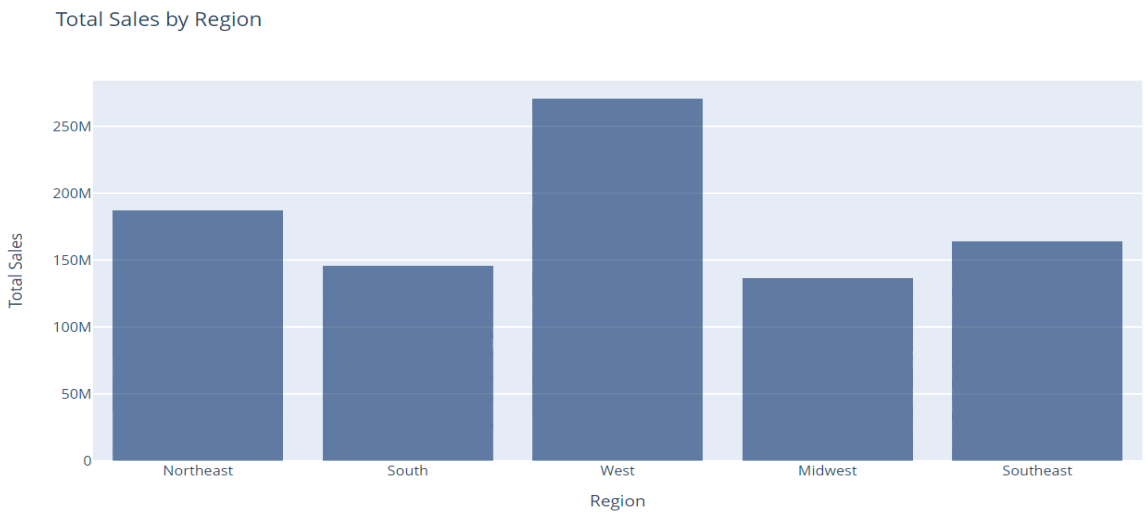
About Dataset:
A quarterly sales forecasting dataset may include historical sales data, market trends, economic indicators, and other relevant factors affecting Company's sales performance in the upcoming quarter. The dataset may also include information on Company's product line, target markets, and sales channels, as well as data on competitors and industry trends. The dataset consists of 9647 rows and 13 columns in it. The dataset contains the following columns retailer, retailer_id, invoice_date, region, state, city, product, price_per_unit, units_sold, total_sales, operating_profit, operating_margin, sales_method. These columns provide us with details about the sales, region of sales and many others about the company's product. Based on this information, statistical and machine learning models can be used to predict Adidas's sales performance for the upcoming quarter. The accuracy of the forecasting models can be evaluated by comparing the actual sales figures to the forecasted values. Accurate forecasting can help Adidas to make informed decisions regarding inventory, production, marketing, and other aspects of their business.

EDA :- There are no missing values in the dataset. From the report we can see we have a high cardinality in the product_name column, and a high correlation between the total_sales and the operating_profit columns. We can also see that the dataset is imbalanced. We have more data for the year 2020 than for the year 2021. "cardinality" refers to the number of unique values in a categorical feature. A categorical feature with a high cardinality means that it has a large number of unique

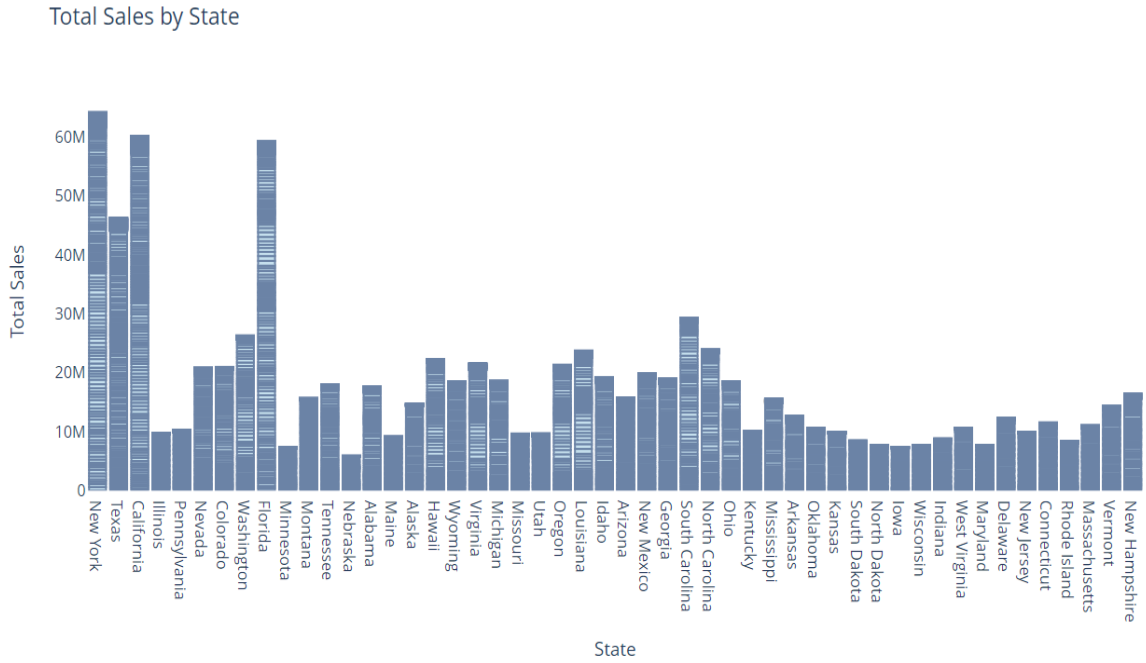
values. This can be a problem in some cases because it can make it difficult to analyze the data and can increase the size of the dataset.

Visualization :- Visualization is an important step in data analysis because it allows us to explore and understand data in a more intuitive and interactive way. By exploring this data visually, we can quickly identify areas that need more attention and focus our efforts accordingly.

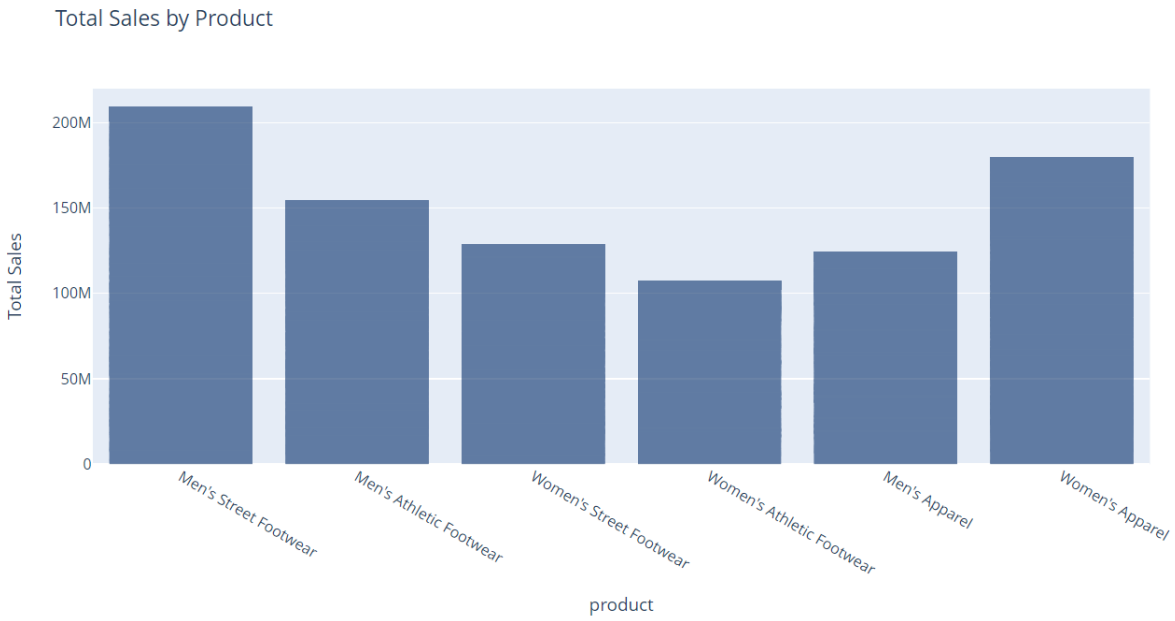
1. Most Sales were made in the region of the west. The midwest which had the least amount of sales was Nebraska.



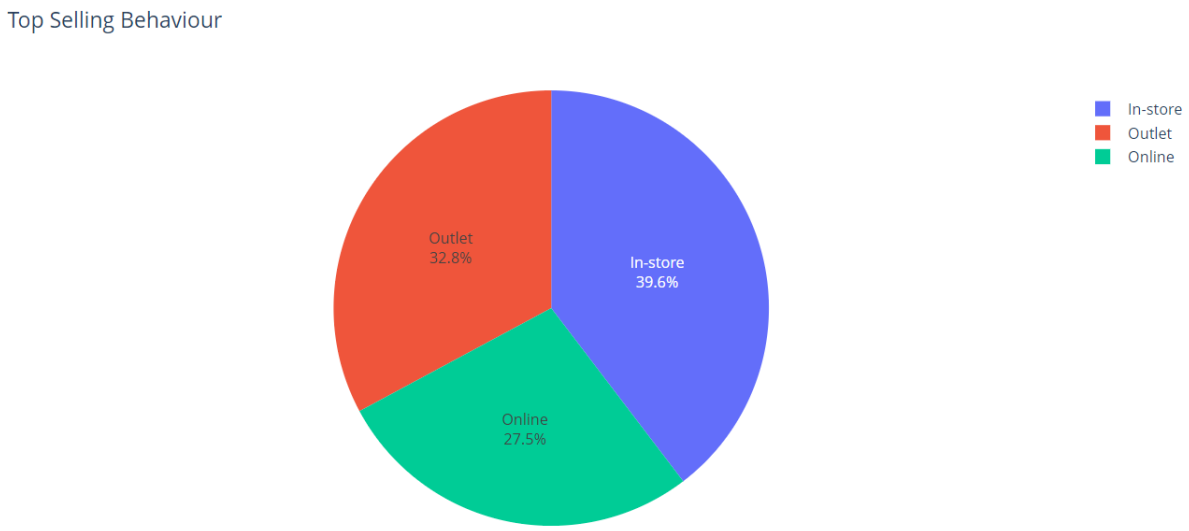
2. Most Sales were made in the state of New York followed closely with the state of California. The state which had the least amount of sales was Nebraska.



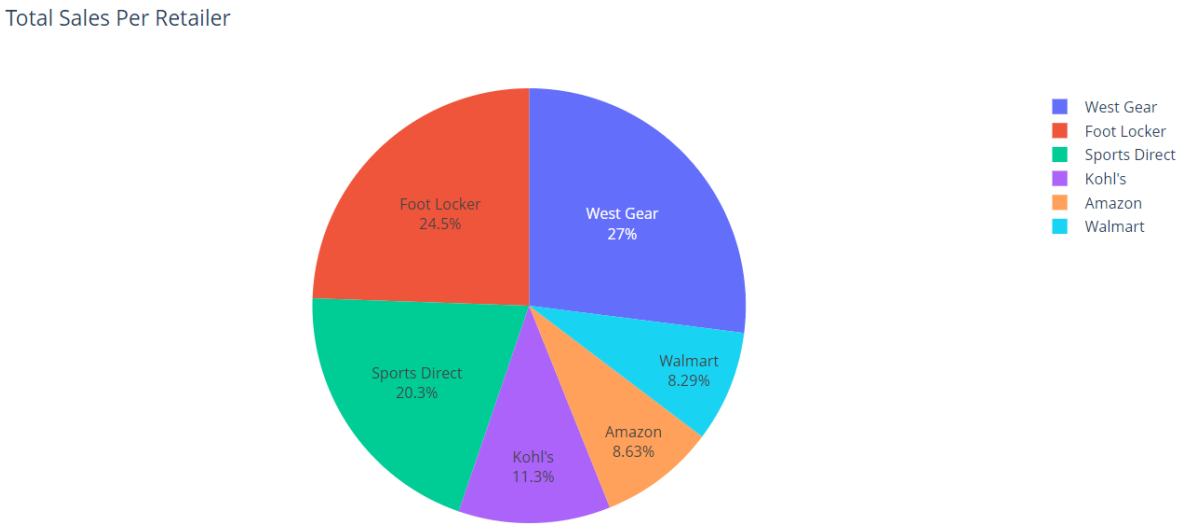
3. Men's street Footwear was the product that made most sales while the least sales can be seen in Women's Athletic Footwear.



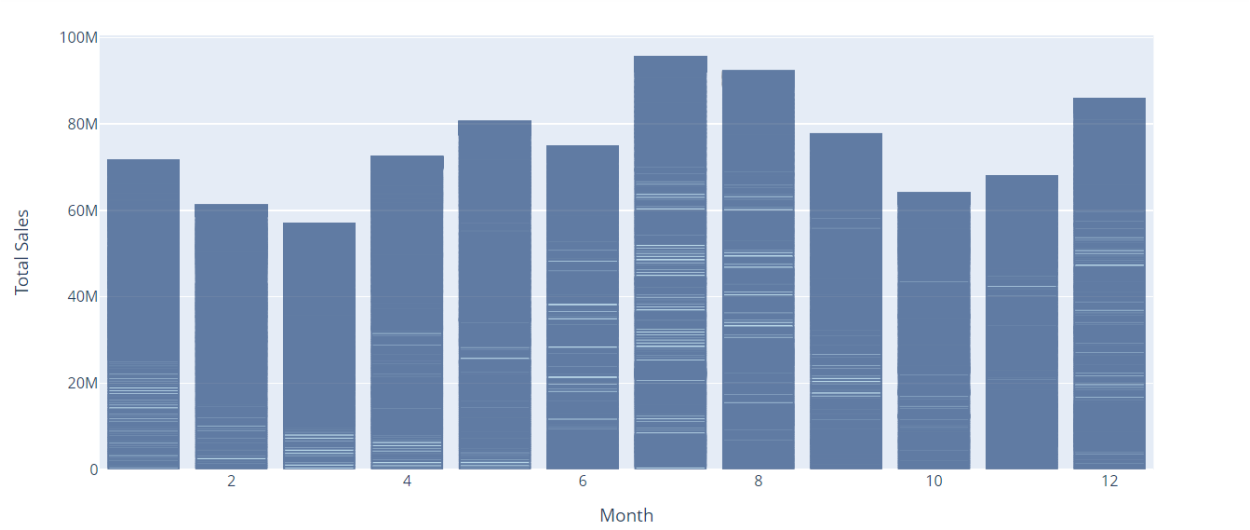
4. Top selling behavior by Retailers was In-store. Most customers can be seen to preffer carrying out their purchases In-Stores.



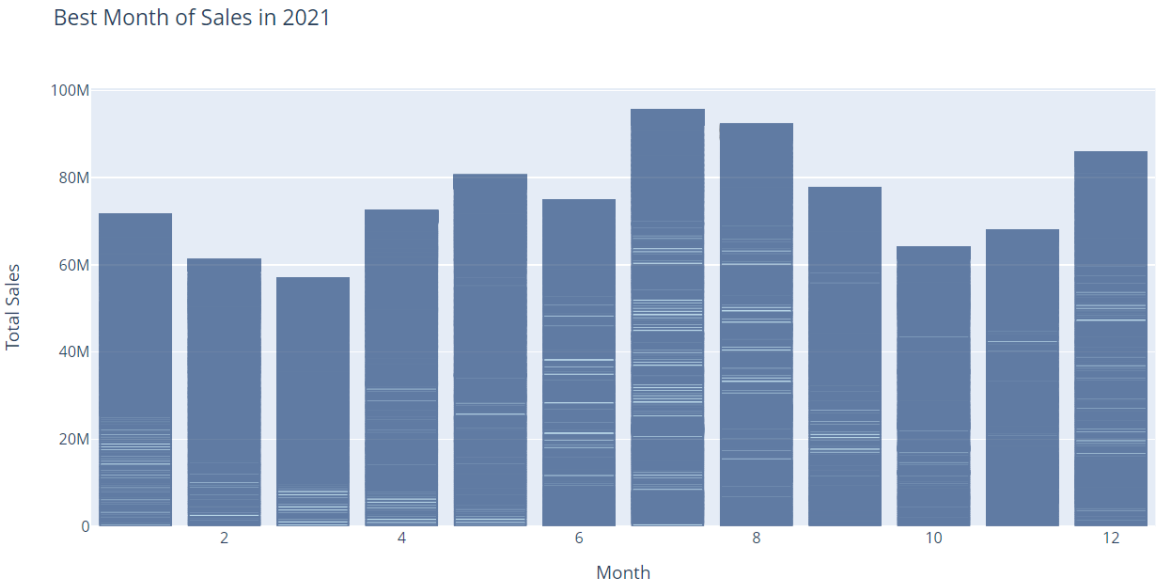
5. West Gear was the biggest retailer with a share percentage of 27%



6. In the year 2020, July experienced the most number of sales but there was a steady decline in August.



7. Over the span of the 2 years we can say that most sales were made in the month of July(The 7th month of the year).



Machine Learning

Machine learning is a subset of artificial intelligence (AI) that uses statistical techniques to give computer systems the ability to "learn" (e.g., progressively improve performance on a specific task) with data, without being explicitly programmed. Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal

human intervention. We'll focus on converting categorical columns to numeric columns and removing any other extraneous columns. We'll also use the LabelEncoder class from the scikit-learn library to convert the categorical columns to numeric columns.

Step 3: Business Modelling

Introduction

The retail industry has been evolving rapidly over the past few years due to technological advancements and changes in consumer behaviour. One of the key challenges that retail businesses face is forecasting demand accurately. Traditional demand forecasting methods are often based on historical data and lack the ability to factor in market trends and other external factors. As a result, retail businesses often face the issue of overstocking or understocking products, leading to waste and lost revenue. The goal of this business model is to provide retail businesses with an AI-based product/service for predictive demand forecasting that can help them optimize their inventory levels, reduce waste, and increase profits. This report outlines the business model and the key steps involved in developing the AI product/service.

Customer Segments:

The AI-based predictive demand forecasting product/service will be particularly beneficial for businesses that operate in the following industries: 1. Apparel and fashion: The fashion industry is highly seasonal, with trends changing rapidly. Accurate demand forecasting can help businesses to optimize their inventory levels and avoid overstocking or understocking products. 2. Grocery and food: The food industry is highly perishable, and businesses need to manage their inventory carefully to avoid waste. Accurate demand forecasting can help businesses to optimize their ordering and inventory management processes, resulting in less waste and increased profits. 3. Electronics and technology: The electronics industry is highly competitive, and businesses need to stay on top of changing trends to remain relevant. Accurate demand forecasting can help businesses to stay ahead of the curve and make informed decisions about their product offerings. 4. Home goods and furnishings: The home goods industry is highly seasonal, with demand for certain products increasing during specific times of the year. Accurate demand forecasting can help businesses to optimize their inventory levels and avoid overstocking or understocking products.

Value Proposition:

The AI-based predictive demand forecasting product/service will provide retail businesses with the following key value propositions: 1. Accurate demand forecasting: Accurate demand forecasting is crucial for retail businesses to optimize their inventory levels and avoid stockouts and overstocking. By using AI to analyze historical sales data, market trends, and other relevant factors, the product/service can provide accurate demand forecasts to businesses. This will help businesses plan their inventory levels and purchasing decisions more effectively, leading to reduced waste and increased profits. 2. Inventory optimization: The product/service will provide businesses with recommendations for optimizing their inventory levels based on demand forecasts. This will help businesses reduce waste by avoiding overstocking and stockouts. By optimizing inventory levels, businesses can increase their profits by minimizing the cost of carrying excess inventory while also ensuring that they always have enough stock to meet customer demand. 3. Real-time insights: In today's fast-paced retail environment, real-time insights are essential. The product/service will provide businesses with real-time insights into changing market trends and consumer behavior. This will help businesses stay ahead of the competition by quickly adapting to changes in the market and customer behavior. 4. Customizable dashboards and reports: The product/service will provide businesses with customizable dashboards and reports that can be tailored to their specific needs. This will make it easier for businesses to access the insights and data they need to make informed decisions. Customizable dashboards and reports will also help businesses identify trends and opportunities that they may have missed otherwise. 5. Seamless integration: The product/service will seamlessly integrate with existing POS and inventory management systems. This will make it easy for businesses to adopt the product/service without disrupting their existing workflows. Seamless integration will also ensure that businesses have access to all the data they need to make informed decisions

The Revenue Streams:

The revenue streams for forecasting sales for Walmart will be generated through the subscription-based pricing model. The pricing model will be divided into different tiers based on the size of the business and the level of service required. This will ensure that the product/service is affordable for businesses of all sizes while providing Walmart with a reliable stream of recurring revenue. The subscription model will provide customers with access to the AI-based predictive demand

forecasting product/service, as well as support and training. The subscription will be renewed annually or monthly, depending on the preference of the customer. Walmart may also generate additional revenue streams by offering customized consulting services to customers who require more personalized support. Consulting services may include customized data analysis, inventory optimization, and business strategy development. These consulting services will be provided on a per-project or hourly basis, depending on the scope of the project and the needs of the customer. Walmart may also consider offering value-added services such as marketing analytics, pricing optimization, and customer segmentation to provide a comprehensive suite of services to its customers. These value-added services can be offered at an additional cost and will help Walmart stand out from its competitors by providing a more holistic solution to its customers. Overall, the subscription-based pricing model will be the primary revenue stream for forecasting sales for Walmart, supplemented by additional revenue streams such as consulting services and value-added services.

Key Resources:

In order to develop and launch the AI-based predictive demand forecasting product/service, Walmart will require a range of key resources to ensure the success of the venture. These resources include:

1. Data scientists and machine learning engineers: These professionals will be responsible for developing the machine learning algorithms and analytics tools used to analyze sales data and generate demand forecasts. They will be tasked with building a robust and reliable system that can provide accurate forecasts to businesses of all sizes.

2. Cloud-based services: The product/service will be built using cloud-based services such as AWS, Google Cloud Platform, or Microsoft Azure. These platforms provide scalable and reliable infrastructure that can support the development, deployment, and management of machine learning models and analytics tools. 3. Development tools: The product/service will be developed using Python, which is a popular language for data analysis and machine learning. Walmart will require a team of skilled developers who are proficient in Python to build and maintain the product/service.

4. Sales and marketing professionals: The team will be responsible for promoting the product/service and generating new business. Walmart will require a team of experienced sales and marketing professionals who can effectively communicate the value proposition of the product/service to potential customers.

5. Customer support and training: The team will be responsible for providing ongoing support and training to customers. This will include answering questions, providing technical support, and ensuring that customers are able to make the most of the product/service.

Overall, the key resources required to develop and launch the AI-based predictive demand forecasting product/service for Walmart include a team of data scientists and machine learning engineers, cloud-based services, development tools, sales and marketing professionals, and customer support and training. By leveraging these key resources, Walmart can ensure the success of the venture and provide its customers with a valuable and reliable predictive demand forecasting product/service.

Key Activities:

Additionally, some key activities involved in the AI-based predictive demand forecasting product/service can be listed as follows:

1. Data Collection: This involves collecting relevant data from various sources such as point-of-sale systems, inventory management systems, market trends, and consumer behavior.

2. Data Preparation: This activity involves cleaning and preparing data for analysis, which may include removing irrelevant data, handling missing data, and normalizing data.

3. Data Analysis: This activity involves using machine learning algorithms to analyze historical sales data, market trends, and other relevant factors to generate accurate demand forecasts.

4. Platform Development: This activity involves developing and maintaining the platform, which includes developing new features, fixing bugs, and ensuring security and scalability.

5. Marketing and Sales: This activity involves promoting the product/service to potential customers through various channels such as digital marketing, trade shows, and industry events. 6. Customer Support: This activity involves providing ongoing support to customers through online tutorials, webinars, and personalized consulting services to ensure customer satisfaction.

7. Training: This activity involves providing training to customers to ensure that they can effectively use the product/service to generate accurate demand forecasts and optimize their inventory levels.

Channels:

Walmart can leverage its existing channels to promote and distribute the AI-based predictive demand forecasting product/service. Walmart can use its existing network of retail businesses as potential customers, offering the product/service as a value-added service to improve their business operations. Walmart can also leverage its online marketplace to promote the product/service, as well as its physical stores by showcasing the benefits of the product/service to its customers. Walmart can also collaborate with other companies in the retail industry, such as pointof-sale system providers, inventory management software providers, and logistics companies. By partnering with these companies, Walmart can offer the predictive demand forecasting product/service as an integrated solution, making it easier for retail businesses to adopt and use the product/service. This can also help Walmart expand its customer base and increase revenue streams.

Cost Structure:

The cost structure for developing and launching the AI-based predictive demand forecasting product/service will include the following costs:

1. Data storage and computing costs: The product/service will be built using cloudbased services, which will incur ongoing storage and computing costs.

2. Personnel costs: The team will require data scientists, machine learning engineers, sales and marketing professionals, and customer support and training staff.

3. Development tools: The product/service will be developed using Python and other data analysis and machine learning tools.

4. Overhead costs: The business will incur ongoing overhead costs

key metrics:

To elaborate further on key metrics for the AI-based predictive demand forecasting product/service for retail businesses, the following KPIs could also be considered:

1. Revenue growth: Measuring the revenue growth of the business will help determine the effectiveness of the product/service in increasing profits.

2. Customer satisfaction: Measuring customer satisfaction through surveys and feedback will help understand if the product/service is meeting customer needs and expectations.

3. Time to value: Measuring the time it takes for customers to see value from the product/service will help determine if the onboarding and training process is efficient and effective.

4. Conversion rate: Measuring the conversion rate of leads to customers will help determine the effectiveness of the marketing and sales strategy.

5. User engagement: Measuring user engagement through metrics such as active users, frequency of use, and time spent using the product/service will help understand how customers are using the product/service and identify areas for improvement.

6. Return on investment (ROI): Measuring the ROI of the product/service will help determine if the benefits outweigh the costs for customers and the business

Step 4: Financial Modelling (equation) with Machine Learning and Data Analysis

Linear regression is a statistical technique for simulating the connection between a dependent variable and one or more independent variables. The objective of linear regression is to find the best-fitting straight line that describes the linear relationship between the dependent variable and the independent variable(s).

In simple linear regression, there is only one independent variable, and the relationship between the dependent variable and independent variable is modelled using a straight-line equation of the form y = mx + b, where y is the dependent variable, x is the independent variable, m is the slope of the line, and b is the intercept.

In multiple linear regression, there are two or more independent variables, and the relationship between the dependent variable and independent variables is modelled using a linear equation of the form y = b0 + b1x1 + b2x2 + ... + bnxn, where y is the dependent variable, x1, x2, ..., xn are the independent variables, and b0, b1, b2, ..., bn are the coefficients of the independent variables.

Linear regression is commonly used in various fields, including finance, economics, marketing, and social sciences, to predict or estimate the dependent variable's values based on the independent variable(s).

Financial Model Description

Adidas is a multinational corporation that designs, develops, and markets a wide range of sports apparel, footwear, and accessories. The company operates in the global sportswear market and competes with other major players such as Nike, Puma, and Under Armour.

Financially, Adidas uses a variety of financial models to manage its operations and maximize profitability. Here are some key aspects of Adidas' financial model:

Revenue streams: Adidas generates revenue from three main streams: wholesale, retail, and other business activities. Wholesale is the largest revenue stream, where Adidas sells its products to retail partners, distributors, and other intermediaries. The retail business includes Adidas-owned stores and e-commerce platforms, which account for a significant portion of the company's revenue. Other business activities include licensing, sponsorship, and other brand-related services.

Cost structure: Adidas' cost structure includes both fixed and variable costs. Fixed costs include expenses such as rent, salaries, and marketing expenses, while variable costs include costs associated with production, such as raw materials, labor, and logistics. The company aims to optimize its cost structure by streamlining its supply chain, improving operational efficiency, and using technology to automate processes.

Marketing strategy: Adidas invests heavily in marketing to build and maintain its brand. The company uses various channels such as social media, television, and sponsorships to promote its products and engage with consumers. Adidas has also partnered with major sports leagues and teams around the world, including the NBA, UEFA, and FIFA, to increase brand awareness and reach new audiences.

Financial performance: Adidas' financial performance is closely monitored by investors and analysts. Key performance indicators include revenue growth, gross margin, and operating profit margin. The company also focuses on generating strong cash flow to fund its operations and invest in future growth opportunities.

Overall, Adidas' financial model is centered around maximizing revenue and profitability through a combination of strong branding, efficient operations, and strategic partnerships.

Formulation of financial Model equations

1.Linear Regression Model:

The linear regression model is a simple but effective way to predict demand based on historical sales data. The equation for a linear regression model is:

$y = \beta 0 + \beta 1x1 + \beta 2x2 + \ldots + \beta nxn + \varepsilon$

Where:

- y = the dependent variable (product demand)
- $\beta 0$ = the intercept term
- $\beta 1, \beta 2, \ldots, \beta n$ = the coefficients of the independent variables (sales trends, seasonality, promotional activity, etc.)
- x1, x2, …, xn = the independent variables
- ε = the error term

2. Time Series Models:

Time series models are useful for forecasting demand based on trends and seasonal patterns in the data. The following are some of the common time series models used for demand forecasting:

a) Autoregressive Integrated Moving Average (ARIMA) Model:

ARIMA models are used to model stationary time series data. The equation for an ARIMA model is:

$y(t) = \mu + \phi 1y(t-1) + \ldots + \phi py(t-p) + \varepsilon(t) + \theta 1\varepsilon(t-1) + \ldots + \theta q\varepsilon(t-q)$

Where:

- y(t) = the dependent variable (product demand at time t)
- μ = the mean of the time series
- $\phi 1, \ldots, \phi p$ = the coefficients of the autoregressive terms

- $\varepsilon(t)$ = the error term at time t
- $\theta 1, \ldots, \theta q$ = the coefficients of the moving average terms
- $\varepsilon(t-1), \ldots, \varepsilon(t-q)$ = the lagged error terms

b) Seasonal ARIMA (SARIMA) Model:

SARIMA models are used to model seasonal time series data. The equation for a SARIMA model is similar to that of the ARIMA model, but includes seasonal terms:

$$y(t) = \mu + \phi 1 y(t-1) + \ldots + \phi p y(t-p) + \varepsilon(t) + \theta 1 \varepsilon(t-1) + \ldots + \theta q \varepsilon(t-q) + \phi S \varepsilon(t-S) + \ldots + \theta S \varepsilon(t-S)$$

Where:

- S = the number of seasonal periods
- $\phi S, \ldots, \phi S+pS$ = the seasonal autoregressive coefficients
- $\theta S, \ldots, \theta S+qS$ = the seasonal moving average coefficients

3. Machine Learning Models:

Machine learning models can be used to forecast demand based on a wide range of variables, including demographic data, weather data, economic indicators, and more. Some of the common machine learning models used for demand forecasting include:

a) Decision Trees:

Decision trees are used to make predictions based on a series of decisions. The equation for a decision tree model is:

$$y = f(x)$$

Where:

- y = the dependent variable (product demand)
- x = the independent variables (demographic data, weather data, economic indicators, etc.)
- f(x) = the decision tree function

b) Random Forests:

Random forests are used to make predictions based on multiple decision trees. The equation for a random forest model is similar to that of a decision tree model, but includes multiple decision trees:

$y = f1(x) + f2(x) + \ldots + fn(x)$

Where:

- $fi(x)$ = the decision tree function for the ith tree

Conclusion:

In the case of Walmart, the implementation of this product/service could lead to significant cost savings and revenue growth. By accurately forecasting demand, Walmart could reduce its inventory levels and avoid stockouts, leading to cost savings. In addition, the product/service could help Walmart identify new market trends and consumer behaviour, leading to new revenue opportunities. The key to success will be ensuring the accuracy of the demand forecasts and providing a seamless user experience for customers. This can be achieved by investing in data scientists and machine learning engineers to develop and refine the machine learning algorithms, as well as investing in customer support and training to ensure customers are effectively using the product/service. Overall, the potential benefits of the AI-based predictive demand forecasting product/service for Walmart and other retail businesses are significant, and the business model outlined in this report provides a solid framework for developing and launching this product/service.

Github Link:

Project_3_Feynn_labs