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SALES FORECASTING

A Project Work Synopsis

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ABSTRACT

Forecasting sales is a common and essential use of machine learning (ML). This paper discusses need of Sales Forecasting. Sales Forecasting is the estimate of amount of sales to be expected for a item/product or products for a future period of time. Using Sales Forecasting the management of the enterprise can take decision regarding operations planning, scheduling, production programming inventories of various types, physical distribution and operating profits on the basis of sales forecasts. It also contains some additional benefits like deciding investment proporsals like modernization, expansion of existing units etc. Sales forecasts are essential to make proper arrangement for training the man-power in its own unit or sending them to other industries in the country or abroad to meet the future needs of expertise.

Keywords: sales forecasting, expansion, planning, ML , Training

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1 INTRODUCTION

Sales forecasting involves analyzing a company's historical sales data to make predictions about its future sales performance. It is an essential aspect of financial planning that helps companies plan for short- and long-term growth. Like all forecasting processes, there is a level of risk and uncertainty involved, so it is important for sales forecasting teams to acknowledge this uncertainty in their forecasts. Sales forecasting is a widely practiced corporate strategy that involves setting objectives, creating action plans, and allocating budgets and resources to achieve those objectives. Several techniques are commonly used for sales forecasting, including Linear Regression, Decision Tree, Random Forest, and XG BOOST.

PROBLEM DEFINITION

The main focus of this project is to use training data, specifically the data from Big Mart, to create a Sales Forecasting system. By analyzing this data and using machine learning techniques, the goal is to develop accurate models that can predict sales transactions for any company. Sales forecasts can be useful for setting benchmarks, evaluating the impact of new initiatives, and planning resources to meet expected demand. Additionally, they can be used to project future budgets

1.1 PROJECT OVERVIEW

- Sales Forecast helps in predicting the short-term or long-term sales performance of that company.
- The data for the Sales will be taken from Kaggle.
- Data wrangling (Data profiling, missing value treatment, exploratory data analysis) will be performed.

- Prediction will be automated with Machine learning Models thus saving a lot of time.
- We will be working on Pandas, Matplotlib, Model Training, AWS,HTML, and CSS, Flask.

1.2 HARDWARE SPECIFICATIONS

1.3.1 PC

A pc is a personal computer that can be used for multiple purposes depending on its size, capabilities, and price. They are to be operated directly by the end-user. Personal computers are single-user systems and are portable. Our web application program will be installed on the pc for our clients to use it. This makes it feasible for individual use.

1.3 SOFTWARE SPECIFICATIONS

1.4.1 Jupyter Notebook:

Jupyter Notebook is a web-based open-source application that is used for editing, creating running, and sharing documents that contain live codes, visualization, text, and equations. Its core supported programming languages are Julia, R, and Python. Jupyter notebook comes with an IPython kernel that allows the programmer to write programs in python. There are over 100 kernels other than IPython available for use.

1.4.2 Atom Text editor

Atom is a text and source code editor which works across all operating systems. It speeds up find-and-replace operations by an order of magnitude and improves loading performance for large, single-line files It's a desktop application built with HTML, JavaScript, CSS, and Node.js integration.

1.4.3 AWS

Amazon Web Services, Inc. (AWS) is a subsidiary of Amazon that provides on-demand cloud computing platforms and APIs to individuals, companies, and governments, on a metered pay-as-you-go basis. Through AWS server farms, these cloud computing web services offer software tools and distributed computer processing capability. One of these services is Amazon Elastic Compute Cloud (EC2), which enables customers to have a virtual computer cluster at

their disposal that is always accessible via the Internet. The majority of a real computer's features, such as hardware central processing units (CPUs) and graphics processing units (GPUs) for processing, local/RAM memory, hard-disk/SSD storage, a choice of operating systems, networking, and pre-loaded application software including web servers, databases, and customer relationship management, are all emulated by AWS's virtual computers (CRM).

1.4.4 FLASK

Flask is a micro web framework written in Python. It is classified as a microframework because it does not require particular tools or libraries. It has no database abstraction layer, formvalidation, or any other components where pre-existing third-party libraries provide common functions. However, Flask supports extensions that can add application features as if they were implemented in Flask itself. Extensions exist for object-relational mappers, form validation, upload handling, various open authentication technologies and several common framework- related tools.

1.4.5 MS-EXCEL

Microsoft produced Microsoft Excel, a spreadsheet, for Windows, macOS, Android, and iOS. It has calculating or computing capabilities, graphing tools, pivot tables, and the Visual Basic for Applications macro programming language (VBA). The Microsoft Office programme package includes Excel.

2 LITERATURE REVIEW

2.1 Existing System Summary

Year and citation	Annals of R.S.C.B., ISSN:1583-6258, Vol.25, Issue 5, 2021, Pages. 3928 - 3936 Received 15 April 2021; Accepted 05 May 2021.	https://www.anaplan.com/blog/sales-forecasting-guide/ 2022	T uyls, Karl & Maes, Sam & Vanschoenwinkel, B.. (2023). Machine Learning Techniques for sales forecasting
Article Title	"Intelligent Sales Prediction Using Machine Learning Techniques	"MachineLearning Models for Sales Forecasting"	"Forecast of Sales of Walmart Store Using Big Data Applications"
Purpose of the study	The forecast is composed of a smoothed averaged adjusted for a linear trend. Then theforecast is also adjusted for seasonality Machine learning algorithms such as Generalized Linear Model (GLM), Decision Tree (DT) and Gradient Boost Tree (GBT) are used in prediction of future sales.	Regression algorithm captures the patterns in the whole set of stores or products.The analysis includes the attributes such as mean sales value of historical data, state and school holiday flags,distance from store to competitor's store, storeassortment type are considered in prediction.Various machine learning models such as Random Forest, Neural network, Lasso regularization, Arima model and Extra Tree model are used to analyze the data.	The plan calls for gathering vast amounts of sales-related data, which is then sent to HDFS (Hadoop's distributed file system) for map reduction. To forecast sales, the Holt Winters algorithm is employed. The algorithm exhibits seasonality, trend, and randomness. Data sets are utilised to train the algorithm, and then it is used to predict sales.
Tools/ Software used	- Jupyter Notebook	- Jupyter Notebook	- Jupyter Notebook
Comparison of techniques done	- Generalized Linear Model (GLM) - Decision Tree (DT) - Gradient Boost Tree (GBT)	- Lasso - Neural Network	- Neural Network - Decision Tree (DT)
Evaluation parameters	- Model Accuracy	- Model Accuracy	- Model Accuracy

Table 2.1: Literature review summary

2.2 Proposed System

- This project mainly focuses on developing a system that can Predict Sales of a Company
- Data wrangling (Data profiling, missing value treatment, exploratory data analysis) will be performed.
- We will be working on Pandas, Matplotlib, Model Training, AWS,HTML, and CSS.

3 PROBLEM FORMULATION

- Sales forecasting plays a critical role in the success of any business. It provides essential information to allocate resources, hire new staff, manage costs, and increase quotas. The goal of sales forecasting is to provide accurate predictions that businesses can use to make informed and impactful decisions.
- Sales forecasts help businesses make informed decisions about staffing, inventory, product lines, and marketing efforts. It allows sales managers and representatives to spot potential issues and address them before they become problems.
- Sales forecasting is a valuable tool for sales managers and leaders to set realistic goals. Sales forecasts form the basis of your entire strategy throughout the year, and the insights lay the groundwork not just for the company’s vision, but also for the direction of sales team.
- Sales forecasting also enables sales managers and leaders to set realistic goals for their teams. It forms the basis of a company's strategy throughout the year and provides insights that guide the direction of the sales team.

4 OBJECTIVES

The proposed work is aimed to carry out work leading to the development of an approach for predicting Sales. The Sales forecasting system, which is theproposed work will be achieved by dividing the work into the following objectives:

1. Obtain the Big Maty dataset from the web
2. Perform Data Wrangling.
3. Work on different Machine learning Algorithms
4. Try to develop algorithms based on different models to achieve maximum accuracy.
5. To develop the GUI using flask and deploy the model on AWS.

5 METHODOLOGY

The following methodology will be followed to achieve the objectives defined for the proposed research work:

1. Detailed study on Sales Forecasting will be done.
2. Installation and hands-on experience on existing approaches of Sales Forecasting will be done. Relative pros and cons will be identified.
3. Various parameters will be identified to evaluate the proposed system.
4. Comparison of newly implemented approach with existing approaches will be done.

6 TENTATIVE CHAPTER PLAN FOR THE PROPOSED WORK

CHAPTER 1: INTRODUCTION

This chapter will cover the overview of Sales Forecasting and the different machinelearning and deep learning algorithms.

CHAPTER 2: LITERATURE REVIEW

This chapter includes the literature available for Sales Forecasting The findings of the researchers will be highlighted which will become the basis of the current implementation.

CHAPTER 2: BACKGROUND OF PROPOSED METHOD

This chapter will provide an introduction to the concepts which are necessary to understandthe proposed system.

CHAPTER 4: METHODOLOGY

This chapter will cover the technical details of the proposed approach.

CHAPTER 5: EXPERIMENTAL SETUP

This chapter will provide information about the subject system and tools used for theevaluation of the proposed method.

CHAPTER 6: RESULTS AND DISCUSSION

The result of the proposed technique will be discussed in this chapter.

CHAPTER 7: CONCLUSION AND FUTURE SCOPE

The major finding of the work will be presented in this chapter. Also, directions forextending the current study will be discussed.

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7 REFERENCES

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