OPTIMISATION IN INVENTORY MANAGEMENT USING MACHINE LEARNING

MINOR PROJECT SYNOPSIS

BACHELOR OF TECHNOLOGY

Information Technology

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1   Introduction

Machine learning is a branch of artificial intelligence (AI) and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy. Machine learning is an important component of the growing field of data science. Through the use of statistical methods, algorithms are trained to make classifications or predictions, uncovering key insights within data mining projects. These insights subsequently drive decision making within applications and businesses, ideally impacting key growth metrics. As big data continues to expand and grow, the market demand for data scientists will increase, requiring them to assist in the identification of the most relevant business questions and subsequently the data to answer them.

Inventory management is a technique of controlling, storing, and keeping track of your inventory items. Inventory management is an essential component of supply chain management, as it regulates all the operations that are involved from the moment an item enters your store until it has been dispatched. To put it in simple words, inventory management helps in streamlining the operations, organize the resources, and maximize the returns. Inventory management works at all three levels — structure, process, and system. inventory management secures the major components of your organization, like Marketing and Finance. Each of these components has different specific goals. Inventory management keeps marketing goals secured by ensuring the right items are available at the right time, and it keeps your finances aligned by controlling the flow of stock.
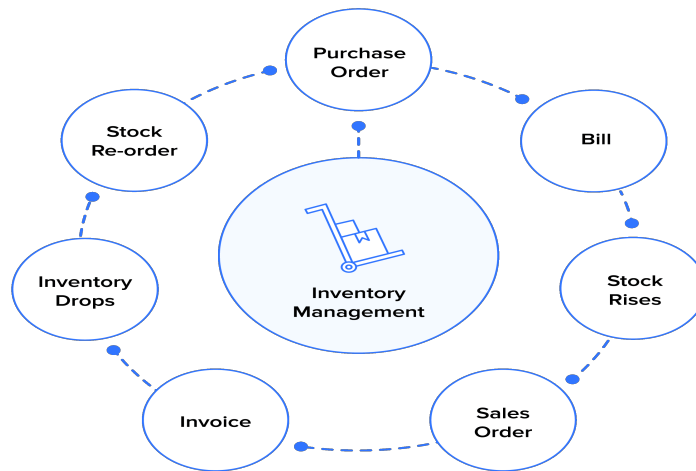

Figure 1: Inventory management

2   Objectives

1) To collect and cleanse data

2) To analyse the data and find the best model

3) To optimise inventory management

3 Feasibility study

A major requirement for small/medium-sized businesses is Inventory Management since a lot of money and skilled labor has to be invested to do so. E-commerce giants use Machine Learning models to maintain their inventory based on demand for a particular item. Inventory Management can be extended as a service to small/medium sized businesses to improve their sales and predict the demand of various products. Demand forecasting is a crucial part of all businesses and brings up the following question: How much stock of an item should a company/business keep to meet the demands, i.e., what should the predicted demand of a product be? Among its many benefits, a predictive forecast is a key enabler for a better customer experience through the reduction of out-of-stock situations, and for lower costs due to better planned inventory and less write-off items. We discuss the challenges of building an Inventory system and discuss the design decisions.

4 Methodology

These are the steps followed to achieve the objectives of the project:

1. Gathering data – The sales dataset is collected from kaggle.There are several ways data can be acquired such as leveraging public datasets, data scraping, product intervention, a combination of different acquisition strategies, etc.

2. Data pre-processing – Data preprocessing is a process of preparing the raw data and making it suitable for a machine learning model. It is the first and crucial step while creating a machine learning model.A real-world data generally contains noises, missing values, and maybe in an unusable format which cannot be directly used for machine learning models. Data preprocessing is required tasks for cleaning the data and making it suitable for a machine learning model which also increases the accuracy and efficiency of a machine learning model.

3. Splitting of training and testing data is done- In machine learning data preprocessing, we divide our dataset into a training set and test set.

Training Set: A subset of dataset to train the machine learning model, and we already know the output.

Test set: A subset of dataset to test the machine learning model, and by using the test set, model predicts the output.

4. Model evaluation- It helps to find the best model that represents the data and how well the chosen model will work in the future.we can then decide on whether the model is performing as we'd like it or whether it needs more work to get the desired behavior from the model — this process would include looking at the mistakes made by the model and judging how they may be improved. We are using the following models-

* Logistic Regression

* Support Vector Machine

* Random forest classifier

* Decision tree classifier

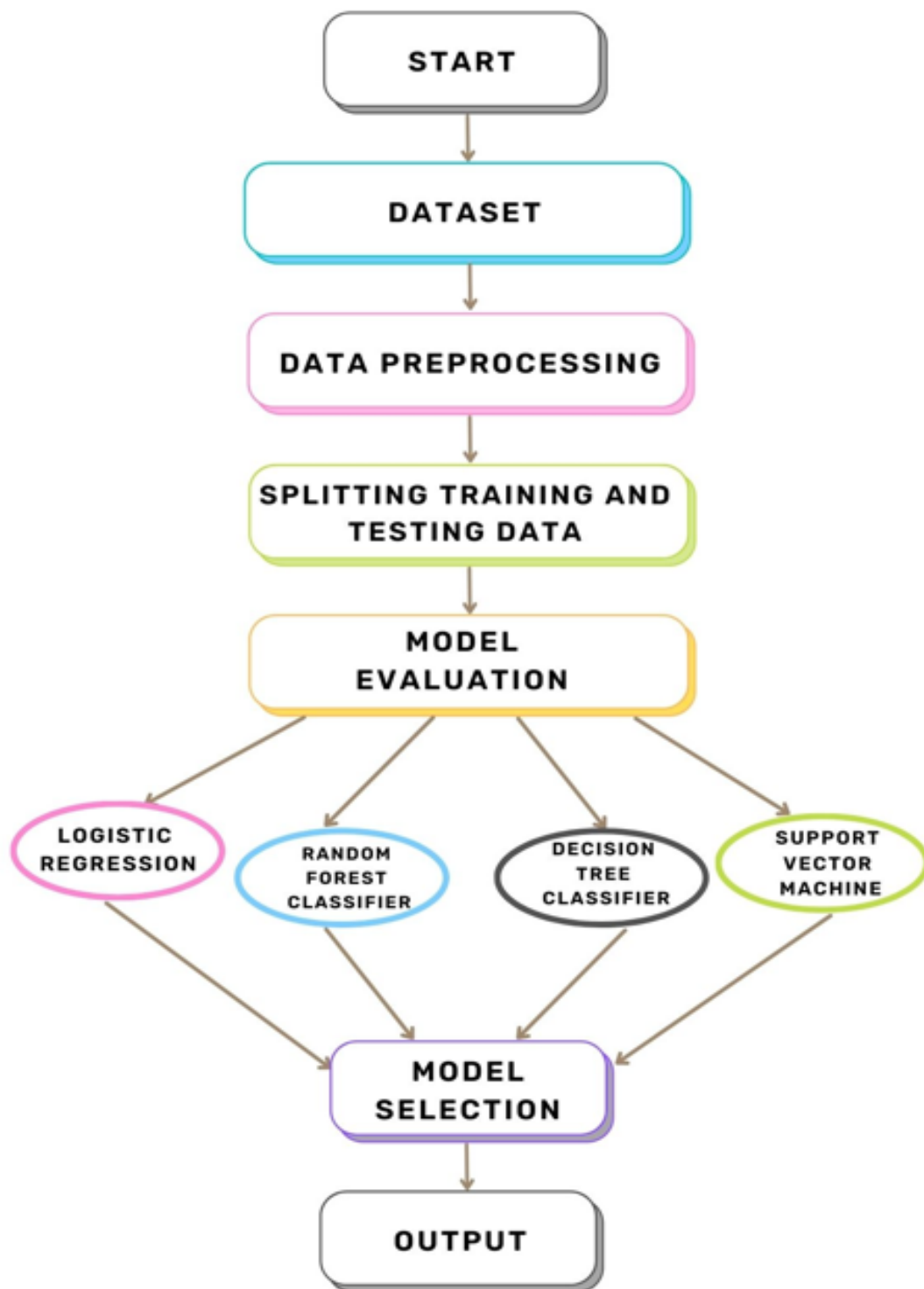5. Predictions- Based on the best fit model the results are predicted for future use.

Figure 2 : Workflow

5 Facilities required for proposed work

Software Requirement: Python interface (any).

The code will be running in any python interface Such as Jupyter Notebooks, Google Colab etc.

The IDE used for the project is Pycharm and Google Colab.

Apart from this, Tensorboard is used for graphical representations.

The dataset will be taken from kaggle

6 References

1. Jason Brownlee "Master Machine Learning Algorithms" Edition, v1.13, 2018

2. https://www.kaggle.com/

3. https://www.javatpoint.com/machine-learning

4. https://towardsdatascience.com/

5. https://www.geeksforgeeks.org/machine-learning/