**1. Project Overview**

The project plan must include the following:

**· A Project Title.**

Supply Chain Management on Retail Store Inventory Forecasting

**· A short summary of the project topic and background.**

Retail businesses that want to achieve a proper balance between product availability and minimum inventory costs realise the need for effective supply chain management. Therefore, accurate inventory forecasting allows the retailers to directly satisfy customers demand without overstocking, hence optimizing operational efficiency and profitability. The aim of this project is to analyse Montgomery County, Maryland’s "Warehouse and Retail Sales" dataset to develop predictive models that will improve the inventory forecasting accuracy. The dataset consists of sales and movement data, which were monthly categorised by department and item.

**· A Research Question.**

How can machine learning models be used in predicting retail store inventory demand through past sales, seasonal trends, and outside factors to manage and maintain supply chain efficiency?

**· The Project Objectives.**

To analyse the sales trends by examining historical sales data to identify patterns and trends across different items and departments.

To create models to forecast future inventory requirements, aiming to improve stock availability and reduce excess inventory.

To enhance Supply Chain Efficiency: Provide actionable insights to optimize ordering processes and minimize costs associated with overstocking or stockouts.

**· Reference List**

Mitra, A., Jain, A., Kishore, A. and Kumar, P., 2022. A Comparative Study of Demand Forecasting Models for a Multi-Channel Retail Company: A Novel Hybrid Machine Learning Approach. *Operations Research Forum*, 3(4), p.58. <https://doi.org/10.1007/s43069-022-00166-4>.

Nasseri, M., Falatouri, T., Brandtner, P. and Darbanian, F., 2023. Applying Machine Learning in Retail Demand Prediction—A Comparison of Tree-Based Ensembles and Long Short-Term Memory-Based Deep Learning. *Applied Sciences*, 13(19), p.11112.

Punia, S., Nikolopoulos, K., Singh, S.P., Madaan, J.K. and Litsiou, K., 2020. Deep learning with long short-term memory networks and random forests for demand forecasting in multi-channel retail. *International Journal of Production Research*, 58(16), pp.4964–4979. <https://doi.org/10.1080/00207543.2020.1735666>.

**2. Project Plan: Task List and/or Project Timeline**

| **Task Number** | **Task Description** | **Start Date** | **End Date** | **Notes** |
| --- | --- | --- | --- | --- |
| 1 | Conduct Literature Review on Inventory Forecasting Methods | Feb 10, 2025 | Feb 22, 2025 | Review existing research to inform model development. |
| 2 | Data Collection and Cleaning | Feb 23, 2025 | Mar 8, 2025 | Acquire and preprocess the dataset for analysis. |
| 3 | Exploratory Data Analysis (EDA) | Mar 9, 2025 | Mar 22, 2025 | Identify sales trends and patterns in the data. |
| 4 | Model Development | Mar 23, 2025 | Apr 12, 2025 | Develop predictive models for inventory forecasting. |
| 5 | Model Validation and Testing | Apr 13, 2025 | Apr 25, 2025 | Evaluate model performance and refine as necessary. |
| 6 | Report Writing and Presentation Preparation | Apr 26, 2025 | May 3, 2025 | Compile findings and prepare for final presentation. |
| 7 | Final Assessment Submission | May 5, 2025 | May 5, 2025 | Submit the final report and present findings. |

**3. Data Management Plan**

Overview of the Dataset:

The source of the "Warehouse and Retail Sales" dataset is Montgomery County, Maryland. It includes monthly sales and movement data that is appended by department down to item. The dataset is available to the public through Data.gov.

*Data Collection:*

The dataset will be downloaded from Warehouse and Retail Sales. Collecting the latest data updates, data is checked on a regular basis.

*Metadata:*

It is available in CSV, RDF, JSON and XML formats. Specifically, the CSV file is about 1.2 MB in size and includes detailed sales record and inventory movement details.

*Document Control:*

There will be a GitHub repository used for source and documentation. Version control will be maintained in the form of weekly commits. The repository will be public so that it can be accessed for the purposes of assessment.

*ReadMe File:*

The project will be overviewed in the ReadMe file, there will be instructions to reproduce analyses, descriptions of the data and code structures, and guidelines for future use or modification.

*Security and Storage:*

To prevent data loss, data and code will be stored in GitHub repository and backupped weekly into OneDrive. Sensitive information will be kept to authorised personnel only.

Ethical requirements: You must address each of the following issues and state how your specific dataset meets these requirements, give evidence when possible (e.g. screenshots or references):

1. Does the data come under GDPR requirements?

The data includes sales aggregated into basic data sets and without the personal identifiers so it doesn’t fall under GDPR.

2. Does the project conform to UH ethical policies?

The use of publicly available data and transparent analysis of results follows ethical guidelines of this project.

3. Do you have permission to use the data for your proposed research project?

The dataset is publicly available and permits researchers to reproduce the results.

4. Are you assured that the data was collected ethical (i.e. by the original people who gathered/collected/ collated/made the data)?

Montgomery County collected and published the data, adhering to ethical standards in data collection.