

**DOMAIN:** Applied Data Science.

**PROJECT NAME:** product demand prediction with machine learning.

***Problem Definition:***

☐ The problem is to create a machine learning model that forecasts product demand based on historical sales data and external factors.

☐ The goal is to help businesses optimize inventory management and production planning to efficiently meet customer needs.

***Design Thinking:***

☐ This project involves 6 steps. They are data collection, data preprocessing, feature engineering, model selection, training, and evaluation.

**1. DATA COLLECTION:**

- In this part data is collected to be first from various sources. then the data that is used for training the model.
- But in our case we are already provided by datasets for product demand prediction from KAGGLE platform.
- *Dataset link:* <https://www.kaggle.com/datasets/chakradharmattapalli/product-demand-prediction-with-machine-learning>
- This dataset contains 5 columns and 150150 rows.
- The data in the columns are based on
  1. ID of the product
  2. ID of the store
  3. Total price of the product (i.e manufacturing price)
  4. Base price of the product (i.e retail price)
  5. No. of units sold.

**2. DATA PREPROCESSING:**

In this part include major of 3 things;

***1. Clean and preprocess the data:***

Here, we are going to clear outliers that perform distinct significant from the other observation

***2. handle the missing values:***

☐, we are working with large amount of data, therefore every is need to be consistent and every data is need to be verified before the process.

☐ if we found any entity with missing values we have to replace a \*ZN() function replaces a Null value for the data field that is placed inside the brackets with a zero\*

***3. convert categorical features into numerical values:\****

Here, we are converting the data values into numerical values for example ,most of the price values are in INR and some of them are in \$ ,so here we have to convert them(\$) into INR.

### 3. FEATURE ENGINEERING:

In this step we are adding additional feature that capture seasonal patterns/ trends,and external influences on product demand.

**1.seasonal patterns/trends:** A certain time series with repetitive or predictable patterns of demand due to re-occurring seasonal events. These patterns can re-occur over days, weeks, months or quarters and can make it harder for businesses to forecast future demand trends. Eg: MEESHO maha indian sale .

**2. External influences on products demand:** Such as,

- based on demand of the product.
- Competition between same product but on different manufacturers
- Suppliers of raw materials and goods
- economic conditions
- buyers
- Government

### 4.MODEL SELECTION:

☐ In this part we are choosing a suitable model RANDOM FOREST algorithm for demand forecasting.

☐ model selection involves 3 steps.

**Step 1:** In the Random forest model, a subset of data points and a subset of features is selected for constructing each decision tree. Simply put, n random records and m features are taken from the data set having k number of records.

**Step 2:** Individual decision trees are constructed for each sample.

**Step 3:** results from each tree are aggregated to give a prediction for each observation.

### 5.MODEL TRAINING:

- Here , We first create an instance of the Random Forest model, with the default parameters.
- We then fit this to our training data. We pass both the features and the target variable, so the model can learn.
- At this point, we have a trained Random Forest model, but we need to find out whether it is making accurate predictions.

**7 STEPS** involved in this section are:

- 1.Import the relevant Python libraries
2. Import the data
- 3.Read / clean / adjust the data (if needed)
- 4.Create a train / test split
- 5.Create the Random Forest model object
- 6.Fit the model
- 7.Predict

#### **6.MODEL EVALUATION:**

- At this point, we have a trained Random Forest model, but we need to find out whether it is making accurate predictions.
- The simplest way to evaluate this model is using accuracy;
- we check the predictions against the actual values in the test set and count up how many the model got right.

#### **CONCLUSION:**

- These are all the steps that are involved in product demand prediction forecasting with machine learning.
- These are the things that we are understood in the project. By this way we are going to done our project.