1. **Predicting Loan Default**

Scenario: A bank wants to predict whether a loan applicant will default based on credit score, income, and past loan history.

Problem solution using: *Supervised Learning- Classification*

Step-by-step procedure:

- Collect customer Data like financial history, credit scores, and loan repayment records.

- Preprocess the data handle missing values, standardize numerical features, and encode categorical variables.

- Divide the dataset into training and testing sets.

- Choose Algorithm like Logistic Regression, Decision Trees, or Random Forest.

- Fit the model using training data.

- Evaluate Performance using ROC-AUC and F1-score.

- Predict loan default for new applicants and deploy the best model.

2. **Forecasting Demand for a Retail Store**

Scenario: A retail store wants to predict the demand for different products to optimize inventory levels.

Problem solution :*Supervised Learning- Regression*

Step-by-step procedure:

- Collect product data like past sales data, seasonal trends, and product demand.

- Preprocess Data handle missing values, normalize numerical data, encode categorical variables.

- Divide the data into training and testing sets.

- Choose Algorithm like Linear Regression, Random Forest Regression, or XGBoost.

- Fit the model using training data.

- Evaluate Performance using R² score.

- Make Predictions for upcoming product sales.

3. <u>Detecting Defective Products in Manufacturing</u>

Scenario: A factory wants to detect whether a manufactured product is defective based on sensor readings and quality control data.

Problem solution using: *Supervised Learning- Classification*

Step-by-step procedure:

- Collect Data product production details, and defect labels.

- Preprocess Data like handling missing values, normalize numerical values, and encode categorical features.

- Divide the data into training and testing sets.

- Use classification algorithm like Logistic Regression, KNN, Navie Bayes, Random Forest classification etc.

- Fit the model using training data.

- Evaluate Performance using ROC_AUC and F1-score.

- Predict the result for new input and deploy the model.

4. <u>Classifying Medical Diagnoses</u>

Scenario: A healthcare provider wants to classify patient symptoms into different disease categories.

Problem solution using: *Supervised Learning- Classification*

Step-by-step procedure:

- Collect Data -patient with symptoms and diagnoses.

- Preprocess Data – Handle missing values, normalize medical test results, and encode categorical features.

- Divide the data into training and testing sets.

- Use classification algorithm like Logistic Regression, KNN, Navie Bayes, Random Forest classification etc.

- Fit the model using training data.

- Evaluate Performance using ROC_AUC and F1-score.

- Predict the result for new input and deploy the model.

5. Identifying Fake Online Reviews

Scenario: An e-commerce company wants to detect fake reviews posted by bots or fraudsters.

Problem solution using: *Supervised Learning- Classification*

Step-by-step procedure:

- Collect Data - dataset of real and fake reviews.

- Preprocess Data – Tokenize text, remove stop words and vectorize using TF-IDF.

- Feature Engineering – Identify suspicious patterns like repetitive words, unnatural phrasing, and review frequency.

- Divide the data into training and testing sets.

- Use classification algorithm like Logistic Regression, KNN, Navie Bayes, Random Forest classification etc.

- Fit the model using training data.

- Evaluate Performance using ROC_AUC and F1-score.

- Predict the result for new input and deploy the model.

6. Predicting Stock Market Trends

Scenario: A financial firm wants to predict stock price movement based on historical price data and market indicators.

Problem solution :*Supervised Learning- Regression*

Step-by-step procedure:

- Collect Data like historical stock prices and economic indicators.

- Preprocess Data – Handle missing values, normalize price changes and engineer features like moving averages.

- Divide the data into training and testing sets.

- Choose Algorithm like Linear Regression, Random Forest Regression, or XGBoost.

- Fit the model using training data.

- Evaluate Performance using R^2 score.

- Predict the result for new input and deploy the model.

7. **Detecting Fake Social Media Accounts**

Scenario: A social media platform wants to identify and remove fake user accounts.

Problem solution using: *Supervised Learning- Classification*

Step-by-step procedure:

- Collect Data like account details, activity logs and engagement patterns.

- Preprocess Data – Handle missing values, engineer features like average post frequency and follower ratio and encoding categorical features.

- Divide the data into training and testing sets.

- Use classification algorithm like Logistic Regression, KNN, Navie Bayes, Random Forest classification etc.

- Fit the model using training data.

- Evaluate Performance using ROC_AUC and F1-score.

- Predict to Identify and flag fake accounts for new input and deploy the best model.

8. **Optimizing Ad Targeting for Online Marketing**

Scenario: A digital marketing company wants to show the most relevant ads to users based on their browsing behavior.

Problem solution using: Uns*upervised Learning- Clustering*

Step-by-step procedure:

- Collect Data like user click behavior, browsing history information.

- Preprocess Data like convert categorical features into numerical format, handle missing data.

- Choose Clustering Algorithm like K-Means or Hierarchical Clustering.

- Use the Elbow Method/Dendrograms to identify number of clusters.

- Train Model to group users.

- Analyze Clusters to identify user browsing behavior.

- Deliver targeted ads based on cluster preferences.

9. Classifying Land Cover in Satellite Images

Scenario: A geospatial research team wants to classify different land types (forest, water, urban) using satellite images.

Problem solution using: *Supervised Learning- Classification*

Step-by-step procedure:

- Collect Data satellite images labeled with land types.

- Preprocess Data –Normalize pixel values, remove noise, and extract image features.

- Split Dataset – Train-test split.

- Use classification algorithm like Logistic Regression, KNN, Navie Bayes, Random Forest classification etc.

- Fit the model on the training dataset.

- Evaluate Model using ROC_AUC score and F1-score.

- Make Predictions to classify new satellite images into land cover types.

10. Predicting Customer Churn for a Subscription Service

Scenario: A streaming service wants to predict which users are likely to cancel their subscriptions.

Problem solution using: *Supervised Learning- Classification*

Step-by-step procedure:

- Collect Data like user engagement data, subscription history.

- Preprocess Data – Handle missing values and encode categorical variables.

- Feature Engineering – Create features like average watch time and last login frequency.

- Split Dataset – Train-test split.

- Use classification algorithm like Logistic Regression, KNN, Navie Bayes, Random Forest classification etc.

- Fit the model on the training dataset.

- Evaluate Model using ROC_AUC score and F1-score..

- Make Predictions to identify customers likely to churn..