1. Predicting House Prices

 Scenario: A real estate company wants to predict the price of a house based on square footage, number of bedrooms, and location.

 Problem solution using: *Supervised Learning- Regression*

 Step-by-step procedure:

1. Gather historical data with features like square footage, number of bedrooms, and location.

2. Data preprocessing by handle missing values, encode categorical variables (e.g., location).

3. Divide the dataset into training and testing sets.

4. Use a regression model like Linear Regression ,SVM, Decision Tree Regression, Random Forest Regression.

5. Fit the model on the training dataset.

6. Use metrics like RMSE (Root Mean Square Error) and R² score.

7. Use the model to predict house prices for new data.

2. Identifying Fraudulent Transactions

 Scenario: A bank wants to detect whether a transaction is fraudulent or not based on transaction history and customer behavior.

Problem solution using: *Supervised Learning- Classification*

 Step-by-step procedure:

1. Collect transaction records labeled as fraud or non-fraud.

2. Remove outliers, normalize transaction amounts, and encode categorical features.

3. Divide data into training and testing sets.

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

5. Fit the model using labeled transaction data.

6. Use metrics like accuracy, precision, recall, and F1-score and ROC_AUC score to analyze the model performance

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

3. Grouping Customers Based on Spending Habits

Scenario: A supermarket wants to segment customers into different groups based on their shopping patterns.

Problem solution using: Uns*upervised Learning- Clustering*

Step-by-step procedure:

1. Collect customer purchase history, amount spent, and frequency of purchases.

2. Data Preprocessing like Normalize data (e.g., scale spending amounts to avoid bias).

3. Choose Clustering Algorithm like K-Means, DBSCAN, or Hierarchical Clustering.

4. Use the Elbow Method to find the best number of clusters.

5. Train Model to group customers.

6. Analyze Clusters – Interpret results to identify high-spending, medium-spending, and low-spending customer groups.

7. Use Clusters for Marketing like target each segment with personalized promotions.

4. Predicting Employee Salaries

Scenario: A company wants to estimate an employee's salary based on years of experience, job title, and education.

Problem solution using: *Supervised Learning- Regression*

Step-by-step procedure:

1. Collect employee records with years of experience, education, and salary.

2. Handle missing values and encode categorical variables (e.g., job title).

3. Separate data into training and testing sets.

4. Choose Algorithm like Multiple Linear Regression ,SVM, Decision Tree Regression Random Forest Regression.

5. Fit the model on training data.

6. Use R² score for accuracy measurement.

7. Predict salary based on new employee data.

5. Detecting Spam Emails

Scenario: An email provider wants to classify emails as either spam or not spam based on content and sender details.

Problem solution using: *Supervised Learning- Classification*

Step-by-step logic:

1. Collect Data of spam and non-spam emails.

2. Preprocess Data by converting email text to numerical format.

3. Divide data into training and testing sets.

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

5. Fit the model using labeled email data.

6. Evaluate Model using accuracy using Precision, Recall, and F1-score,ROC_AUC score.

7. Deploy the best model and predict email as spam or not spam.

6. Customer Reviews Sentiment Analysis

Scenario: A company wants to determine whether customer reviews about a product are positive or negative based on review text.

Problem solution using: *Supervised Learning- Classification*

Step-by-step logic:

1. Data collection- labeled customer reviews (positive/negative).

2. Data preprocessing remove punctuation, and tokenize words and convert text into numerical format.

3. Split Dataset – Train-test split.

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

5. Fit the model on the training dataset.

6. Evaluate Model accuracy and F1-score to assess model performance.

7. Make Predictions to Classify new customer reviews as positive or negative.

7. Predicting Car Insurance Claims

Scenario: An insurance company wants to predict whether a policyholder will file a claim in the next year.

Problem solution using: *Supervised Learning- Classification*

Step-by-step logic:

1. Collect Data like past claim history and customer details.

2. Preprocess Data like missing values and encode categorical features.

3. Divide data into training and testing sets.

4. Choose Algorithm like Logistic Regression, KNN, Navie Bayes, Random Forest classification.

5. Fit the model using training data.

6. Evaluate Model using Precision-Recall, ROC-AUC score.

7. Deploy Model to predict claims for new customers.

8. Recommending Movies Based on Viewing History

Scenario: A streaming platform wants to group users into categories based on their movie preferences and recommend similar content.

Problem solution using: Uns*upervised Learning- Clustering*

Step-by-step procedure:

1. Collect Data regarding user movie preferences, genres watched, and ratings.

2. Preprocess Data - Convert categorical movie names into numerical format.

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

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

5. Train Model to group users.

6. Analyze Clusters to identify user preferences

7. Suggest movies based on cluster preferences.

9. **Predicting Patient Recovery Time**

Scenario: A hospital wants to predict how long it will take for a patient to recover from surgery based on age, medical history, and lifestyle.

Problem solution using: *Supervised Learning- Regression*

Step-by-step procedure:

1. Collect Data like patient age, medical history, and lifestyle habits.

2. Preprocess Data to handle missing values and convert categorical data.

3. Choose Regression Algorithm like Random Forest Regression or Linear Regression etc.

4. Fit the model on training data.

5. Evaluate Model with R2 score to check accuracy.

6. Predict recovery time for new patients and deploy the best model.

10. **Predicting Student Exam Scores**

Scenario: A university wants to predict a student's exam score based on study hours, past performance, and attendance.

Problem solution using: *Supervised Learning- Regression*

Step-by-step procedure:

1. Collect Data like student with study hours, attendance, and exam scores.

2. Preprocess Data -Handle missing values and standardize numerical features.

3. Divide data into training and testing sets.

4. Choose Algorithm like Linear Regression or Support Vector Regression etc.

5. Fit the model on training data.

6. Evaluate Performance using R^2 score.

7. Predict exam scores for new students.