PRICE PREDICTION

Group Members:

Eesha Azhar (21L-1755)
Areej Fatima (21L-5418)
Maryam Nadeem (21L-5458)
Khizra Yaseen (21L-7517)
Muntaha Naeem (21L-5156)

Decision Tree

- Details:
    - A decision tree model is constructed using the features of clothing items (brand, category, color, size, material) to predict their prices.The decision tree model utilizes the attributes of clothing items to predict their prices accurately, assisting retailers in optimizing pricing strategies.
- Results:
    - Mean Squared Error: 5764.220104
    - Root Mean Squared Error: 75.92246112976053
    - R-squared (R2) Score: -1.0183467344461365

Linear Regression

- Details:
    - Linear regression is a statistical method used to model the relationship between a dependent variable (target) and one or more independent variables (predictors) by fitting a linear equation to observed data. Linear regression models the relationship between clothing attributes and prices assuming a linear relationship.
- Results:
    - R-squared Error: 0.01393637071515441

Lasso Regression

- Details:
    - Lasso Regression is a linear regression model that performs L1 regularization, enforcing sparsity in the learned coefficients. Lasso Regression, by penalizing the absolute size of the coefficients, can help in feature selection, potentially improving the interpretability of the model.
- Results:
    - R-squared Error: 0.0060694545676101

Neural Network

- Details:
    - A neural network model with multiple layers is trained on clothing attributes to predict prices, capturing complex patterns.
    - Hyperparameters: Epochs (50, 100, 150), Learning Rate (0.001, 0.01, 0.1)
- Results:
    - Test Loss:
        - Epochs: 50, Learning Rate: 0.001, Test Loss: 2836.378174
        - Epochs: 50, Learning Rate: 0.010, Test Loss: 5067.833984
        - Epochs: 50, Learning Rate: 0.100, Test Loss: 5480.484863
        - Epochs: 100, Learning Rate: 0.001, Test Loss: 2978.040527
        - Epochs: 100, Learning Rate: 0.010, Test Loss: 5131.520508
        - Epochs: 100, Learning Rate: 0.100, Test Loss: 5399.437500
        - Epochs: 150, Learning Rate: 0.001, Test Loss: 3315.601318
        - Epochs: 150, Learning Rate: 0.010, Test Loss: 5222.574707
        - Epochs: 150, Learning Rate: 0.100, Test Loss: 5412.884766

Support Vector Classifier

- Details:
    - A Support Vector Classifier (SVC) with a polynomial kernel is employed to classify clothing items into different categories.
- Results:
    - Support Vector Classifier with highest accuracy: Linear

- Accuracy: 0.01
- Sensitivity (True Positive Rate): 0.660243

Conclusively, after evaluating various regression models for predicting clothing prices, including decision tree, neural network, support vector classifier, and lasso regression, we have selected **Linear Regression** as the final model due to its superior accuracy. With an R-squared error of 0.0139, the linear regression model demonstrates a stronger ability to capture the relationship between clothing attributes and prices compared to other models evaluated.