**Tirth Patel (tjp187)**

**Model Description**

**Overview**

Decision Tree Classifier is the model of classifier used to predict if a flight ticket is eligible for a discount ("Yes" or "No"). The train data consist of passenger demographics, ticket price, departure date, and country. The model uses data patterns to classify discounts effectively.

**Four Discount Patterns**

**1. Age-Based Discount**

• Airlines typically apply discounts for senior citizens and children as a conventional industry practice in order to cater to families and senior citizens. The chosen age ranges (86-90 years and 0-4 years) are usual industry practices.

**2. Month-Based Discount**

• Travel demands differ throughout the year, and airlines prefer granting discounts on specific months. Holiday and post-holiday travel in December and January makes them obvious choices for offering promotional discounts.

**3. Price & Gender-Based Discount**

• Price sensitivity varies with gender due to market segmentation policies. The cut-offs were established on the basis of ticket price percentiles such that discounts extend to passengers who pay significantly lower fares, which is in line with airline pricing strategies.

**4. Country-Based Discount**

• Some nations such as the USA, UK, and Canada are significant international travel generators. Airlines make use of region-specific promotions to attract travelers from these high-traffic regions, so this trend is a reasonable assumption.

**Model Selection**

* A Decision Tree Classifier was used since it is interpretable and can handle categorical data efficiently.
* The model was trained using a train-validation split (90% training, 10% validation).
* Hyperparameters:
  + max\_depth=5000
  + min\_samples\_leaf=1
  + random\_state=75
* The model trained to validation accuracy of 92.44%