**Title: Predicting Landing Delays Compared to Scheduled Arrival Time**

This study leverages machine learning techniques, specifically k-Nearest Neighbors (kNN) and Softmax, to predict landing delays relative to scheduled arrival times. Landing delays, which are influenced by factors such as adverse weather conditions, air traffic congestion, operational issues, and technical malfunctions, have a significant impact on airline schedules, airport operations, and passenger satisfaction. Disruptions caused by these delays lead to increased operational costs for airlines and inconvenience for travelers. Addressing this challenge, the study aims to develop a robust predictive model utilizing kNN for delay classification and Softmax to estimate probabilities for various delay categories. By analyzing key features, such as weather data, departure delays, flight schedules, and air traffic patterns, the model seeks to provide accurate predictions and valuable insights into delay causation.

The methodology involves several steps. First, historical flight data will be collected, cleaned, and preprocessed to ensure consistency and accuracy. Key delay factors will then be identified through feature selection, emphasizing variables with the most substantial impact on delays. The model will employ kNN for grouping flights based on similar delay patterns and Softmax to calculate probabilistic outputs for multi-class delay classification. The dataset will be divided into training and testing subsets, allowing the model to learn and validate its performance effectively. Evaluation metrics, including accuracy, precision, recall, and F1 score, will measure the model's overall performance and reliability.

Expected outcomes include the development of a highly accurate predictive model capable of identifying patterns and key contributors to landing delays. Insights derived from the analysis will enable airlines and airport operators to implement proactive measures to minimize disruptions, optimize scheduling, and enhance passenger experience. Furthermore, the study underscores the potential of machine learning in addressing complex, real-world challenges in transportation, offering a scalable and efficient solution to improve aviation efficiency and operational planning.