README: Weather Prediction and Picnic Suitability Analysis Project

Project Title: Weather Prediction and Picnic Suitability Analysis

Data Source: EUROPEAN CLIMATE ASSESSMENT & DATASET (ECA&D)

Project Description

This project involves analyzing a comprehensive weather dataset to predict weather conditions and assess their suitability for picnics in various European cities from 2000 to 2010. The project aims to leverage historical weather data to understand and predict outdoor activity suitability, focusing on picnic conditions.

Data Files

`weather_prediction_dataset.csv`: Contains daily observations of various weather parameters for 18 European cities spanning from 2000 to 2010.
`weather_prediction_picnic_labels.csv`: Provides boolean labels indicating whether the weather conditions are suitable for a picnic.
`metadata.txt`: Describes the dataset, including details on data collection and processing.

Key Components

Exploratory Data Analysis (EDA): Involves temporal, comparative, and correlation analyses to understand weather patterns and their variations.
Label Integration and Analysis: Examines the suitability of weather conditions for picnics across different locations.
Predictive Modeling: Utilizes machine learning (Random Forest Classifier) to predict picnic suitability based on weather parameters.

Technologies Used

- Python

- Libraries: Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn

Setup and Requirements

- Python 3.x
- Required Python packages: `pandas`, `numpy`, `matplotlib`, `seaborn`, `scikit-learn`

Instructions for Use

Load the datasets using Pandas.
Perform EDA to understand and visualize the data.
Merge the weather data with picnic labels for integrated analysis.
Develop and evaluate the predictive model using the Scikit-learn library.
Use the findings and visualizations for reporting and insights generation.

Key Findings and Insights

- Significant variability in weather conditions and picnic suitability across European cities.
- Temperature, global radiation, and precipitation are key determinants of picnic suitability.
- The predictive model shows high accuracy but may require adjustments for potential overfitting.

Future Work and Recommendations

- Further refinement of the predictive model to address overfitting.
- Exploration of additional weather parameters or external data integration.
- Consideration of deployment strategies for practical application.

Project Status

Completed. Future updates may include model refinement and integration of additional datasets.