**High-Level Documentation for Flight Price Prediction App**

**1. Overview**

The **Flight Price Prediction App** is a Streamlit-based web application that allows users to predict the price of a flight ticket based on various input features such as airline, seat type, departure/arrival time, journey date, and cities. The model is built using machine learning techniques (Random Forest) and provides predictions based on the user input.

**2. Features**

* **User Input Form**: Users provide inputs for several factors influencing flight prices.
  + **Total Stops**: Number of stops in the flight (slider with values from 0 to 4).
  + **Journey Date**: Date of the journey (date picker).
  + **Departure and Arrival Time**: Departure and arrival time in hours and minutes (sliders for both times).
  + **Number of Passengers**: Input field for the number of passengers (number input).
  + **Seat Type**: Drop-down to select seat type (Economy, Premium Economy, Business, First Class).
  + **Airline**: Drop-down to select the airline, with automatic one-hot encoding.
  + **Source and Destination Cities**: Drop-downs to select the source and destination cities, with automatic one-hot encoding.
* **Prediction Output**:
  + Once all inputs are provided, the user clicks a button to get the predicted flight price.
  + The output includes the prediction, which is displayed in a visually appealing manner with an optional balloon animation.
* **Features Handling**:
  + One-hot encoding is applied to categorical variables such as airlines, source cities, and destination cities.
  + Departure and arrival times are processed to calculate flight duration.

**3. Architecture**

* **Frontend**: Streamlit is used for the user interface to provide an easy-to-use interactive experience.
  + Users interact with sliders, input fields, and drop-downs to provide necessary data.
* **Backend**:
  + The backend is powered by a Random Forest regression model, which was pre-trained and saved using joblib.
  + The model is used to predict flight prices based on the user inputs.
* **Data Preprocessing**:
  + Inputs are preprocessed by one-hot encoding categorical features and splitting time inputs into hours and minutes.
* **Prediction Logic**:
  + The input data is formatted into a DataFrame matching the model's expected feature names.
  + The prediction is made using the pre-trained model, and the result is returned and displayed to the user.

**4. Dependencies**

To run the application, the following Python packages are required:

* **streamlit**: For building the web app interface.
* **pandas**: For handling and preprocessing input data.
* **numpy**: For numerical computations.
* **joblib**: For loading the pre-trained model.
* **scikit-learn**: For machine learning functionality, especially for model prediction.

**5. Conclusion**

* This app leverages machine learning to predict flight prices, taking into account various factors like flight stops, seat type, airlines, departure/arrival times, and more. By providing an easy-to-use interface, it offers a seamless experience for users looking to estimate flight costs based on their travel preferences.