**Flight Fare Prediction**

# PROJECT SUMMARY:

**The goal or objective of flight fare prediction is to estimate the price of airline tickets accurately based on various factors such as route, date of travel, time of booking, airline, demand-supply dynamics, and other relevant parameters.**

This model predicts the price of the flight based on some parameters like total stops, journey Day, journey month, Air India, Indigo, source, destination, etc. I have trained this model using the random forest regressor and after training, fine-tune the model which is also known as hyper parameter tuning. Then save a model and deploy this Flight Fare Prediction model using the Flask application on the localhost.

**Approach:-**

The classical machine learning tasks like Data Exploration, Data Cleaning, Feature Engineering, Model Building and Model Testing. Try out different machine learning algorithms that’s best fit for the above case.

**Project Steps:-**

Data Exploration I started exploring datasets using pandas, NumPy,matplotlib and seaborn.

Visualization: Ploted colleration matrix to get insights about dependend and independed variables. Made chats like( Bocxplot,countplot,distplot,pairplot).

Model Selection: Made many model but selected XGBoost Regressor

Hyperparameter Optimization: Using Gridsearch CV to select the best parameter for training the model.

**Model Selection and Hyperparameter Tuning:**

* Selected XGBoost (Extreme Gradient Boosting) as the predictive modeling algorithm due to its effectiveness in handling complex datasets and providing high accuracy.
* Utilized Grid Search CV (Cross-Validation) to tune hyperparameters of the XGBoost model (e.g., learning rate, max depth, number of estimators) for optimal performance.

**Model Training and Evaluation:**

* Split the dataset into training and testing sets.
* Trained the XGBoost model using the training data.
* Employed Grid Search CV to search for the best combination of hyperparameters using cross-validation.
* Evaluated the model's performance on the test set using metrics such as Root Mean Squared Error (RMSE).

**Results and Conclusion:**

* Achieved a predictive model that accurately forecasts flight fares based on input parameters.
* The model provides valuable insights for travelers to make informed decisions about booking flights and helps airlines optimize pricing strategies for revenue maximization.

**Future Scope:**

* Enhance the model's accuracy by incorporating additional features and exploring advanced modeling techniques.
* Continuously update the model with new data to adapt to changing market dynamics and improve prediction performance over time.

This flight fare prediction project demonstrates the application of machine learning in the travel industry, offering practical benefits to both travelers and airlines in optimizing travel planning and revenue management.

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