# House Price Prediction - Report & Documentation

## 1. Data Preprocessing & Feature Engineering

The dataset used for house price prediction consists of various features such as Median Income, House Age, Average Rooms, Average Bedrooms, Population, Average Occupancy, Latitude, and Longitude.

The following preprocessing steps were performed:  
- Handling missing values: No missing values were found in the dataset.  
- Feature scaling: Standardization was applied to ensure all numerical features have a mean of 0 and standard deviation of 1.  
- Feature selection: All available features were used as they provided significant predictive power.

## 2. Model Selection & Optimization

A regression model was used for predicting house prices. The following steps were taken for model selection and optimization:  
- Multiple models were tested, including Linear Regression, XGBoost Regressor and Random Forest Regressors.  
- GridSearchCV was used to tune hyperparameters and optimize model performance.  
- The XGBoost performed best with optimized hyperparameters, achieving the lowest RMSE (Root Mean Square Error).  
- The final model was trained using 80% of the dataset, with 20% reserved for validation.

## 3. Deployment Strategy & API Usage Guide

The trained model was deployed using FastAPI and hosted on Render. The deployment strategy included:  
- Serializing the trained model using Pickle.  
- Building a FastAPI server with an endpoint to receive input data and return predicted prices.  
- Deploying the API on Render and UI on Netlify for scalability and reliability.

**API Usage Guide:**  
- Base URL: https://house-price-prediction-tu3t.onrender.com  
- Endpoint: `/predict` (POST request)  
- Request Format (JSON):  
  
{  
 "MedInc": 8.3252,  
 "HouseAge": 41.0,  
 "AveRooms": 6.9841,  
 "AveBedrms": 1.0238,  
 "Population": 322.0,  
 "AveOccup": 2.5556,  
 "Latitude": 37.88,  
 "Longitude": -122.23  
}  
  
- Response Format:  
{ "predicted\_price": 452600.0 }

**Frontend:**

The UI has been deployed on Netlify.

URL: https://houseprice-prediction.netlify.app/