**SYNOPSIS**

**Car Price Predictor: Machine Learning-Based Web Application for Predicting Car Prices**

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* **OVERVIEW:**

The project aims to develop a machine learning model to predict the price of cars based on various input features such as car name, car company, purchased year, price, kilometers driven, and fuel type. This predictive model will assist users in estimating the value of a car before buying or selling it, providing valuable insights into the pricing dynamics of the used car market.

* **KEY COMPONENTS:**
* **Data Collection and Preprocessing:**
* A dataset containing information about various cars, including make, model, year of purchase, price, mileage, and fuel type, is gathered.
* The collected data undergoes cleaning and preprocessing steps, including handling missing values, removing outliers, and encoding categorical variables.
* **Feature Engineering:**
* Relevant features are extracted from the dataset and transformed into a suitable format for model training.
* Feature scaling and normalization techniques are applied to ensure uniformity across different features.
* **Model Selection and Training:**
* Various regression algorithms such as linear regression, decision trees, random forests, and gradient boosting regressors are explored.
* Model performance is evaluated using metrics like mean squared error, mean absolute error, and R-squared score.
* The most accurate model is selected based on evaluation results and its hyperparameters are fine-tuned to improve performance.
* **Deployment:**
* A web application is developed using the Flask framework to provide an intuitive interface for users to input car details and obtain price predictions.
* The trained machine learning model is integrated into the Flask application, enabling real-time predictions based on user inputs.
* The web application is deployed on a suitable platform such as Heroku or AWS for accessibility to users.
* **Project Impact:**
* Empowers users in making informed decisions regarding buying or selling cars by providing accurate price predictions.
* Enhances transparency and efficiency in the used car market by offering a reliable tool for assessing car values.
* Facilitates smoother transactions and negotiations between buyers and sellers, leading to more satisfactory outcomes for both parties.
* **Web Application Using Flask Framework:**

To create the web application using Flask, the following steps are implemented:

* Setting up routes for different functionalities such as rendering the homepage, handling form submission, and displaying predicted prices.
* Structuring the frontend of the application using HTML templates.
* Integrating the machine learning model to make predictions based on user inputs.
* Deploying the Flask application to a web hosting platform.
* **TOOLS & TECHNOLOGIES:**
* **Python:**
* Python serves as the primary programming language for data collection, preprocessing, model training, and web application development due to its versatility and extensive libraries for machine learning and web development.
* **Pandas:**
* Pandas is utilized for data manipulation and analysis, facilitating tasks such as handling missing values, removing outliers, and transforming data into suitable formats for model training.
* **Scikit-learn:**
* Scikit-learn provides a comprehensive suite of machine learning algorithms and tools for model selection, training, and evaluation. Various regression algorithms such as linear regression, decision trees, random forests, and gradient boosting regressors are implemented using Scikit-learn.
* **Flask:**
* Flask, a lightweight and flexible web framework for Python, is employed for developing the web application. It enables the creation of routes, handling form submissions, and integrating machine learning models into the application.
* **HTML:**
* HTML is used for building the frontend of the application.
* **Jupyter Notebook:**
* Jupyter Notebook is utilized for exploratory data analysis, model prototyping, and documentation. It provides an interactive environment for experimenting with code and visualizing data insights.
* **CONCLUSION:**

The Car Price Predictor project represents a comprehensive integration of machine learning and web development technologies to address the challenge of predicting car prices accurately. Through meticulous planning and execution, the project is successfully achieving its objectives and delivering a valuable tool for both buyers and sellers in the used car market.