Project Design Phase-I
Proposed Solution Template

Date	15.10.2022
Team ID	PNT2022TMID09895
Project Name	Car resale value prediction
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	A car price prediction has been a high interest research area, as it requires noticeable effort andknowledge of the field expert. Considerable number of distinct attributes are examined for the reliableand accurate prediction. Vehicle price prediction especially when the vehicle is used and not comingdirect from the factory, is both a critical and important task. With increase in demand for used cars moreand more vehicle buyers are finding alternatives of buying new cars. There is a need of accurate priceprediction mechanism for the used cars. Prediction techniques of machine learning can be helpful in thisregard. It is common to lease a car in many countries rather than buying a new car. After the lease periodis over, the buyer has the possibility to buy the car at its residual value, i.e. its expected resale value.
2.	Idea / Solution description	The main idea of making a car resale value prediction system is to get hands-on practice for python using Data Science. Car resale value prediction is the system to predict the amount of resale value based on the parameters provided by the user. User enters the details of the car into the form given and accordingly the car resale value is predicted.
3.	Novelty / Uniqueness	The system is defined in the python language that predicts the amount of resale value based on the given information. The system works on the trained dataset of the machine learning program that evaluates the precise value of the car. User can enter details only of fields like purchase price of car, kilometers driven, fuel of car, year of purchase. Due to limited data, system only takes into account limited features for predicting the resale value of the car. Since this is an online system, current system does not take into account any physical damage to the car body or engine while predicting the resale value. The new system developed by us consists of two parts - Data gathering and Prediction using Machine Learning based algorithms.

4.	Social Impact / Customer Satisfaction	Data scraped consists of many unwanted characters like comma, whitespaces etc. which has to be removed as model can only understand numbers. Moreover, fuel type was converted into numerical codes via one-hot encoding. A one hot encoding is a representation of categorical variables as binary vectors. This requires that the categorical values be mapped to integer values. After data preprocessing, all 5 files, each representing each city has to be merged for model training. Various different machine learning algorithms were implemented on the dataset along with hyperparameter tuning using GRID SEARCH CV Reason behind GBR's good performance is because of its mathematical working. The reason why GBR could outcome all other regression algorithms is the mathematics behind it.
5.	Business Model (Revenue Model)	Currently, system can only deal with Swift Dzire cars due to lack of data. Also, data has been collected of only 5 cities of India. This can be extended to multiple car models and cities so as to improve accuracy and usability. Efficient use of deep learning such as LSTM (Long shortterm memory) or RNN (Recurrent Neural networks) can be implemented once enough data is collected. This can improve accuracy and decrease RMSE drastically. Currently, only few features are used to predict resale value of the car. This can be extended to more features. One can also implement CNN to determine physical condition of the car from images like identifying dents, scratches etc. and thus predicting more relevant resale value of a car.
6.	Scalability of the Solution	However, once more data is collected and various different cars are included in the system, deep learning-based ANN or LSTM would perform better. But currently, GBR based car valuation system can predict resale value of a car with Root Mean Squared Error (RMSE) of 50,000 INR. I have no other words to express my sincere thanks to faculties of Indus University, Ahmedabad for their kind cooperation and able guidance. Especially to Mrs. Sejal Thakkar, my project guide in college without whom the project could not be executed.