Project Design Phase-I
Proposed Solution Template

Date	19 September 2022
Team ID	PNT2022TMID30316
Project Name	Project-Intelligent Vehicle Damage Assessment and Cost Estimator for Insurance Companies
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)	Nowadays a lot of money is being wasted in the car insurance business due to leakage claims. Claims leakage Underwriting leakage is characterized as the discrepancy between the actual payment of claims made and the sum that should have been paid if all of the industry's leading practices were applied. Visual examination and testing have been used to may these results. However, they impose delays in the processing of claims.
2.	Idea / Solution description	Our solution is to build a VGG16 model that can detect the area of damage on a car. The rationale for such a model is that it can be used by insurance companies for faster processing of claims if users can upload pics and the model can assess damage(be it dent scratch from and estimates the cost of damage. This model can also be used by lenders if they are underwriting a car loan, especially for a used car.
3.	Car Detection	The approach narrows down to two separate models pipelined. The first task is to differentiate between a whole and a damaged car followed by detecting the extent of damage and classify accordingly. Each class has at least 300 images to train upon.
4.	Feature Extraction	An extensively comparison of the performances of many deep feature approaches was done in terms of feature extraction and decided to use the VGG16 model with ImageNet weights due to its simplistic model architecture and computational efficiency.
5.	Transfer Learning	The VGG16 architecture was selected because it has a relatively simple architecture and Keras ships with a model that has been pre-trained on ImageNet. It is just a number of Conv2D and MaxPooling2D layers with a dense network on top with a final softmax activation function. Additional dense trainable layers with sigmoid function above this model have been added.

6.	Classification	After successfully extracting the features for the two classes, two binary classification model for the pair of two classes were built.
7.	PREPROCESSING	The RGB (Red-Green-Blue) images are Gray-scaled. The images are are resized throughout the dataset using a predefined image size in order to change them into a desirable format. The image data and corresponding class index are appended to training data. The training data is randomly shuffled to ensure that each data point creates an independent change on the model, without being biased by the same points before them. Pickle file is generated to save the serialized format of training data to a file and load it later to directly train the different models without repeating the hassle of data preprocessing.