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RECOGNITION-BASED AUTOMOBILE SPECIFICATION APPLICATION

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ABSTRACT

This research paper renders information about the cars just by taking a clear image from any angle as an input. A person can get detailed information about the car whose photo he captures via the application. This information can include various details like the characteristics of the car, its features, its cost, its weight etc. The application would include processing on Cloud or on Device depending on the range of the application. It also allows the users to share their reviews regarding the car models. This application saves the time that we spend on unimportant trivialities and aims to detect and identify cars accordingly

Keywords: Application Of CNN Algorithm, Image Processing Application, Feature Extraction Using CNN Algorithm, Android Studio.

I. INTRODUCTION

In this fast world, managing your personal and skilled lives will be extremely feverish. If you don't have your own personal mode of transportation, life will become even additional feverish. to create your life easier, you ought to forever notice a neater and reliable mode of transportation. getting a vehicle is probably one among the most important investments you'll ever build, second to the acquisition of your home. Therefore, your vehicle isn't simply a vehicle, it's like property. In times of want, you'll sell it for a more cost-effective model, and use the cash for one thing helpful. In times of success, you'll trade it sure one thing that comes with even higher options, edges and appears. So, we tend to produce associate automaton application to helps user verify that automotive is appropriate. In currently days, each practicality is handily obtainable via smartphones. For such times wherever everything is simply a click away, Recognition-based Automobile Specification Application the functions as associate application on mobile phones that helps its users to spot the vehicles, like cars, by capturing their image itself.

II. LITERATURE SURVEY

Study of the major research has been checked and studied thoroughly and got some key points to refer Camera-based object Detection, identification and distance estimation technical paper to build our project. So basically, we focus image identification part in this paper and studied the paper to deal with image identification. A Convolutional Neural Network (CNN) is used to detect and identify objects in the field of vision of the camera.As we analyzed 3 research papers and got the major idea that most them used CNN as their technology. Some of them had some limitation and some of them had proper approach. Rahul associate degreed Binoy B Nair given an automatic system that may find the presence of an obstacle, determine it additionally as estimate its distance, is of nice importance in ADAS (Advanced Driver help Systems) applications that area unit currently being progressively deployed in vehicles. A number of tries are created towards camera based mostly distance estimation, for instance in [1], [2]and [3], image process techniques were accustomed find vehicles within the camera's field of vision and estimating distances. Stereo vision has been utilized in [4] for automaton navigation, whereas in [5], stereo vision based mostly detection and pursuit of multiple objects in traffic has been given. Vision based mostly cameras have additionally been used, as in [6], however with restricted accuracy. However, it's ascertained that ancient image process algorithms have their limitations and thence, a trial has been created during this study to mix state-of-theart deep learning techniques in conjunction with stereo vision to develop associate degree embedded system based mostly resolution to the task of obstacle detection and distance estimation.Payam Goodarzi*, Martin Stellmacher, archangel Paetzold, Ahmed Hussein, and Elmar Matthes planned camera lens cameras square measure wide utilized in the auto trade, thanks to their wide field of read for the setting. There square measure plenty of algorithms that researchers use for object detection, among them Convolutional Neural Networks (CNN) detectors are widespread throughout the course of the last decade, however, they're largely trained and applied on standard puncture camera pictures. During this paper, a trial to optimize a CNN-based detector for camera lens cameras was created, taking into thought the barrel distortion, that complicates the item detection. Many experiments were administrated to optimize one progressive detector, exploitation artificial camera lens impact on coaching dataset. The obtained result proves that camera lens augmentation will significantly advance a CNN-based detector's performance on camera lens pictures in spite of the distortion. On the manner, a brand-new object detection framework supported the TensorFlow Estimator API was made to perform the experiments as convenient as potential.Damir Demirović, emeer emeer, Amira Šerifović-Trbalić given Signal, image and artificial Aperture measuring system imaging algorithms in recent time are employed in a daily routine. Thanks to Brobdingnagian information and quality, their process is sort of not possible during a real time. Usually image process algorithms are inherently parallel in nature, so that they match nicely into parallel architectures multicore Central process Unit (CPU) and Graphics process Unit GPUs. During this paper image process algorithms were evaluated, that are capable to execute in parallel manner on many platforms central processing unit and GPU.

Table 1: Literature survey summary

SR No.	Author	Name	Description
1	Damir Demirovic, Emir Skejic , Amira Serfovic	Performance of some image processing algorithms in TensorFlow	Image processing algorithms were evaluated, which are capable to execute in parallel manner on several platforms CPU and GPU. All algorithms were tested in TensorFlow, which is a novel framework for deep learning, but also for image processing.
2	Manuel Ibarra Arenado, Juan Maria Pérez Oria, Carlos Torre-Ferrero, Luciano Alonso Rentería	Monovision-based vehicle detection, distance and relative speed measurement in urban traffic	The system proposed integrates a single camera reducing the monetary cost of stereovision and RADAR-based technologies.
3	Nitin Singhal, Man Hee Lee, Sungdae Cho, Chris W. Kim	Design and Performance Evaluation of Image Processing Algorithms on GPUs	In this paper, we construe key factors in design and evaluation of image processing algorithms on the massive parallel graphics processing units (GPUs) using the compute unified device architecture (CUDA) programming model.
4	Zhiyi Yang, Yating Zhu, Yong Pu	Parallel Image Processing Based on CUDA	analyzes the distinct features of CUDA GPU, summarizes the general program mode of CUDA.
5	Payam Goodarzi, Martin Stellmacher, Michael Paetzolad, Elmar Mathes	Optimization of a CNN based Object Detector for fisheye Cameras	Fisheye augmentation can considerably advance a CNN-based detector. The proposed fisheye augmentation technique could be deployed to optimize any CNN-based detectors for fisheye images.
6	Rahul, Binoy B Nair.	Camera based Object Detection, Identification and Distance Estimation.	A deep learning and stereovision camera based system that can detect and identify objects as well as estimate their distances from the camera.
7	Zakaria Charouh, Amal Ezzouhri, Mounir Ghogho, Zouhair Guennoun	A Resource-Efficient CNN-Based Method for Moving Vehicle Detection	A framework to reduce the complexity of CNN-based AVS methods, where a BS-based module is introduced as a preprocessing step to optimize the number of convolution operations executed by the CNN module.

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III. ALGORITHM

A. Convolutional Neural Networks (Heading 2)

A convolutional neural network is a class of deep neural networks, most commonly applied to analyzing visual imagery. They are also known as shift invariant or space invariant artificial neural networks, based on their shared-weights architecture and translation invariance characteristics.

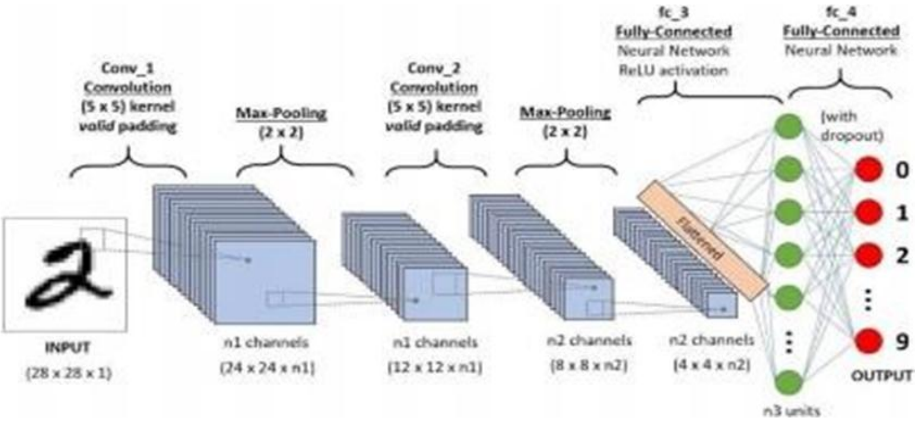

Figure 1: CNN

A convolution neural network has multiple hidden layers that help in extracting information from an image. The four important layers in CNN are:

1. Convolution layer
2. ReLu layer
3. Polling layer
4. Fully connected layer

Convolution Layer

This is the first step in the process of extracting valuable features from an image. A convolution layer has several filters that perform the convolution operation. Every image is considered as a matrix of pixel values

ReLU layer

ReLU stands for the rectified linear unit. Once the feature maps are extracted, the next step is to move them to a ReLU layer.

ReLU performs an element-wise operation and sets all the negative pixels to 0. It introduces non- linearity to the network, and the generated output is a rectified feature map.

The original image is scanned with multiple convolutions and ReLU layers for locating the features.

Pooling Layer

Pooling is a down-sampling operation that reduces the dimensionality of the feature map. The rectified feature map now goes through a pooling layer to generate a pooled feature map.

There are two types of Pooling: Max Pooling and Average Pooling. Max Pooling returns the maximum value from the portion of the image covered by the Kernel. On the other hand, Average Pooling returns the average of all the values from the portion of the image covered by theKernel.The next step in the process is called flattening. Flattening is used to convert all the resultant 2- Dimensional arrays from pooled feature maps into a single long continuous linear vector.The flattened matrix is fed as input to the fully connected layer to classify the image.

Fully connected layer

Adding a Fully-Connected layer is a (usually) cheap way of learning non-linear combinations of the high-level features as represented by the output of the convolutional layer. The Fully-Connected layer is learning a possibly non-linear function in that space.Now that we have converted our input image into a suitable form for our Multi-Level Perceptron, we shall flatten the image into a column vector. The flattened output is fed to a feed-forward neural network and backpropagation applied to every iteration of training. Over a series of epochs, the

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model is able to distinguish between dominating and certain low-level features in images and classify them using the Softmax Classification technique.

IV. ARCHITECTURE

Before you begin to format your paper, first write and save the content as a separate text file. Complete all content and organizational editing before formatting. Please note sections A-D below for more information on proofreading, spelling and grammar.

Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

A. System architecture

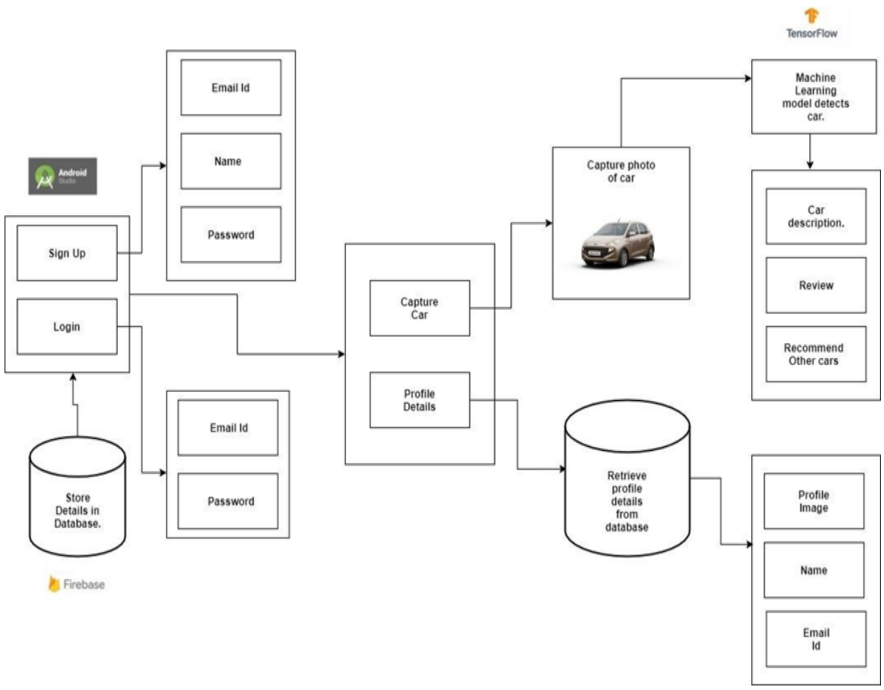

Figure 2: System Architecture

First user will login to the android application by entering email id and password. After successfully login user will capture photo of car and provide to the application.

First user will login to the android application by entering email id and password. After successfully login user will capture photo of car and provide to the application

B. Detailed Design

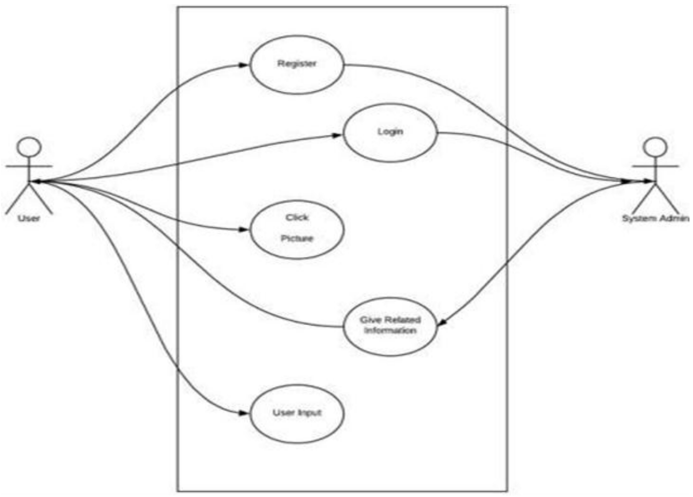

Figure 3: Use case

As we can see in the use case diagram above the general flow of the user using the system and its inner processing is displayed.

The systematic sequence of the machine is displayed in the above diagram from our initial input stage to the end state

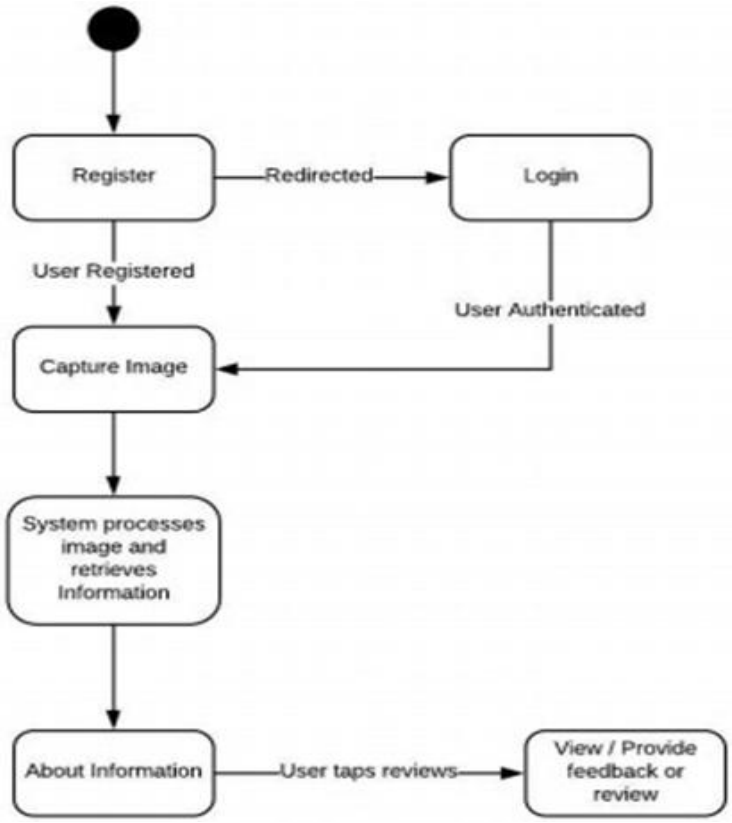

Figure 2: Activity Diagram

The user starts off by registering on the app.

If they have already registered then they are redirected to the login page.

Once the user is registered or authenticated, they can capture the image of the car.

The system then processes the image and retrieves the information based on that image and displays it for the user.

The user can use the back button to go back to the Capture Screen to capture an image again if required.

V. METHODOLOGY

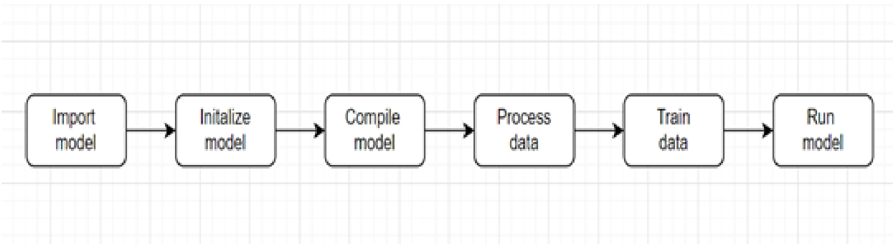

Figure 5: Methodology

- First user will login to the android application by entering email id and password. After successfully login user will capture photo of car and provide to the application.
- To identify image, we use concept of machine learning. So basically, we trained model for different cars to recognize the image or user input. To train module we used TensorFlow.
- We have used TensorFlow Lite for the backend to train the model.
- Android Studio is used for front end development using Adobe XD because as it is effective for making

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different types of layouts.

- Firebase is implemented as our Database.
- We used (CNN) algorithm to create the datasets or trained model. A convolutional neural network is a class of deep neural networks, most commonly applied to analyzing visual imagery. They are also known as shift invariant or space invariant artificial neural networks, based on their shared-weights architecture and translation invariance characteristics.
- Then TensorFlow model converted into TensorFlow lite format i.e. (. TFLITE). Then we create one classifier to classify the user input according to the model and provides output to the user

VI. IMPLEMENTATION DETAILS

Implemented Algorithm's Psudo-code

Following code is used for initialize the model with CNN :-

```
model = tf.keras.models.Sequential([
    # Note the input shape is the desired size of the image 300x300 with 3 b ytes color
    # This is the first convolution
    tf.keras.layers.Conv2D(16, (3,3), activation='relu', input_shape=(300, 3
00, 3)),
    tf.keras.layers.MaxPooling2D(2, 2), # The second
    convolution
    tf.keras.layers.Conv2D(32, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2,2),
    # The third convolution
    tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2,2),
    # The fourth convolution
    tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2,2),
    # The fifth convolution
    tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
    tf.keras.layers.MaxPooling2D(2,2),
    # Flatten the results to feed into a DNN tf.keras.layers.Flatten(),
    # 512 neuron hidden layer tf.keras.layers.Dense(512, activation='relu'),
    # Only 3 output neuron. It will contain 3 classes) tf.keras.layers.Dense(3,
    activation='sigmoid')
])
```

Sequential: That defines a SEQUENCE of layers in the neural network

Flatten: Flatten just takes that square shape images and turns it into a 1 dimensional set.

Dense: Adds a layer of neurons.

Relu effectively means "If X>0 return X, else return 0" -- so what it does it only passes values 0 or greater to the next layer in the network.

Softmax takes a set of values, and effectively picks the biggest one, so, for example, if the output of the last layer looks like [0.1, 0.1, 0.05, 0.1, 9.5, 0.1, 0.05, 0.05, 0.05], it saves you from fishing through it looking for the biggest value, and turns it into [0,0,0,0,1,0,0,0,0] -- The goal is to save a lot of coding.

Max Pooling returns the maximum value from the portion of the image covered by the Kernel.

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C. Results

Figure 3: Splash screen

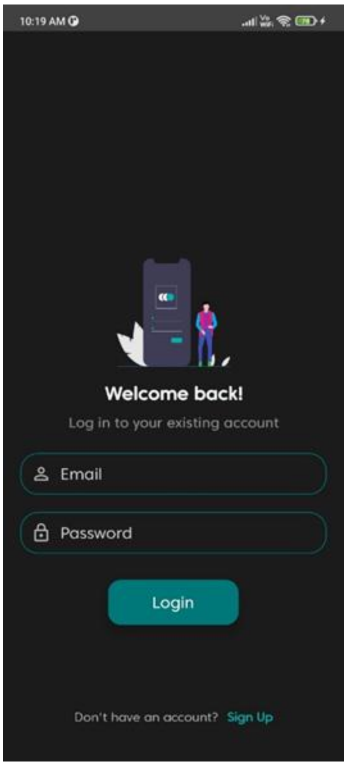

Figure 4: login Screen

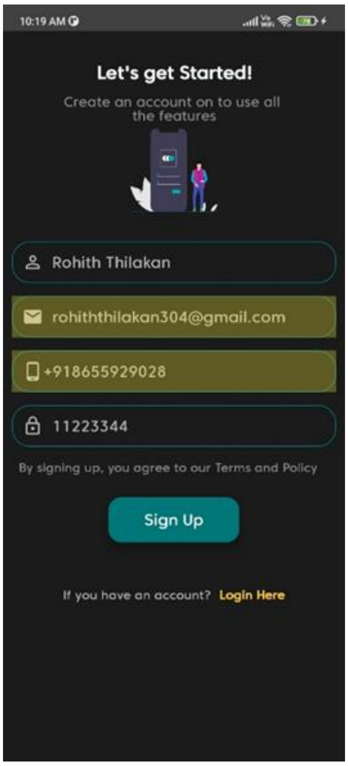

Figure 5: Registration Screen

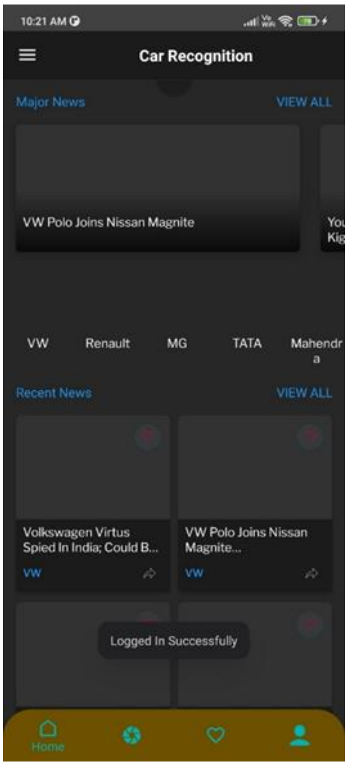

Figure 6: Home Screen

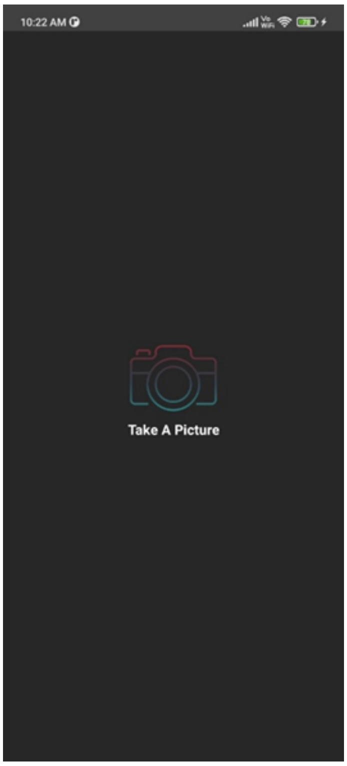

Figure 7: Capturing Image

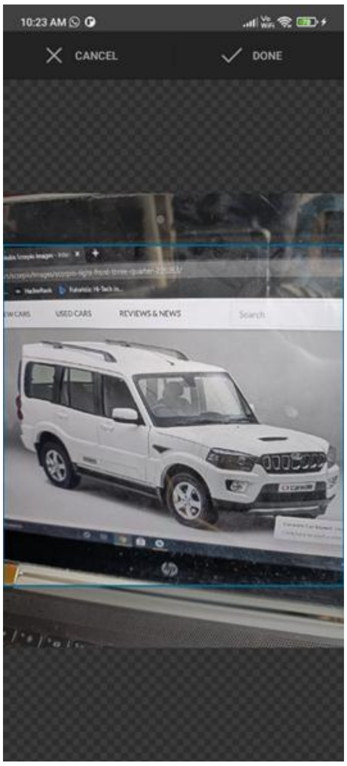

Figure 8: Crop Image

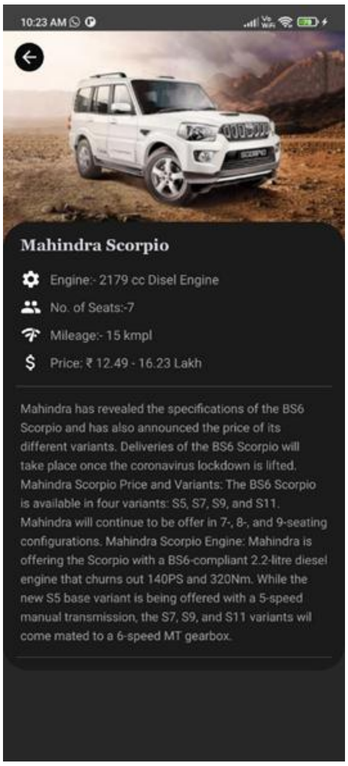

Figure 9: Final result

VII. CONCLUSION

The project we have a tendency to area unit presenting has given the method of image process algorithms in TensorFlow lite. Hence, we have a tendency to plan the matter of developing a mobile application that renders data regarding the automotive simply by taking their live photos as inputs. In alternative words, the applying ought to permit the user to click a photograph and supported the image it ought to show data regarding the automotive. More work can embrace increasing the accuracy of output by up trained model by providing a lot of datasets. Additionally, increase the amount of cars in future model. We have a tendency to additionally therefore place confidence in another options that helps user to spot the automotive and improve automaton layouts to create user-friendly application

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