

## Mid Evaluation Document

### 1. Problem Statement:

The main aim of the project is to develop Vehicle Optical Recognition Technology. As input, users can snap a photo or just a few seconds. It will provide the details about the vehicle make, model, year, user ratings and starting retail price. In addition, it will provide this same information for the two closest competitors so a user can do some quick comparison among the vehicles.

### 2. Functional Requirements.

1. **Image upload:** Users can upload an image from a device or snap a photo from a camera.
2. **Identification:** Identify the vehicle from the image uploaded by the user.
3. **Recommendation of similar vehicles:** After identifying the vehicle from the image, the user will be shown recommendations of similar vehicles based on price and type of vehicle.
4. **Additional Filters:** Users will have an option to find possible vehicles with the applied filters like on-road price, engine power and gear transmission type, fuel and performance etc.
5. **Comparison between vehicles:** User can select model and variant of vehicle which it wants to compare. As a result, the specifications can be compared in form of table.
6. **Invalid input:** When the user enters an image which doesn't contain a vehicle or if the image is blurred, then the user should be asked to enter a valid image. When a user uploads something that isn't in image format(.txt, .bin file), then the product asks them to upload images/files of specific extensions only.

### 3. Non Functional Requirements:

#### a. Product Requirements:

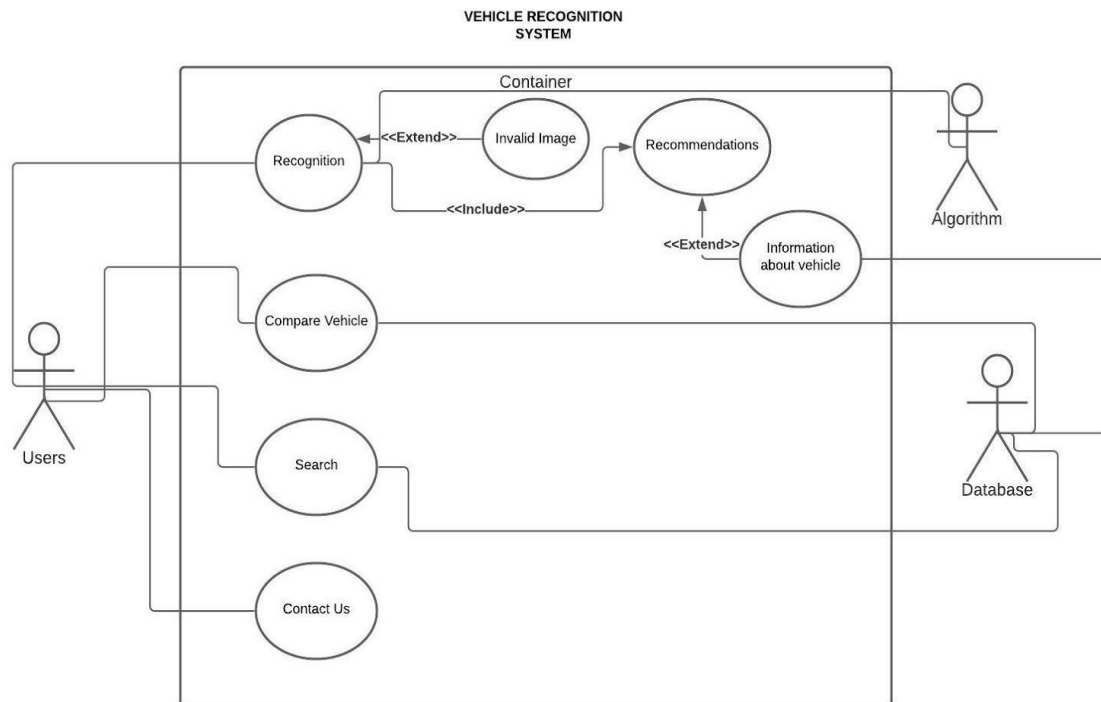
- i. **Performance:** The output should be given within a certain amount of time.
- ii. **Accessibility:** The product should be available to users at all times.
- iii. **Security:** The product code and dataset should be secured and protected from any malicious activity.
- iv. **Maintenance:** The maintenance should be quick and timely updates should be made. Also, the build and maintenance cost should be low.
- v. **Efficiency:** The model should give accurate output.
- vi. **Usability:** UI/UX should be easy to use and be understandable by any new user.
- vii. **Flexibility:** For Dataset for any type of vehicle, it should easily use this model.
- viii. **Reusability:** It can be reused for making other projects like price comparison from different sites.

- b. External requirements:
- i. **Standard constraints:** The prediction rate of our model.
  - ii. **Stability requirements:** System should be able to handle a specific amount of users at once and should not be crashed frequently.
  - iii. **Robustness requirements:** In case the system crashes, it should ensure data is safe and data is recovered quickly.
  - iv. **Portability:** It should work on or above certain versions of browsers (mobile and PCs).
  - v. **Scalability:** If the user scale increases to state/national level, the project should be able to incorporate changes accordingly.
- c. Domain requirements:
- As our app is based on a machine learning recognition system, we would require our app to give accuracy of recognizing vehicles to be more than certain percentage.
  - Backend server must be operational for the entirety of the time

#### 4. Elicitation Techniques:

- Stakeholder analysis- We identified the stakeholders and assigned roles.
- Analysis of existing systems or documentation - We analyzed the features of Google Lens for Optical Recognition part and analyzed CarDekho.com for the features which can be added in our scenario.
- background reading - We read many articles and research papers on Object Classification and recognition and also its implementation.
- Task observation - We checked different websites for observation
- Questionnaires - We circulated a google form among peers
- Interviewing - We interviewed people who submitted the features to be added in the google forms. We tried to understand their point of view and will try to add those features in our website.
- Brainstorming - We discussed what could be done to realise the project
- Use cases and scenarios - The user might upload invalid pictures. The system might give wrong answers as recognition. The recommendations that are shown to the user might be not related to the car in the picture.

#### 5. Use Case Diagram



## 6. User Stories

- As a user, I want to be able to compare two cars so that I can find differences between them.
- As a user, I want to be able to filter out cars so that I can see cars that fit my requirements.
- As a user, I want to be able to see recommended cars so that I can see similar cars.
- As a user, I want to be able to get information about the car by uploading pictures of the car.
- As a developer, I want to be able to access the database so that I can recognise the car in the picture.
- As a user, I want to be able to see details of the developers so that I can contact them.
- As an owner, I want the product to handle a large number of requests so that there is no down time.
- As a user, I need the database to stay updated so that I get the results as per the latest models available.
- As a user, I want to be able to upload images from any device easily so that I can use the product anywhere.
- As a user, I want to be able to contact the concerned persons so that they can solve my issues.
- As a user I want the system to give me correct information about the car with at least 80% accuracy.

## **7. Implementation strategy of your project with a detailed classification of Sprints**

Sprint 1: Within the first week, brainstorming was performed with all the members. All the ideas about the problem statement were collected.

Sprint 2: For the second week, all the ideas collected were sorted and prioritized according to necessity.

Sprint 3: The third week consisted of planning the functionalities and design of the system and prioritizing them.

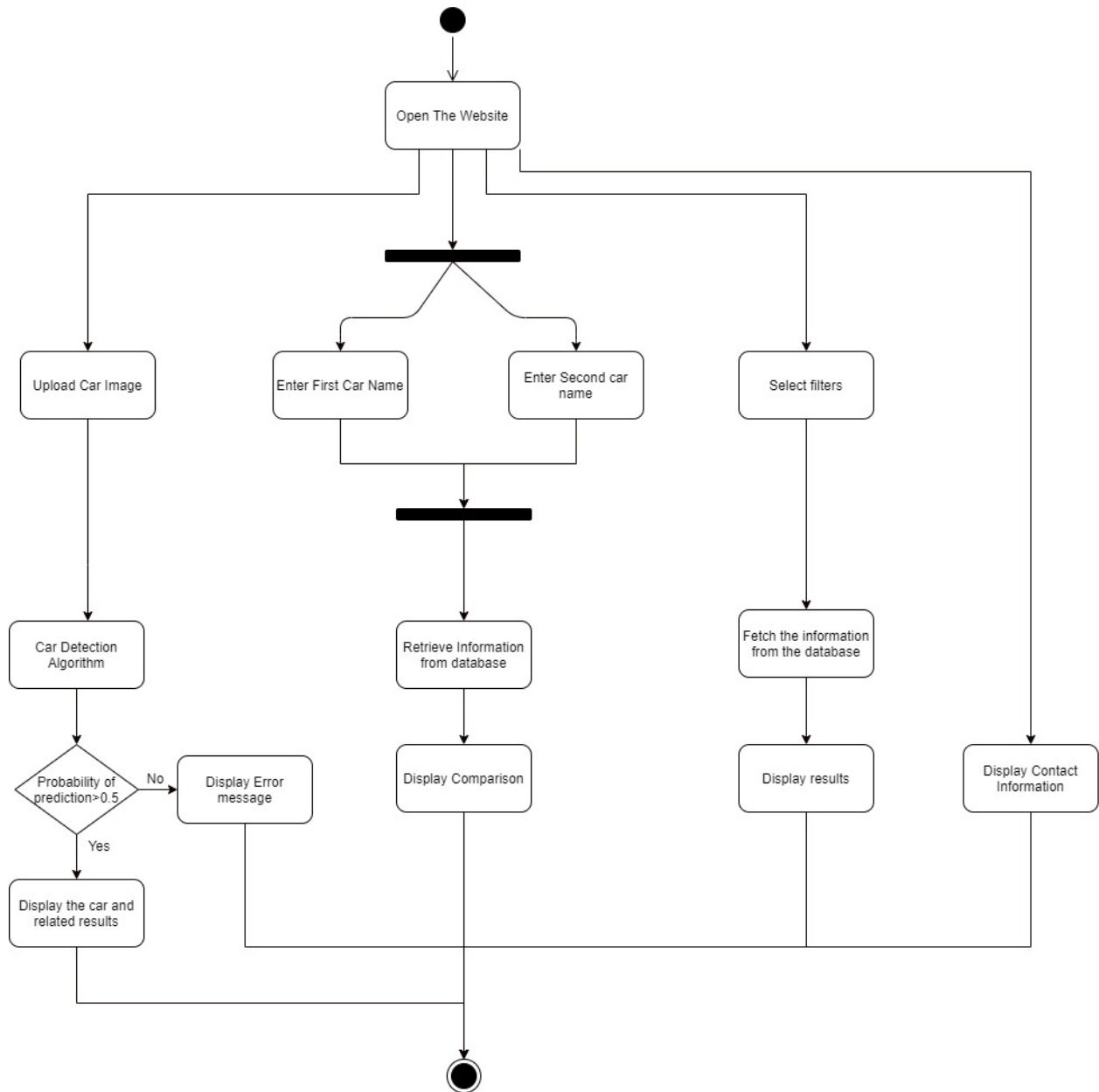
Sprint 4: In the fourth week, members were divided into four teams: Front End, Model, Database, Back end Teams.

Sprint 5: For the fifth week, Model team had explored image datasets, Front End team explored suitable technologies, Database team explored database of vehicles and Back end team explored how to combine Front End with Model and Database.

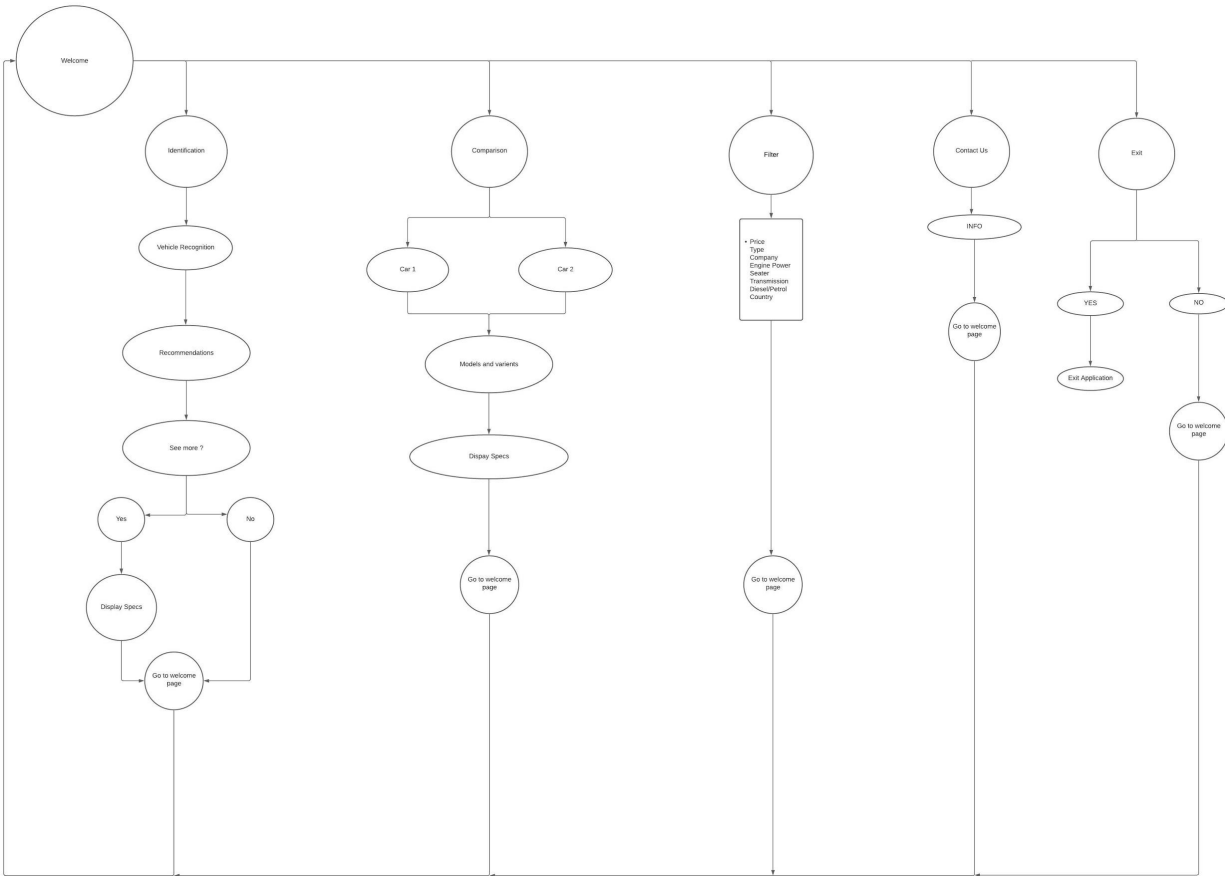
Sprint 6: For the next two weeks, teams started the initial stage of implementation.

Sprint 7: Teams are working on pending development. All team members together reviewed the overall project and planned individual activities.

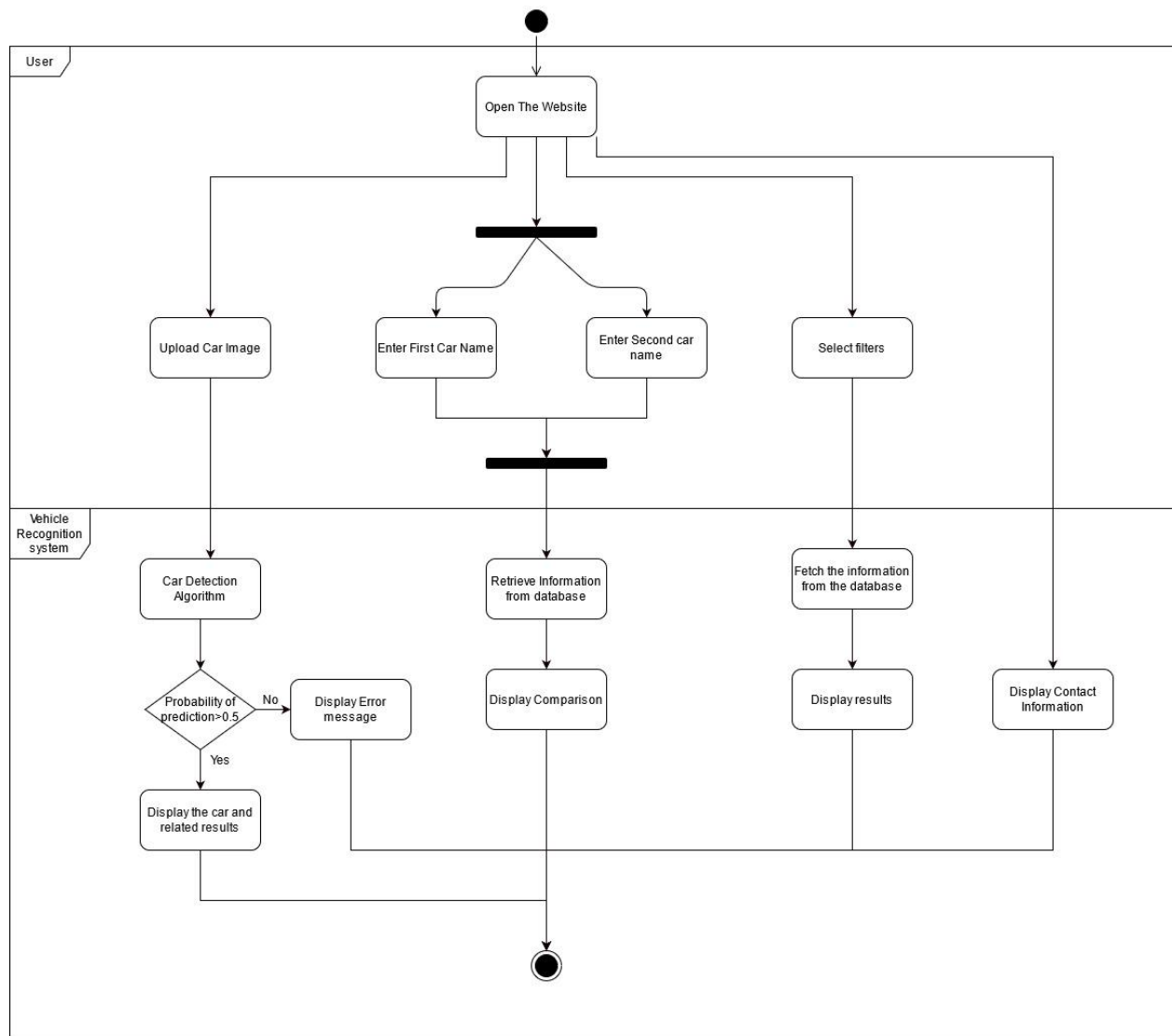
## 8. Activity Diagram



# 9. Concept Map



## 10. State Diagram.



## 11. Planning for further development:

Our top most priority is Integration of backend and frontend and integration of backend with model. We also plan to increase Model's accuracy while adding more cars in the database. With the current dataset available, the scope of our project is limited. We also wished to add other features in our model like uploading photos of the license plate of the car and showing whether it's real or fake but since the data is confidential, the feature can't be included. Similarly, if the dataset of car owners is available, we can display car and owner information in real time which can be a lot of help to police and government agencies.

## 12. Open Issues:

1. Currently we are only doing car recognition and not for all vehicles. This is because of a lack of proper image dataset for other vehicles. We can expand our scope of this project if required datasets are available.
2. The current image dataset we are using is the best available dataset but consists of models that were manufactured upto 2012 which is old but we can modify our dataset once the working model is ready.

## 13. Contributions:

We have divided ourselves into 4 teams:

1. **Model Team:** Swapnil(201801163) and Siddharth(201801196).  
This team works on models based on image recognition, They are trying to incorporate more cars while maintaining accuracy of the model.
  2. **Back End Development Team:** Nisarg(201801013), Ajay(201801414) and Shabbir(201801428)  
This team integrates the Front End with Database and Front end with Model. They are trying to make integration easy so that functionalities run without any problems. They are designing schema and creating databases in Postgres.
  3. **Front End Development Team:** Khyati(201801119), Palak(201801161) and Deep(201801184).  
This team is responsible for the developing website. They are trying to make the website user friendly and interactive.
  4. **Database Team:** Mohil(201801416) and Vishal(201801436)  
Since the car dataset was not available, this team made the dataset from scratch and is trying to run queries that are required in our project.
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