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B.E. SEMESTER VIII, ACADEMIC YEAR 2019-2020

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Business Model Canvas (Image)	Completed
Business Model Canvas (Report)	Completed
Patent Drafting Exercise (PDE)	Completed
Final Plagiarism Report	Completed
Final Project Report	Completed

Name of Student : Deep Pancholi

Name of Guide : Mr.Khem Dhawal Punamchand

Signature of Student : _____

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Name of Student : Gajjar Viren

Name of Guide : Mr.Khem Dhawal Punamchand

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Name of Guide : Mr.Khem Dhawal Punamchand

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Business Model Canvas (Report)	Completed
Patent Drafting Exercise (PDE)	Completed
Final Plagiarism Report	Completed
Final Project Report	Completed

Name of Student : S h a h D h a r m i k
Bharatkumar

Name of Guide : Mr.Khem Dhawal Punamchand

Signature of Student : _____

*Signature of Guide : _____

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A Project Report On

REVAMP

Submitted by **Team ID- 86975**

Deep Pancholi (160130107018)

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Bachelor of Engineering (B.E.)

in

Computer Engineering

under

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From

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Abstract

The idea of this project primarily focusses on an Android Based Application^[1] that uses YOLO Algorithm.^[2] (for object detection system), Machine Learning^[3] (for recommender system), and Augmented Reality^[4] (for visualizing the product). It describes the main fields in the application which are applied to ease out the renovating process of users. Some characteristics of the above-mentioned technology systems will be discussed, and this paper will provide an overview of them. Future scopes are also discussed.

Our idea is to make an application that enables the user to visualize his personal space without having to take the troubles for visiting shops/sellers and selecting new items for the space.

We want to make home renovation so easy a procedure that no user will think twice before initiating the renovation/redesigning process because of the troubles faced during such undertakings that it becomes frustrating for the space owners to take it to the next level.

The work of application is divided into four key steps. The first is the detection of existing product which the user wants to remove/ replace with a new product. The second is a recommender system (for the users who wish to install a new one), which recommends a new product with the visual features from a large data set. The third step comprises of visualizing the newly selected product from the options in place of the old one. And finally, the user can see all the available purchase options according to his preset filters. In the domain of renovation, the system will yield more efficiency comparable to the best previous systems.

Used in real-time applications, the app can minimize significant time of users, and help in achieving the best designs without having to step out.

Acknowledgment

A successful project is a fruitful effort by many people, some directly involved and some indirectly, by providing support and encouragement. We express our sincere gratitude to everyone who had helped us. We would like to thank our friends for their encouragement, inspiration, moral support without which, it would have been almost impossible to complete this project.

We are extremely grateful to our Principal Dr. Sweta Dave which gives us an opportunity to shape our career. Our effort will be incomplete without mentioning our Head of Department Prof. Dhaval Parikh, who provides us the constant support, which was of a great help to complete this project successfully.

We express our heartfelt gratitude to Mr. Dhawal P. Khem, whose support and guidance was invaluable. We are grateful to him for great knowledge, necessary information suggestion and guidance for the success of this Project. They have been constant source of motivation to us. We also thank all our faculties of CE department for their valuable support.

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1. Introduction

1.1 Project Introduction

We are developing **Revamp**, which is an Android Application. Our Idea is to develop an app that can help home/office or any space owners to renovate their space with at most ease and efficiency. Due to the vast customer space, this app will have a very big impact on such users those are willing to undertake renovation projects of their home or any space. And on the other hand, the tremendous wastage of time of selecting various raw materials for replacement or reconstruction by the owners, it is restricting the users from taking up such projects and making their improving the condition and design of their spaces.

Our primary idea is to provide the users with an app that can uses a recommender system using Deep Learning algorithms that recommends new and latest products from the nearby market that match their existing color schemes. And an application that will provide all these features together. A recommender system will work on the image scanned or uploaded by the user, and recommend new products from the nearby market or any other location as selected and filtered by the user using GPS to eliminate all the travelling the user has to undergo, thereby saving valuable time and making efficient use of resources.

For example, if any home owner wants to renovate his home using our app, he will have to scan the items he wants to replace in his home, which our machine learning algorithm will capture and scan the dataset for items related to the scanned item in color and size. The recommender engine will then recommend new items. And then the user can visualize the newly selected item in place of his old product using Augmented Reality. The user can also see his nearby places to check buying options.

1.1.1 Our Project Goal:

Our Primary goal is to target the following class of users to make their home renovation hassle free and easy:

- Commercial Property Owners
- Homeowners
- New Site Constructors/ Builders

1.1.2 Users:

The users of our App are divided into three main categories:

- Admin (Developer Team)
 - Admin manages the application.
 - Admin can remove suspicious Users.
 - Can see user's location.
 - Login using Username and Password
 - User Management and Logs
- User
 - User can use the app for personal uses.
 - Signup Process:
 - First Name
 - Last Name
 - Password
 - Confirm password
 - Mobile no.
 - Login Process:
 - Username
 - Password
 - Reset password
 - Logout
- Suppliers
 - Contacted by users for Inquiry.
 - Upload their brochure on the app.
 - Track stocks of items.

1.2. Analysis of Current System:

Study of Current System:

Current systems do not provide services for communication between the dealer agencies and individual person. These systems work efficiently in the way for only visualizing the item selected by the user.

Problems and Weakness of Current System:

We have done a research on currently available patents related to our invention field. We found some application which only provides visualizing the product in the customers house but there is nothing like getting the nearby dealers list for the customer to see.

1.3. Requirement of New System

The main purpose of this project is to overcome the time wasted and resources' inefficient utilization of users. And even after having undergone so much efforts, still there are faults and perfection glitches. Once the idea caught up the pace, later, it was decided to include a playful factor to our application by providing visualization through Augmented Reality. So that they could also enjoy and take benefit of the advancing technology and visualize and choose the perfect product that suits their present surrounding and color schemes.

This app can bring many of the hard tasks and missions to be achieved easily also reducing the time taken to do so.

Before we jump into the problem's solution to be achieved by this app, it is very necessary to understand the scene without the app or say before the app was proposed. So, the thing is, talking about before, there were a lot of missing things, such as selecting the perfect new product, selecting the correct color variant, surveying the market for its cheapest available price, visualizing the new product at the place it needs to be installed, and other factors such as extensive and unnecessary travelling in the market, time wastage, etc....

With the proposition of this app and by looking at the capabilities it can accomplish, it has wide opened various new possibilities. If we look at it in hands of homeowners, they can use it for all the above-mentioned tasks. Also, it can as effectively be used by commercial space owners. It also supports GPS which can give the exact location of the dealer or shop where the selected product is available at cheapest price, making it less hard to find such dealers physically. And it uses camera and real time visualization through Augmented Reality with the perfect view.

But with every new thing, there comes the pros along with the cons with it, which can't be ignored. This thing too has some cons which we will try to take care in the future enhancements. One of its disadvantages is that some fraud sellers may use it to take data of the customers and use it for undesirable purposes. But we will try our best to protect our customers data from such fraudulent users.

2. System Design

2.1. Tools Required:

- Android Studio: To design the android based application.
- Google Colab: Used to train the object detection model with cloud processing based on a Graphical Processing Unit (GPU).
- Jupyter Notebook: Used to extract images of specific labels from Google Open Images Dataset and their preprocessing.
- YOLO Darknet Framework: Deep Learning framework to implement pre-trained model of You Only Look Once algorithm on our dataset.
- OpenCV: Used to draw boxes on the images after object detection.

2.2. Implementation Strategy:

We divided the modules of our application into these main modules:

- a. Android App for capturing images: This module includes the frontend design of our application and the user interface associated with it.
- b. Dataset preparation: This includes extracting images of specific classes of furniture items from the Google Open Images Dataset.
- c. Image Preprocessing: This includes labelling the images and preprocessing them so that they are ready to train the You Only Look Once model with them.
- d. Training object detection model using TensorFlow: We implemented this on Google Colab cloud processing which provides with GPU for training deep learning models.
- e. Testing object detection model: This includes testing the trained model on other images that have not been used to train it and check the accuracy of the model.
- f. Providing a platform for Visualization (Augmented Reality): This includes implementing the AR Toolkit in our android app so that the user may easily visualize the new item using the app itself.
- g. Implementing Google Maps: Google Maps API will be used to guide the customer to the dealer's address who sells the item that the customer is interested in.

2.3. Use-Case Diagram:

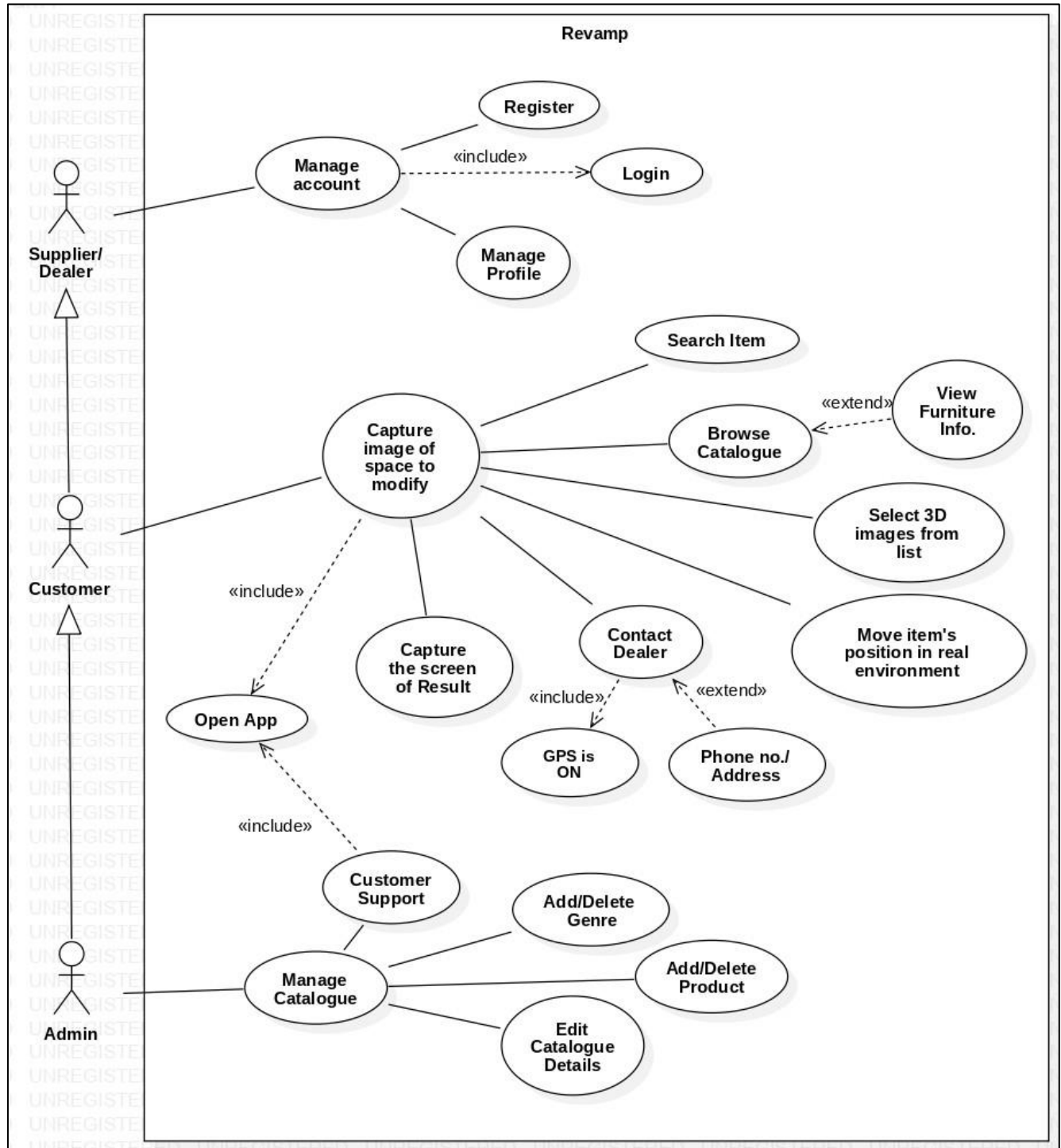


Fig. 2.3. Use- Case Diagram

The Use-Case Diagram of our project shows the different categories of users that may use our application and the probable tasks/activities that they may/should perform with our application to make the most out of it. It also shows the *includes* and *extends* relationship between various activities.

For example, in the above diagram it can be seen that Admin extends the Customer and the Customer extends the Supplier. That means the Admin can by default perform all the activities that a Customer can and similarly, the Customer can perform all the activities that a Supplier can.

- Sequence of Activities:
 - Choosing the mode of operation (replace an existing item or install a new product)
 - Replacing an existing item:
 - i. Scan the present item.
 - ii. Wait for the app to recommend similar new products based on the product details scanned by the user.
 - iii. If the user likes any of the recommended items, he can choose to install it.
 - iv. The user will also be provided with the visualization of the product that he chose in his present space/scenario.
 - v. In the last step, the user will be provided with the details of the nearby sellers or dealers of the product that he chose so that he can enquire about the pricing and availability of the product directly with the dealers.
 - Installing a new item:
 - i. If the user wishes to install a new product, he will have to select a new product from the catalogue.
 - ii. After that, he will have the option of visualizing the new product that he chose in his place.
 - iii. And similar to the above step, he will also get the details of the nearby sellers of that product.

2.4. Product Development:

Our development phases were as mentioned above in the implementation strategy.

Modules Completed:

Android App

Dataset Preparation

Images Preprocessing

Training the You Only Look Once (YOLO) algorithm.

2.5. You Only Look Once (YOLO):

You only look once (YOLO) is a state-of-the-art, real-time object detection system. On a Pascal Titan X it processes images at 30 FPS and has a mAP of 57.9% on COCO test-dev.

Comparison to Other Detectors:

YOLOv3 is extremely fast and accurate. In mAP measured at .5 IOU YOLOv3 is on par with Focal Loss but about 4x faster. Moreover, you can easily tradeoff between speed and accuracy simply by changing the size of the model, no retraining required!

Prior detection systems repurpose classifiers or localizers to perform detection. They apply the model to an image at multiple locations and scales. High scoring regions of the image are considered detections.

We use a totally different approach. We apply a single neural network to the full image. This network divides the image into regions and predicts bounding boxes and probabilities for each region. These bounding boxes are weighted by the predicted probabilities.

Our model has several advantages over classifier-based systems. It looks at the whole image at test time so its predictions are informed by global context in the image. It also makes predictions with a single network evaluation unlike systems like R-CNN which require thousands for a single image. This makes it extremely fast, more than 1000x faster than R-CNN and 100x faster than Fast R-CNN. See our paper for more details on the full system.

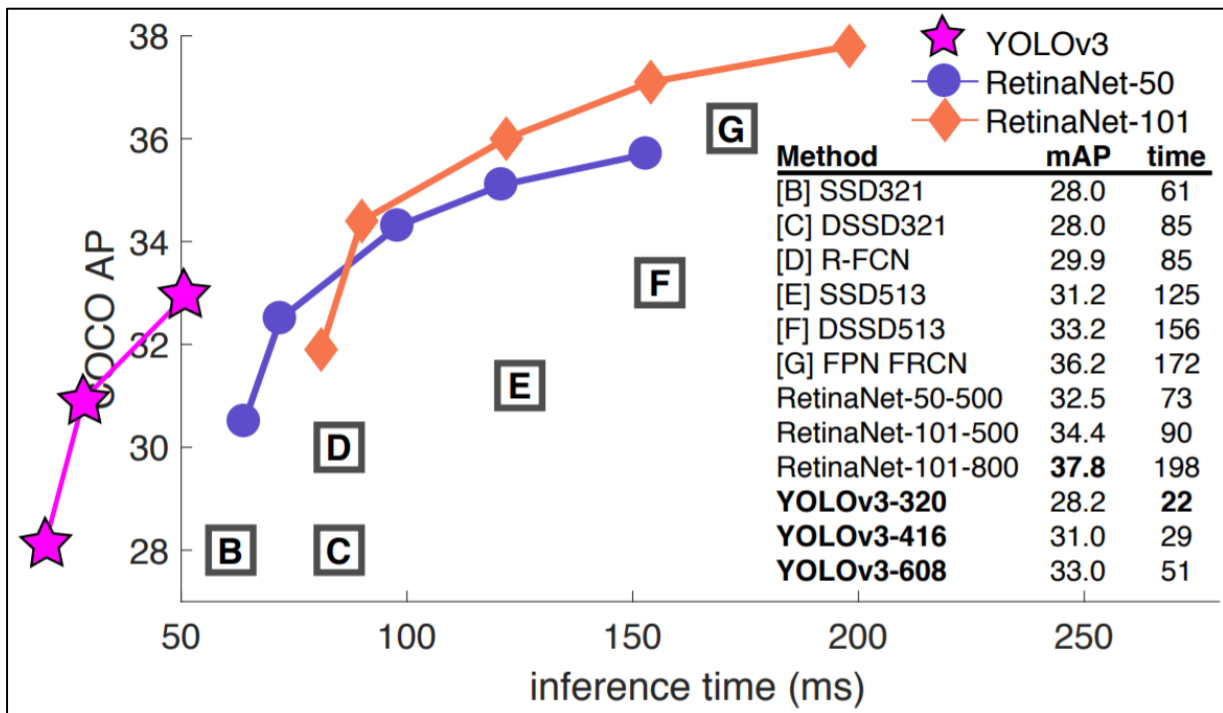


Fig. 2.5. Comparison of YOLO with other algorithms.

3. Database

3.1. E-R Diagram:

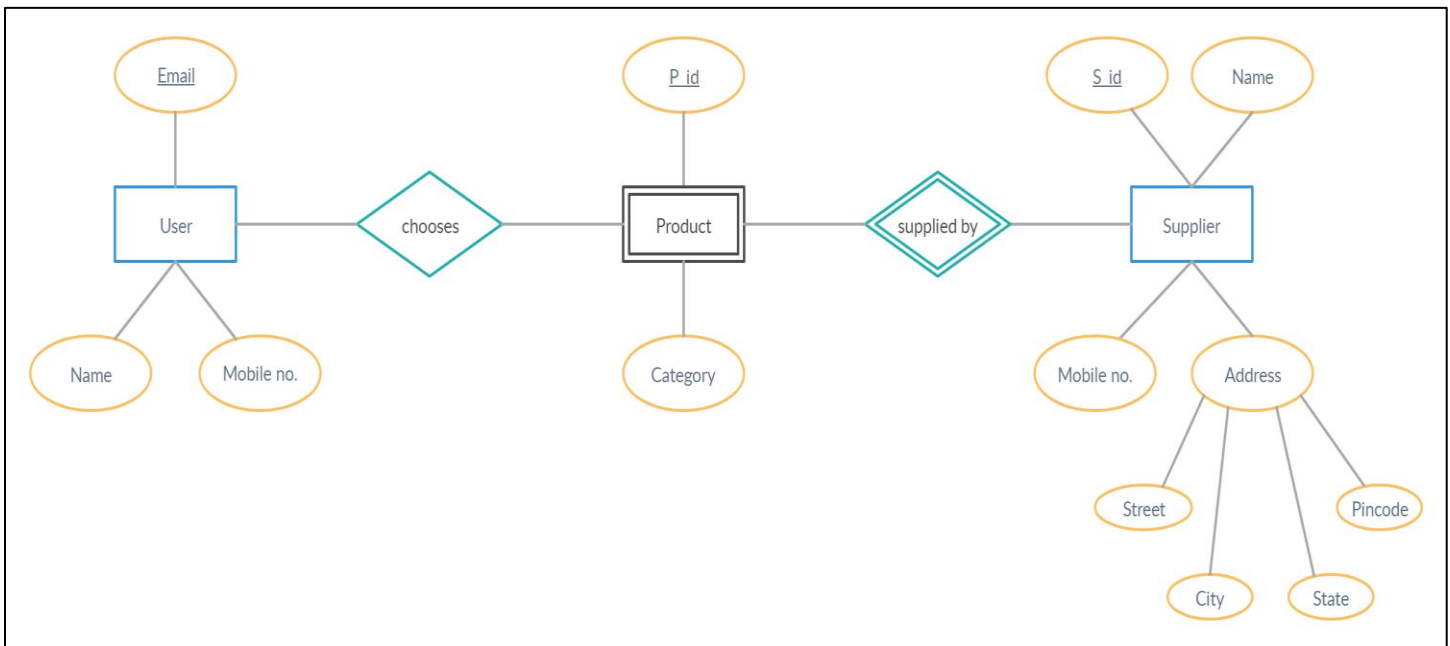


Fig. 3.1.1. E-R Diagram

The Entity-Relationship Diagram shown above shows the relationship between various entities involved in the operation of our application such as User, Supplier, and Product and the various attributes associated with them.

Here, we will be using four relations, namely-

1. User Table:

Attributes: Name, Email, Mobile_no.

Primary Key: *Email*

2. Product Table:

Attributes: P_id, Category

Primary Key: *P_id*

3. Supplier Table:

Attributes: S_id, Name, Contact, Address

Primary Key: *S_id*

4. Supplied_by Table:

Attributes: P_id, S_id

Foreign Keys: *P_id* (referencing to P_id of Product table)

S_id (referencing to S_id of Supplier table)

3.2. Database Design (Relation Schema):

3.2.1. User Table:

Name	<u>Email</u>	mobile_no
ABC	abc@xmail.com	9999999999

Table 3.2.1. User Table

```
CREATE TABLE User (name varchar (255),  
                    Email varchar (255) NOT NULL,  
                    mobile_no varchar (255),  
                    PRIMARY KEY (Email)  
                    );
```

```
INSERT INTO User (name, email ,mobile_no )  
VALUES("ABC", "abc@xmail.com" , "9999999999");
```

3.2.2. Product Table:

<u>P_id</u>	Category
1	Bench

Table 3.2.2. Product Table

```
CREATE TABLE Product(P_id int NOT NULL,  
                      Category varchar(255),  
                      PRIMARY ID(P_id);  
                      );
```

```
INSERT INTO Product(P_id , name);  
VALUES("1", "Bench");
```

3.2.3. Supplier Table:

<u>S_id</u>	name	contact	address
1	abc	1234567890	City1

Table 3.2.3. Supplier Table

```
CREATE TABLE Supplier(S_id int NOT NULL,  
                        name varchar(255),  
                        contact varchar(255),  
                        address varchar(255),  
                        PRIMARY KEY (S_id)  
                        );
```

```
INSERT INTO Supplier(S_id, name, contact, address)  
VALUES("1", "abc", "1234567890", "City1");
```

3.2.4. Supplied by Table:

<u>P_id</u>	<u>S_id</u>
1	1

Table 3.2.4. Supplied by Table

```
CREATE TABLE Supplied_by(P_id int NOT NULL,  
                           S_id int NOT NULL  
                           );
```

```
INSERT INTO Supplied_by(P_id,S_id)  
VALUES("1", "1");
```

4. Interfaces

4.1. Interfaces and Functioning Steps of Android App:

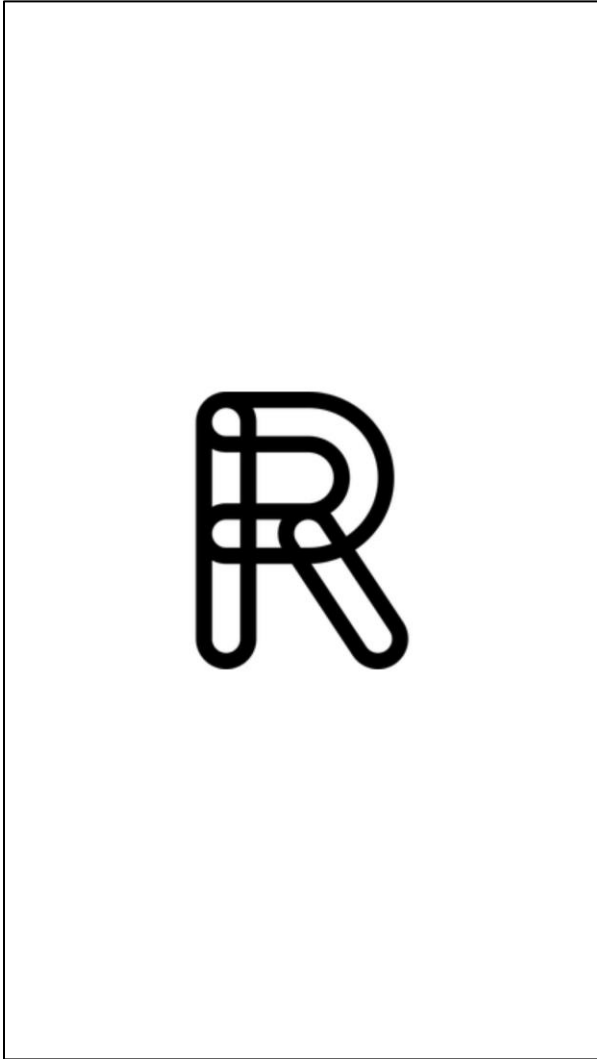


Fig. 4.1(a). Welcome Screen

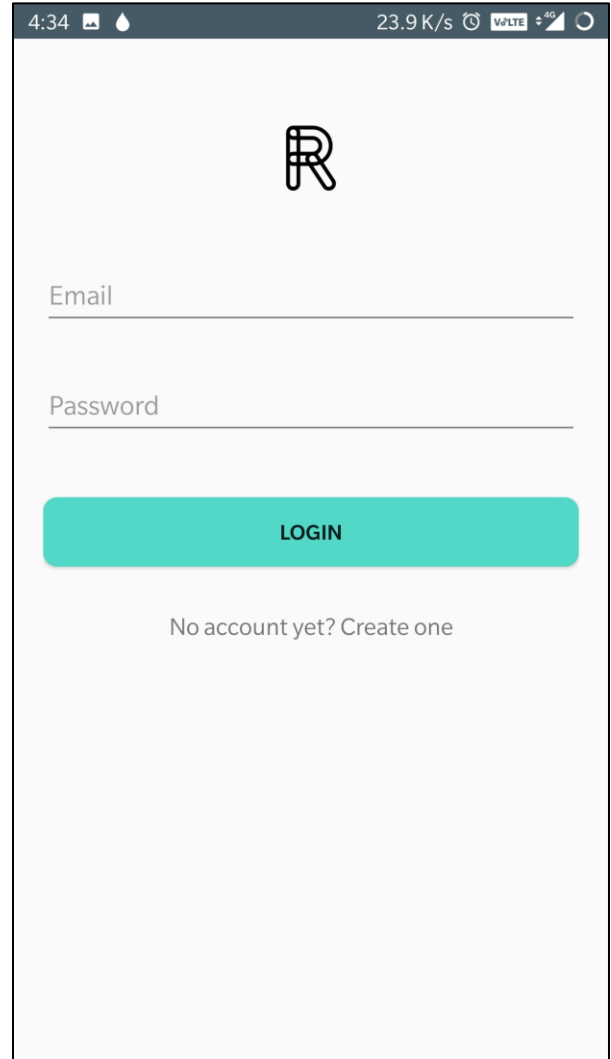


Fig. 4.1(b). Login Screen

The above two screens show the welcome screen once the app is opened and the login page for the existing users.

And if the user is not already registered, he may do so by clicking “No account yet? Create one” button on the second screen.

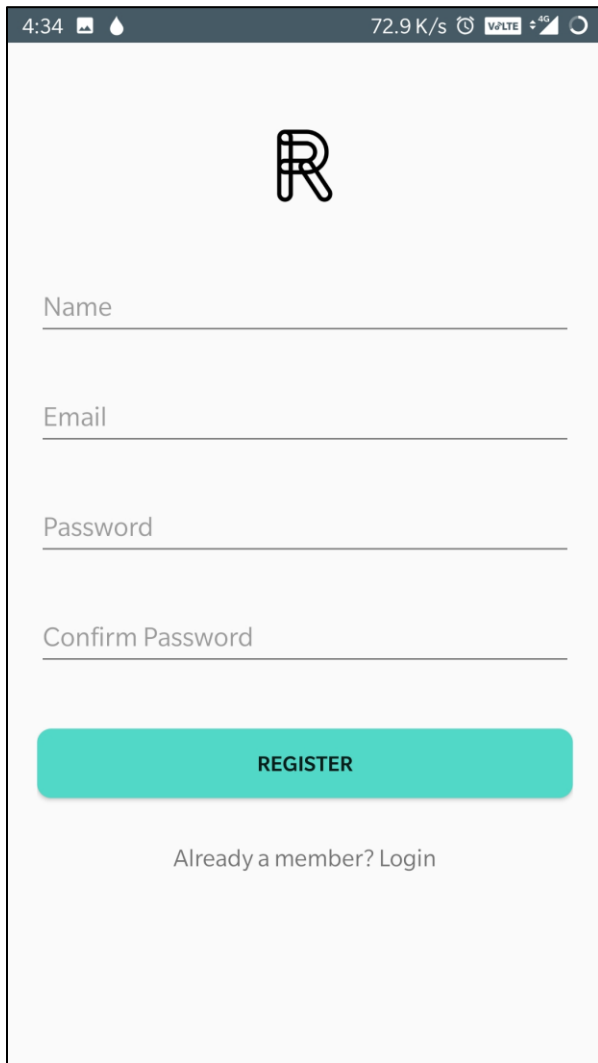
The image shows a mobile application registration screen. At the top, there is a status bar with the time 4:34, battery level, and network status (72.9 K/s, V/LTE, 5G). Below the status bar is a large, stylized 'R' logo. Underneath the logo are four input fields for 'Name', 'Email', 'Password', and 'Confirm Password'. A teal 'REGISTER' button is positioned below the input fields. At the bottom, there is a link that says 'Already a member? Login'.

Fig. 4.1(c) Registration Screen

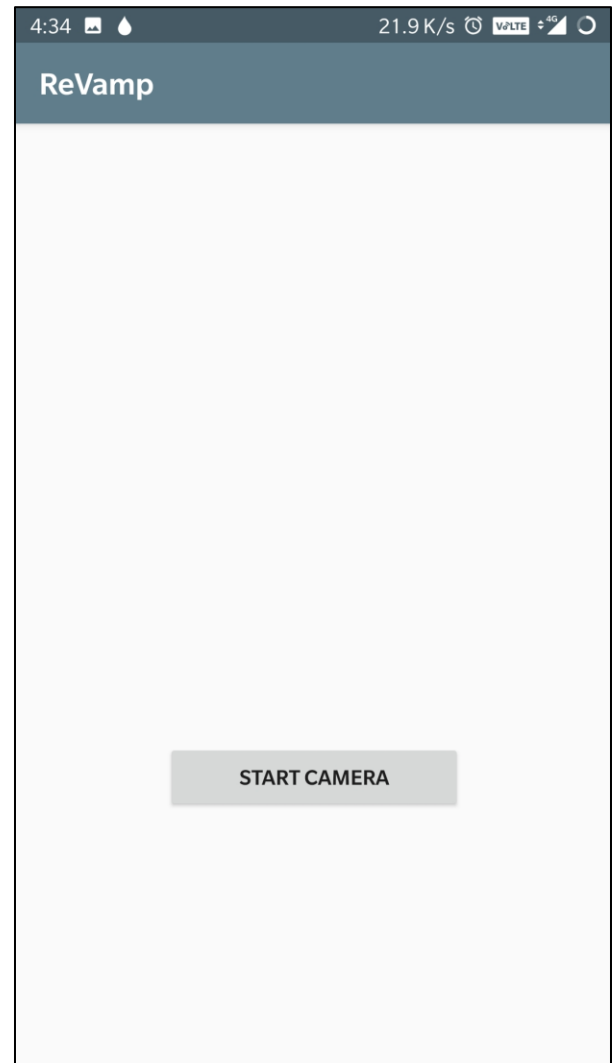


Fig. 4.1(d) Prompt to Start Scanning by User Screen

The above two screens show the Registration page for new users and the prompt to start object scanning of an already installed object by the user respectively.

Once the user clicks on 'Start' button in the second screen, the app will open camera to enable the user to scan furniture items in front of him.



Fig. 4.1(e) Camera Screen

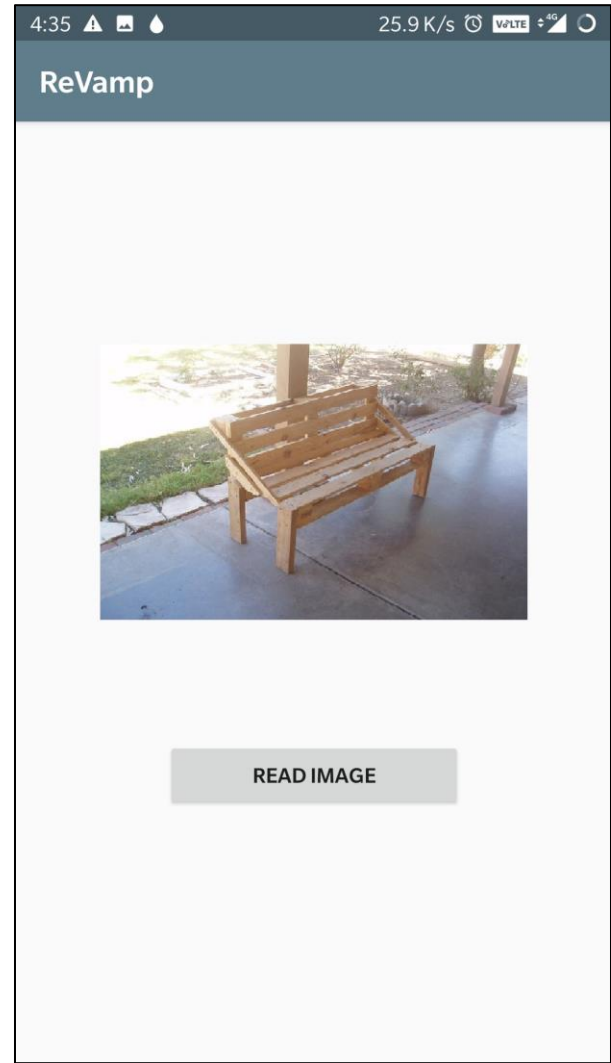


Fig. 4.1(f) Screen showing captured image

The above two screens show the camera screen in our application and the screen showing the captured image once the user captures the object of his choice.

Once the user clicks the 'Read Image' button on the second screen shown above, the image will be saved in the local storage directory of the app on the user's device for further processing as shown below.

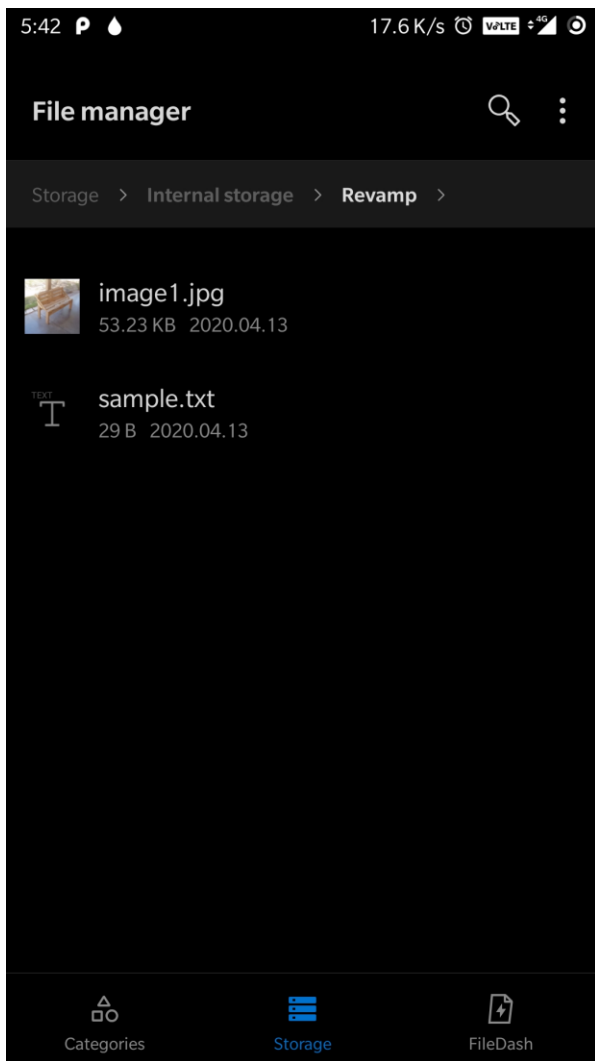


Fig. 4.1(g) Image placed in File manager

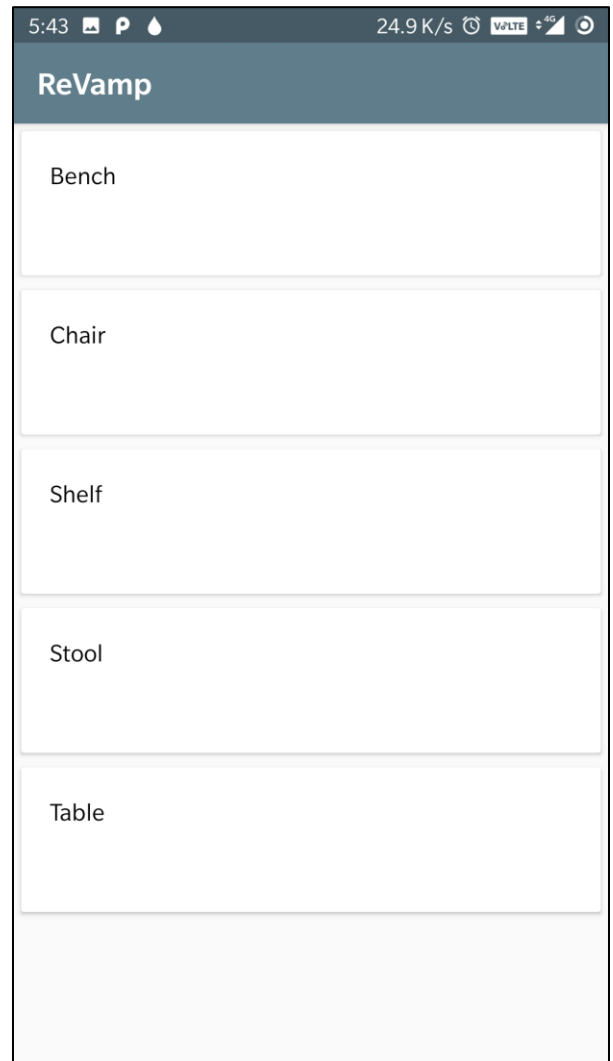


Fig. 4.1(h) List of objects detected in image

The above two screens show the image clicked by the user is placed in the app's folder in the local storage of the device and the list of objects found in the image.

As soon as the image is placed in the folder on local storage, it will be passed onto the object detection algorithm which will detect all the furniture objects detected in the image clicked by the user and write the labels of those images to the text file called 'sample.txt' in the same folder.



Fig. 4.1(i) List of nearby dealers

After that, the app will retrieve the labels written in the text file and show as above in the second screen. The user may then choose the object that he wants to replace among all the objects present in the image as detected by the detection algorithm.

Once he chooses any item, he will be shown the list of nearby dealers of that particular item with all the details of the dealer.

For example, in our image above, as seen it is a Bench. So, the app will show the nearby dealers of the Bench class and also, he will be able to visualize the new bench he chooses in place of the old bench using AR. (Future Scope)

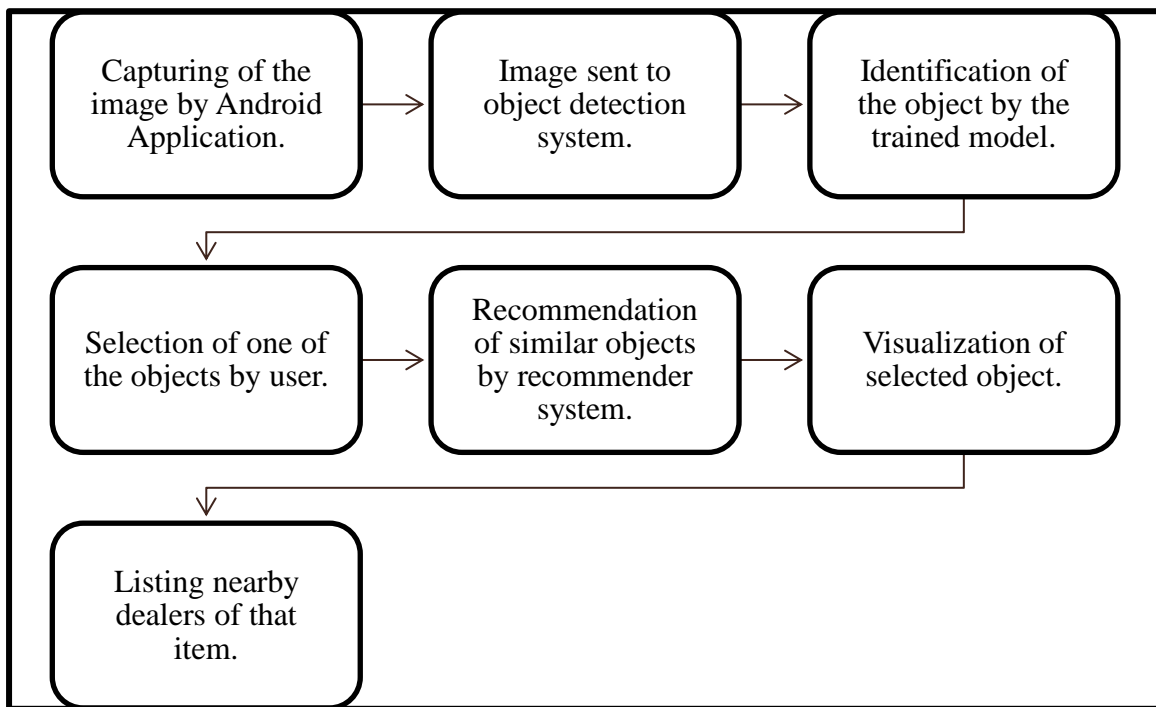
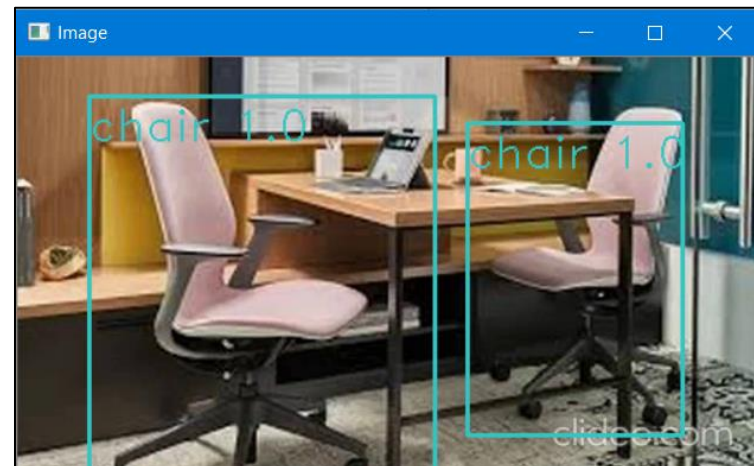
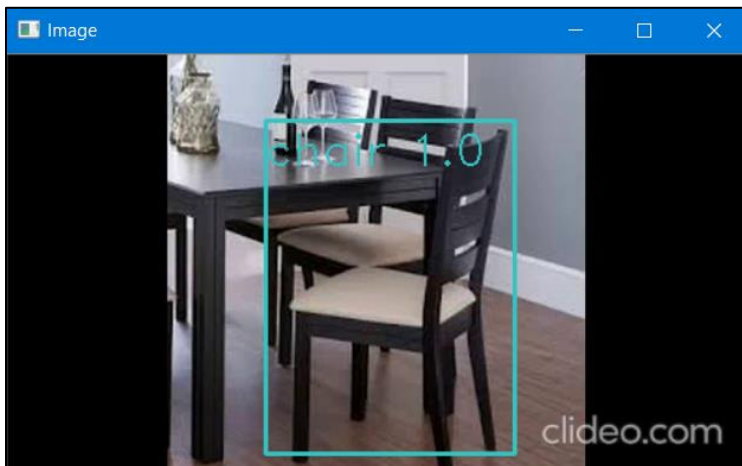
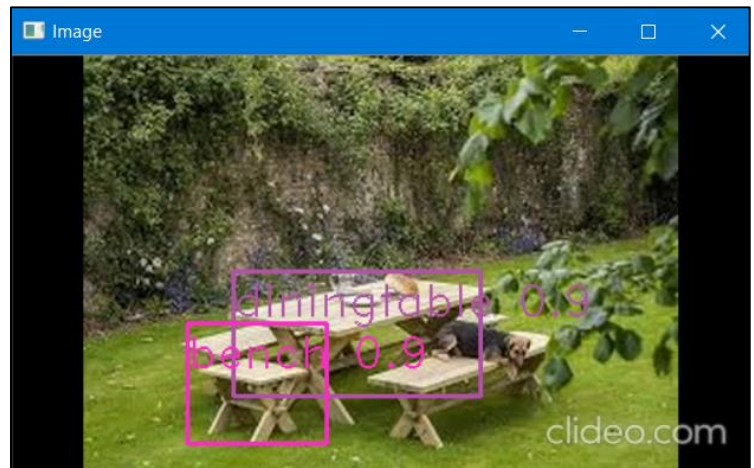
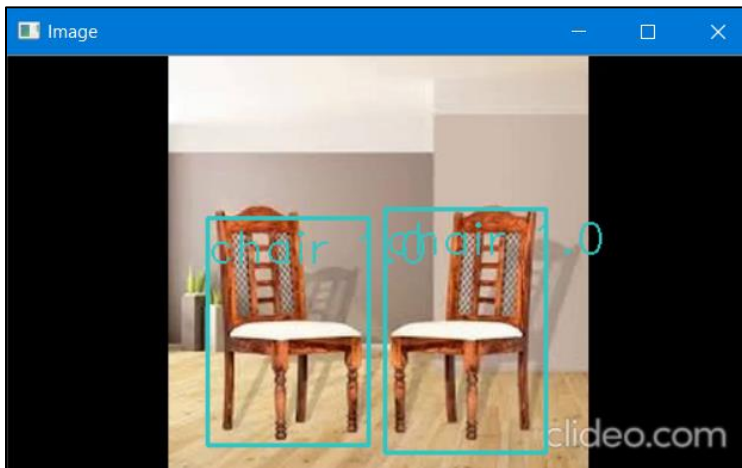


Fig. 4.1(j) Working flow of application

4.2. Results of Object Detection algorithm:



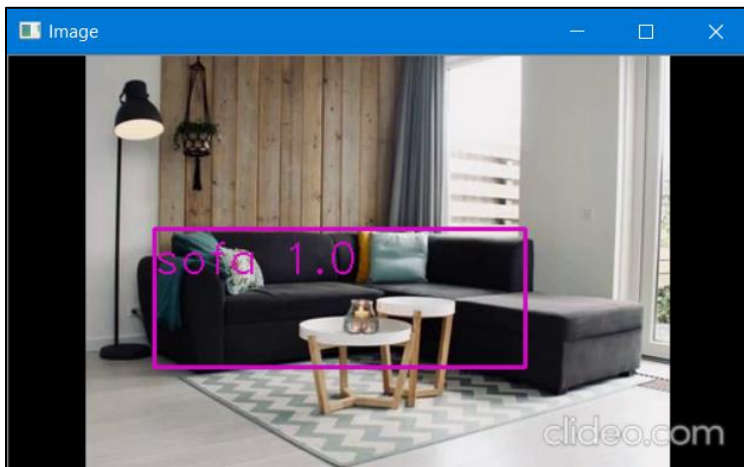
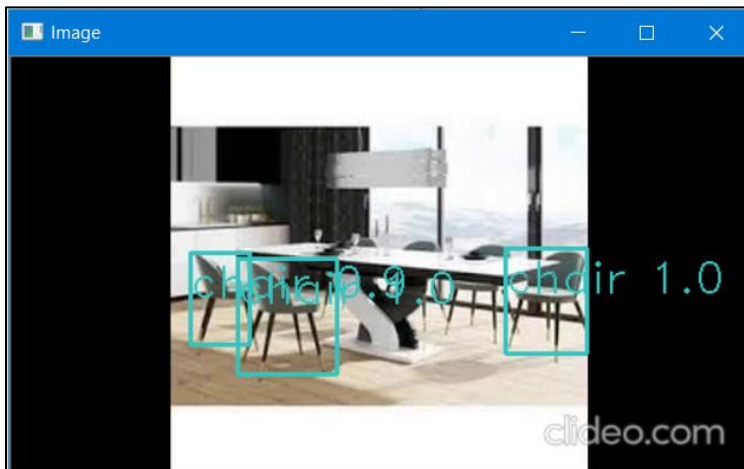
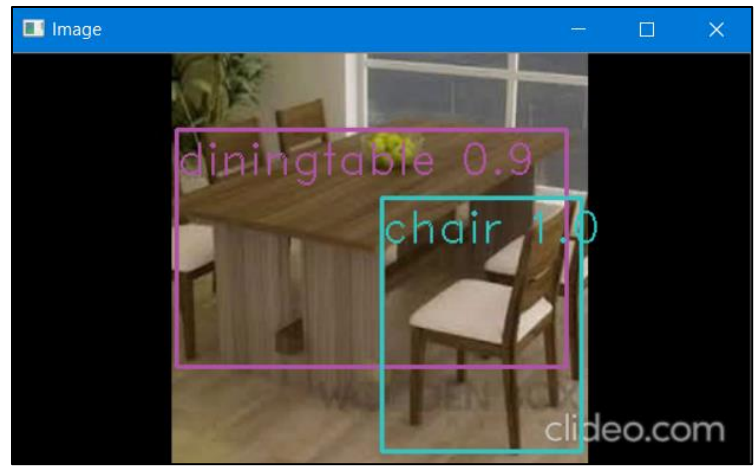
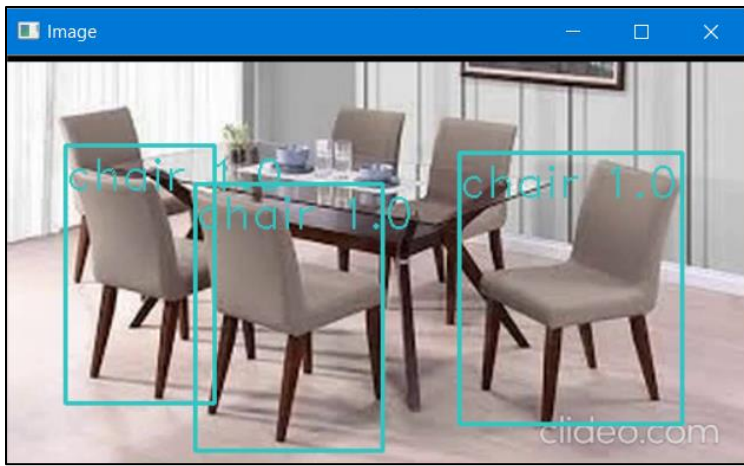


Fig 4.2. Results of YOLO detection

5. Conclusion & Future Scope

5.1. Conclusion

Our product was a great success when proposed and discussed with our faculty guide. It received a great success also when the idea was kept in front of other people. Everyone was happy and liked the new innovative idea. We will now try our best to fulfill the demands and develop the proposed application to give a peaceful home renovating experience to our users. We hope to open doors to new latest technology to the needy people.

5.2. Future Scope

In this phase, we have been able to create the running android app, trained object detection model and proposed idea for the recommender system and augmented reality implementation.

The Future Scope of work includes implementing the AR toolkit in the android application, successfully listing out the real time nearby seller information through Google Maps API.

We have tried our best to analyze the needs of the users and have tried to fulfill them. Though in future, if demanded by users we can put our mind and money in fulfilling their new needs, requirements and wishes. Also, we will try to overcome and solve the issues found by our customers while demonstration of the product. We will try our best to serve the people, which in return will open doors to more advanced and useful form of technology. We will always be open to constructive criticism from our users or guides.

In the proposed idea of the application, there are no new features that our team can think of as if now that can be added to make the app more and useful and responsive for our users.

But, in future if there is scope for any further development or improvement, we will surely contribute to it.

According to our study so far, the application can be extended so that it fits the below shown Entity - Relationship diagram well.

Below shown ER Diagram shows the current implementations as well as future modules that can be worked upon to improve the application.

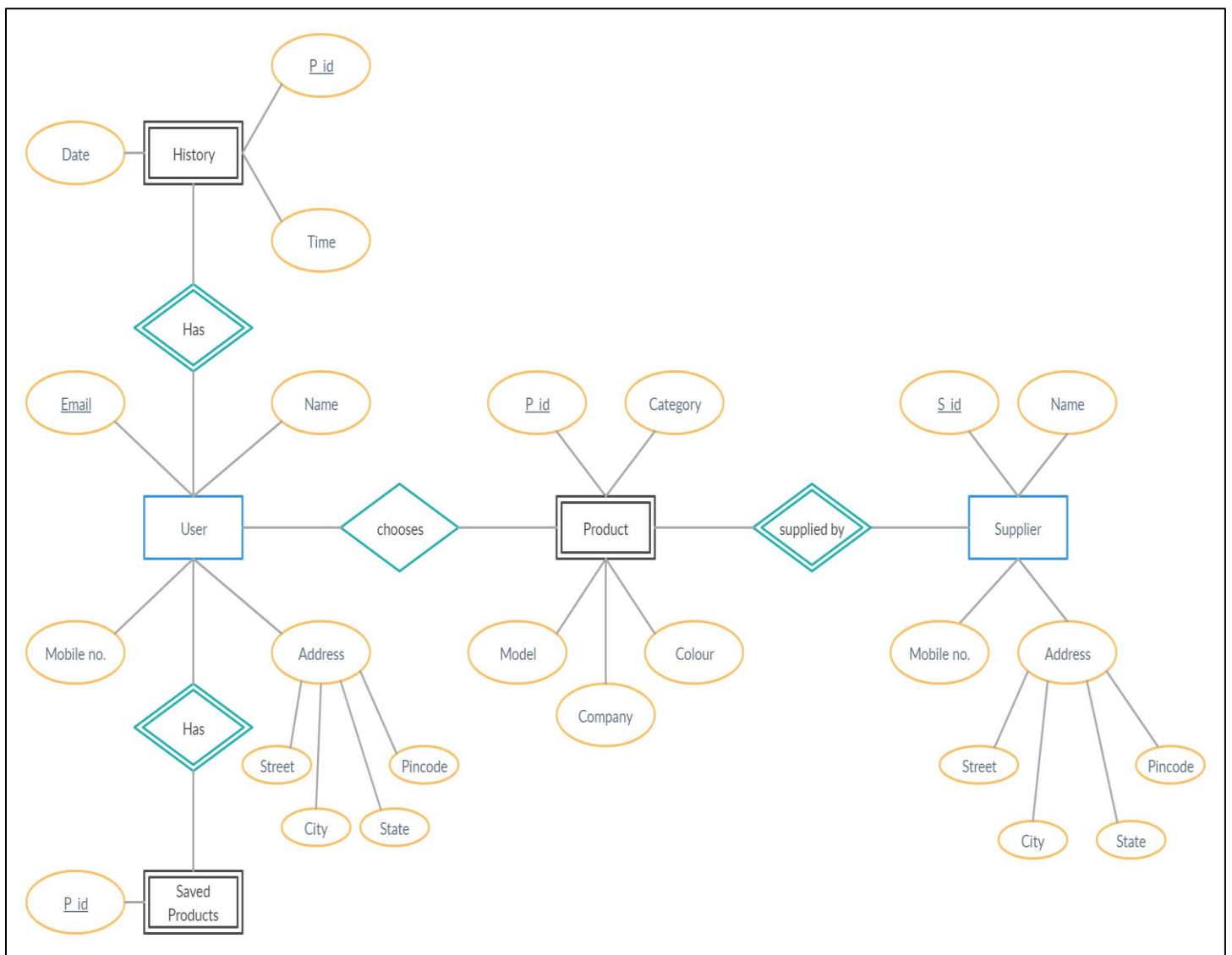


Figure 5.2. ER Diagram with proposed improvements and Future Scopes implemented

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Appendices

A. Case Study:

Project Background: We came across a local family who were renovating their home with new items like furniture, electrical devices, etc....and we saw that this job is pretty difficult when we do not have the facility to match the color or design patterns of furniture that they want to purchase and the paint or color scheme applied in their home. We decided to build an android based application that:

- Could help them visualize new furniture items based on the old ones sitting at their homes.
- Would allow them to call nearby dealers to check the availability of furniture items.
- Would allow detecting customers' existing items.

Business Challenge: We faced a challenging task to develop an application with object detection that would provide a recommender system along with the ability to visualize the new product in the most efficient manner.

Project Description: The development process was organized around the creation and training of various modules. The main steps we made to build the application included:

1. Literature review to choose the best methodology and tools.
2. Gathering images of specific classes to form the dataset.
3. Labeling the images to generate annotations and mapping files.
4. Training of object detection model.
5. Building an android based application in android studio whose screenshots have been shown above in chapter 4.
6. Linking the modules and Future Scope.

Development Process: Each of the above-mentioned steps is described further below.

1. Literature review: In the previous semester, we referred to various research papers online and several projects similar to ours. We also referred to understand the working of the technologies or tools that we were going to use in the development phase.
2. Gathering Images: To build our dataset for the object detection model, we decided to download images from the Open Images dataset by Google. We extracted images of specific classes like Bench, Wardrobe, Shelf, etc.... that fall under the category of Furniture items.
3. Labeling Images: We created annotation files for each image using a tool called LabelImg that helps to manually create xml files for annotation files for images that we downloaded.
4. Training the model: We fine-tuned a pre-trained model of object detection based on TensorFlow API. We used the online processing service of Google Colab.
5. Android App: Parallel to all the above-mentioned steps, we also worked on building the android application which will enable our users to install it on their devices and use it.
6. Linking the modules and future scope: We are now working on linking the object detection algorithm and the android based application. We also look forward to the future scope or possibilities the app could achieve. They are also mentioned in the ER Diagram with future Scope in chapter 5.

Result: We successfully created an Android application that runs on the user's device and enables him to capture and store images on the local storage. The same app can be linked with the object detection algorithm to complete an important module of the project.

B. Files Uploaded on PMMS Portal:

B.1. Periodic Progress Reports (PPR):

B.1.1. Periodic Progress Report: First PPR

1. What Progress you have made in the Project?

we searched for existing algorithms to understand the flow of activities to be done.

2. What challenge you have faced?

we had to search hard for any such algorithm to find one that matches our requirement and specifications

3. What support you need?

We request our college to provide us with a computer system with the minimum requirements so that our development stage of application will be hindrance free.

4. Which literature you have referred?

we referred to various GitHub repositories –

- <https://machinelearningmastery.com/how-to-perform-object-detection-with-yolov3-in-keras/>
- <https://towardsdatascience.com/faster-r-cnn-object-detection-implemented-by-keras-for-custom-data-from-googles-open-images-125f62b9141a>

B.1.2. Periodic Progress Report: Second PPR

1. What Progress you have made in the Project?

after going through various articles and repositories for object detection, we have to decide the algorithm we will

be using.

2. What challenge you have faced?

we had to understand the working of different algorithms such as yolo and r-CNN to choose the best one for our project

3. What support you need?

we need college support and lab

4. Which literature you have referred?

we referred to two different papers- one for yolo and one for rcnn.

B.1.3. Periodic Progress Report: Third PPR

1. What Progress you have made in the Project?

We implemented the You Only Look Once algorithm (YOLO) for object detection with TensorFlow API and also build the android application.

2. What challenge you have faced?

we had to go through a lot of reading material to understand the working of the object detection algorithm that we decided to work on.

3. What support you need?

we need the college support for lab and pc.

4. Which literature you have referred?

we referred to various research papers on YOLO and also the TensorFlow website to understand the implementation of the API.

B.1.4. Periodic Progress Report: Forth PPR

1. What Progress you have made in the Project?

We trained our object detection model using TensorFlow API on google colab and were able to reduce the loss from 0.3 to 0.23 in around 50000 steps. we will also link this trained model and the android app so that the image captured through the android app can be sent to this algo for object detection.

2. What challenge you have faced?

we had to read a lot about how to actually implement TensorFlow API and also to understand the working of Google colab.

3. What support you need?

we need the college lab support for pc

4. Which literature you have referred?

we referred to TensorFlow website to understand the working of API.

B.2. Business Model Canvas (BMC):

B.2.1. Canvas Image:

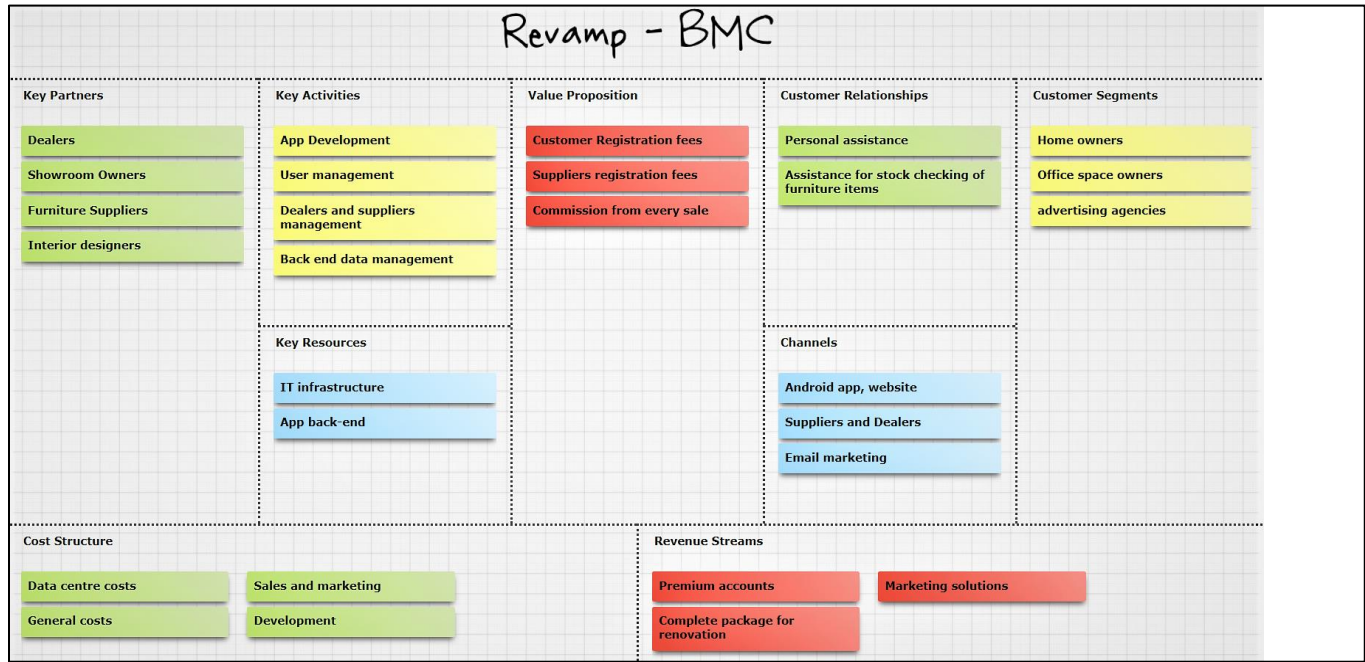


Fig. B.2.1. Business Model Canvas (BMC)

B.2.2. Contents:

- Key Partners: Dealers, Showroom Owners, Furniture Suppliers, Interior designers
- Key Activities: App Development, User management, Dealers and supplier's management, Back end data management
- Value Propositions: Customer Registration fees, Suppliers registration fees, Commission from every sale
- Key Resources: IT infrastructure, App back-end
- Customer Relationships: Personal assistance, Assistance for stock checking of furniture items
- Customer Segment: Home owners, Office space owners, Advertising agencies
- Channels: Android app, website, Suppliers and Dealers, Email marketing
- Cost Structure: Data center costs, Sales and marketing, General costs of Development
- Revenue Streams: Premium accounts, Marketing solutions, Complete package for renovation

B.3. Patent Drafting Exercise (PDE):

College : GOVERNMENT ENGINEERING COLLEGE, SECTOR - 28, GANDHINAGAR
Department : Computer Engineering
Discipline : BE
Semester : Semester 8
Project Name : Revamp
Team ID : 86975

Form 1 – APPLICATION FOR GRANT OF PATENT

Applicants :

Sr. No	Name	Nationality	Address	Mobile No.	Email Id
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3	Shah Dharmik Bharatkumar	Indian	Computer Engineering , GOVERNMENT ENGINEERING COLLEGE, SECTOR - 28, GANDHINAGAR , Gujarat Technological University.	7043577044	dharmik0070@gmail.com
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Inventors :

Sr. No	Name	Nationality	Address	Mobile No.	Email Id
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4	Gajjar Viren	Indian	Computer Engineering , GOVERNMENT ENGINEERING COLLEGE, SECTOR - 28, GANDHINAGAR , Gujarat Technological University.	9426756617	vgajjar1010@gmail.com

I/We, the applicant(s) hereby declare(s) that:

Following are the attachments with the applications :

Form 2 - PROVISIONAL/COMPLETE SPECIFICATION

1 . Title of the project/invention :

Revamp

2. Preamble to the description :

Provisional

3. Description

a) Field of Project / Invention / Application :

This application focuses on the home renovation/ redesigning field.

b) Prior Art / Background of the Project / Invention :

Homeowners and office space owners face an enormous dilemma when they cannot choose the right furniture product that will suit their place well just by looking at it in the showroom before they buy it. Yet, sometimes they have to neglect the differences in colour and texture due to their helplessness. But our app will help them overcome this.

c) Summary of the Project / Invention :

As we know with the help of object detection and augmented reality, we can easily visualize similar furniture items that are already present in our home. In order to reduce the burden on the customers, this app will easily let them visualize the furniture item they like and they think will suit their place before buying it.

The application consists of an object detection system that identifies the presently installed furniture item, inclusive of a recommender engine and an augmented reality visualizer. It has been designed to work in collaboration with nearby dealers and sellers.

d) Objects of Project / Invention :

As we know with the help of object detection and augmented reality, we can easily visualize similar furniture items that are already present in our home. In order to reduce the burden on the customers, this app will easily let them visualize the furniture item they like and they think will suit their place before buying it.

The application consists of an object detection system that identifies the presently installed furniture item, inclusive of a recommender engine and an augmented reality visualizer. It has been designed to work in collaboration with nearby dealers and sellers.

e) Drawings :

h) Claims (Not required for Provisional Application) / Unique Features of Project

The details of the nearby sellers and dealers who sell the furniture item selected by our customer will be provided to the customer so that he/she will not have to visit each and every furniture shop in order to choose the right product for their homes

4. Claims

5. Date and signature

6. Abstract of the project / invention :

The idea of this project primarily focusses on an Android Based Application that uses Single Shot Detection Algorithm from Tensorflow API (for object detection system), Machine Learning (for recommender system), and Augmented Reality (for visualizing the product). It describes the main fields in the application which are applied to ease out the renovating process of users.

Form 3 – STATEMENT AND UNDERTAKING UNDER SECTION 8

Name of the applicant(s) : I/We, Patel Jinal Manharbhai ,Deep Pancholi ,Shah Dharmik Bharatkumar ,Gajjar Viren

Name,Address and Nationality of the joint applicant : Hereby declare :

(i) that I/We have not made any application for the same/substantially the same victim invention outside India.

(ii) that the rights in the application(s) has/have been assigned to

Name of the Country	Date of Application	Application Number	Status of the Application	Date of Publication	Date of Grant
N/A	N/A	N/A	N/A	N/A	N/A

(iii)That I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within three months from the date of filing of such application.

Dated this 12 day of April 2020

To be signed by the applicant or his authorised registered patent agent : Signature.....

Name of the Natural Person who has signed : Patel Jinal Manharbhai ,Deep Pancholi ,Shah Dharmik Bharatkumar ,Gajjar Viren

To,
The Controller of Patents,
The Patent Office,
At Mumbai



A Business Model Canvas Report On

REVAMP

Submitted by **Team ID- 86975**

Deep Pancholi (160130107018)

Dharmik Shah (160130107102)

Jinal Patel (160130107072)

Viren Gajjar (160130107025)

Students of

Bachelor of Engineering (B.E.)

in

Computer Engineering

under

Mr. Dhawal P. Khem, Professor

From

Government Engineering College- Gandhinagar

Gujarat Technological University, Ahmedabad

Acknowledgment

A successful project is a fruitful effort by many people, some directly involved and some indirectly, by providing support and encouragement. We express our sincere gratitude to everyone who had helped us. We would like to thank our friends for their encouragement, inspiration, moral support without which, it would have been almost impossible to complete this project.

We are extremely grateful to our Principal Dr. Sweta Dave which gives us an opportunity to shape our career. Our effort will be incomplete without mentioning our Head of Department Prof. Dhaval Parikh, who provides us the constant support, which was of a great help to complete this project successfully.

We express our heartfelt gratitude to Mr. Dhawal P. Khem, whose support and guidance was invaluable. We are grateful to him for great knowledge, necessary information suggestion and guidance for the success of this Project. They have been constant source of motivation to us. We also thank all our faculties of CE department for their valuable support.

Abstract

The idea of this project primarily focusses on an Android Based Application ^[1] that uses Deep Learning ^[2] (for object detection system), Machine Learning ^[3] (for recommender system), and Augmented Reality ^[4] (for visualizing the product). It describes the main fields in the application which are applied to ease out the renovating process of users. Some characteristics of the above-mentioned technology systems will be discussed, and this paper will provide an overview of them. Future scopes are also discussed.

Our idea is to make an application that enables the user to visualize his personal space without having to take the troubles for visiting shops/sellers and selecting new items for the space.

We want to make home renovation so easy a procedure that no user will think twice before initiating the renovation/redesigning process because of the troubles faced during such undertakings that it becomes frustrating for the space owners to take it to the next level.

The work of application is divided into four key steps. The first is the detection of existing product which the user wants to remove/ replace with a new product. The second is a recommender system (for the users who wish to install a new one), which recommends a new product with the visual features from a large data set. The third step comprises of visualizing the newly selected product from the options in place of the old one. And finally, the user can see all the available purchase options according to his preset filters. In the domain of renovation, the system will yield more efficiency comparable to the best previous systems.

Used in real-time applications, the app can minimize significant time of users, and help in achieving the best designs without having to step out.

Self-Declaration

We, Deep Pancholi (160130107018), Dharmik Shah (160130107102), Jinal Patel (160130107072), Viren Gajjar (160130107025), the students from Computer Engineering, enrolled at **Government Engineering College, Gandhinagar**, as a project group, hereby declare the following:

1. We have defined our project based on inputs as undergraduate student and each of us will make significant efforts to make attempt to solve the challenges. We will attempt the project work at our college or at any location under the direct and consistent monitoring of **Prof. Dhawal P. Khem**. We will adopt all ethical practices to share credit amongst all the contributors based on their contributions during the project work.
2. We have not purchased the solutions developed by any 3rd party directly and the efforts are made by us under the guidance of guides.
3. The project work is not copied from any previously done projects directly. (Same project can be done in different ways but if it has been done in same manner before then it may not be accepted)
4. We to the best of our knowledge is a genuine industry engaged in the professional service/social organizations.
5. We understand and accept that above declaration if found to be untrue, it can result in punishment/cancellation of project definition to we including failure in the subject of project work.

Deep Pancholi

Dharmik Shah

Jinal Patel

Viren Gajjar

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Chapter 1 – Introduction

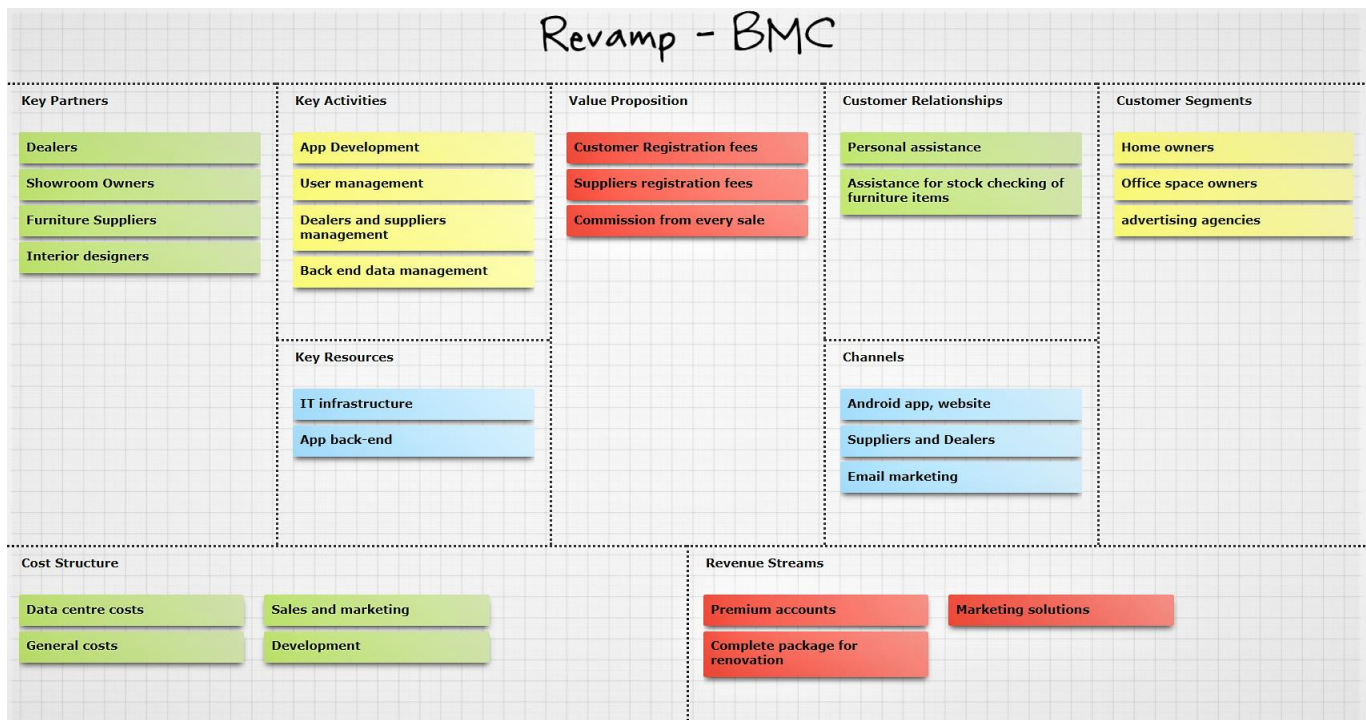


Figure I Revamp - Business Model Canvas

Business Model Canvas is used to validate the market significance of products and services which will be of technology nature in this case. Technology projects are often solutions or processes that solve a technical problem. However, the market implementation of such solutions also require that the problem solution is designed to overcome not just the technical barriers but also market and business-related barriers of costs, customer reach and collaborations and those that pertain to the practical nature of limited initial capacities within the team.

Chapter 2 – Contents of BMC

2.1 Key Partners

- Dealers
- Showroom Owners
- Furniture Suppliers
- Interior designers



Figure II Key Partners

2.2 Key Activity

- App Development
- User management
- Dealers and suppliers management
- Back end data management

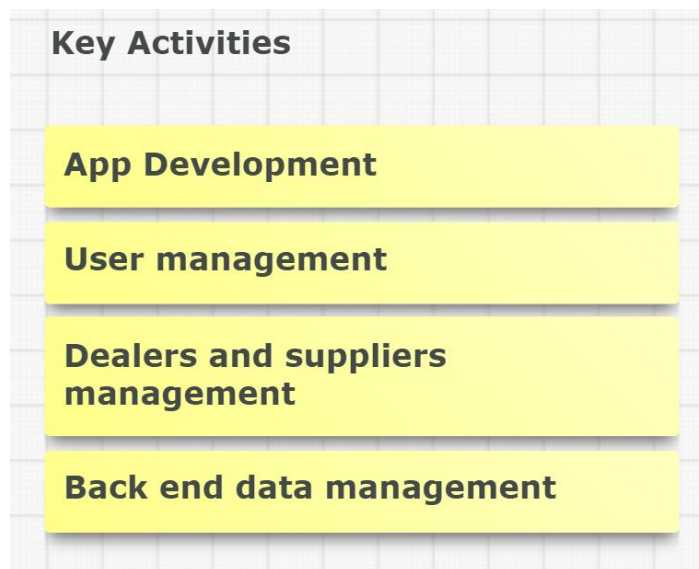


Figure III Key Activities

2.3 Value Proposition

- Customer Registration fees
- Suppliers registration fees
- Commission from every sale



Figure IV Value Proposition

2.4 Key Resources

- IT infrastructure
- App back-end

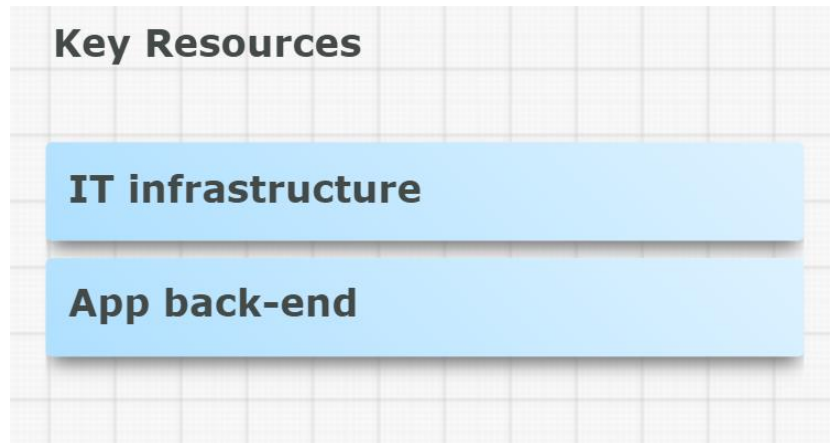


Figure V Key Resources

2.5 Customer Relationships

- Personal assistance
- Assistance for stock checking of furniture items

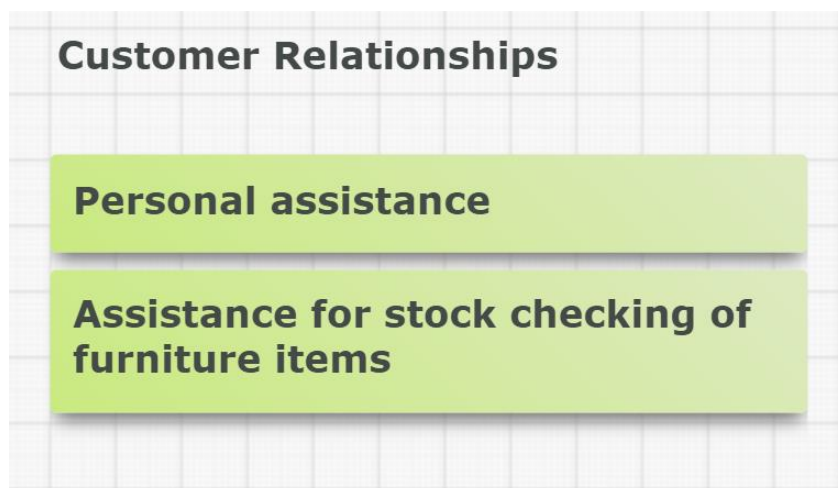


Figure VI Customer Relationships

2.6 Customer Segment

- Home owners
- Office space owners
- Advertising agencies

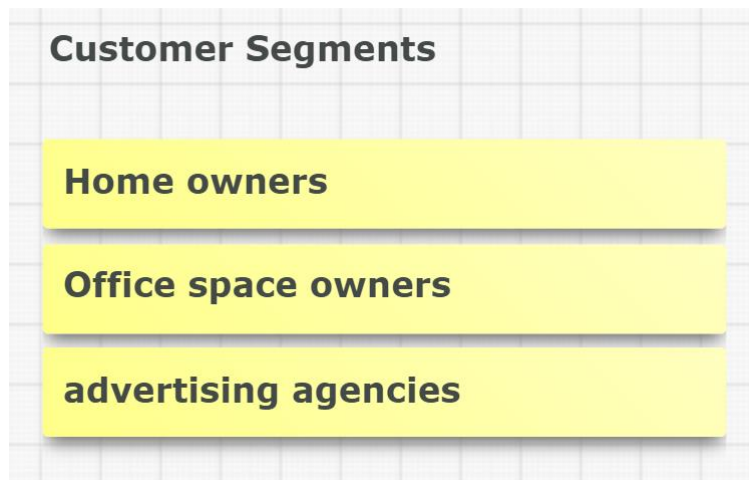


Figure VII Customer Segments

2.7 Channels

- Android app, website
- Suppliers and Dealers
- Email marketing

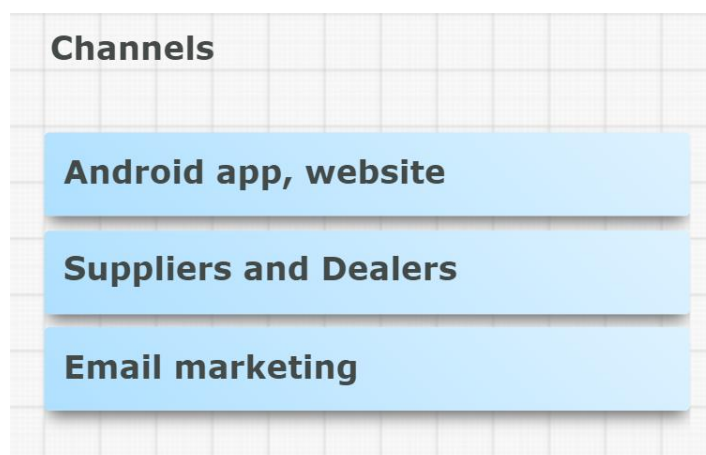


Figure VIII Channels

2.8 Cost Structure

- Data centre costs
- Sales and marketing
- General costs
- Development



Figure IX Cost Structure

2.9 Revenue Streams

- Premium accounts
- Marketing solutions
- Complete package for renovation



Figure X Revenue Streams

Chapter 3 - Conclusion:

Business Model Canvas will be helpful to people to embark entrepreneurship. One can make a good product from their project. Increase manufacturing unit in India and enhance the economy of India.