Project Report Format

1. INTRODUCTION

1.1 Project Overview

There are handicapped people in our society. Although technology is constantly evolving, little is being done to improve the lives of these people. It has always been difficult to communicate with someone who is deaf-mute. It is quite challenging for silent persons to communicate with non-mute people. because hand sign language is not taught to the general public. It might be quite challenging for them to communicate at times of crisis. In circumstances where other modes of communication, like speech, are not possible, the human hand has remained a common alternative for information transmission. To have a proper communication between a normal person and a handicapped person in any language, a voice conversion system with hand gesture recognition and translation will be very helpful.

1.2 Purpose

Our objective is to blend deaf and dumb within society and make them able to use their personal computers more effectively and efficiently.Developing an app will support this vulnerable society of impaired people and enhance communication among people. The application will allow ease in communication, improving their interaction, and hence better life. This project will be a noble cause and translating the sign language into understandable words is the goal.

2. LITERATURE SURVEY

2.1 Existing problem

A voice conversion system with hand gesture recognition and translation will be very useful for interlanguage communication between a normal person and a disabled person in any language.

2.2 References

[1] Bigham, J. P., Jayant, C., Miller, A., White, B., & Yeh, T. (2010, June). VizWiz:: LocateIt-enabling blind people to locate objects in their environment. In 2010 IEEE Computer Society Conference on Computer Vision and Pattern Recognition-Workshops (pp. 65-72). IEEE. Vision and Pattern Recognition-Workshops (pp. 65-72). IEEE.

[2] Manduchi, R., Kurniawan, S., & Bagherinia, H. (2010, October). Blind guidance using mobile computer vision: A usability study. In Proceedings of the 12th international ACM SIGACCESS conference on Computers and accessibility (pp. 241-242).

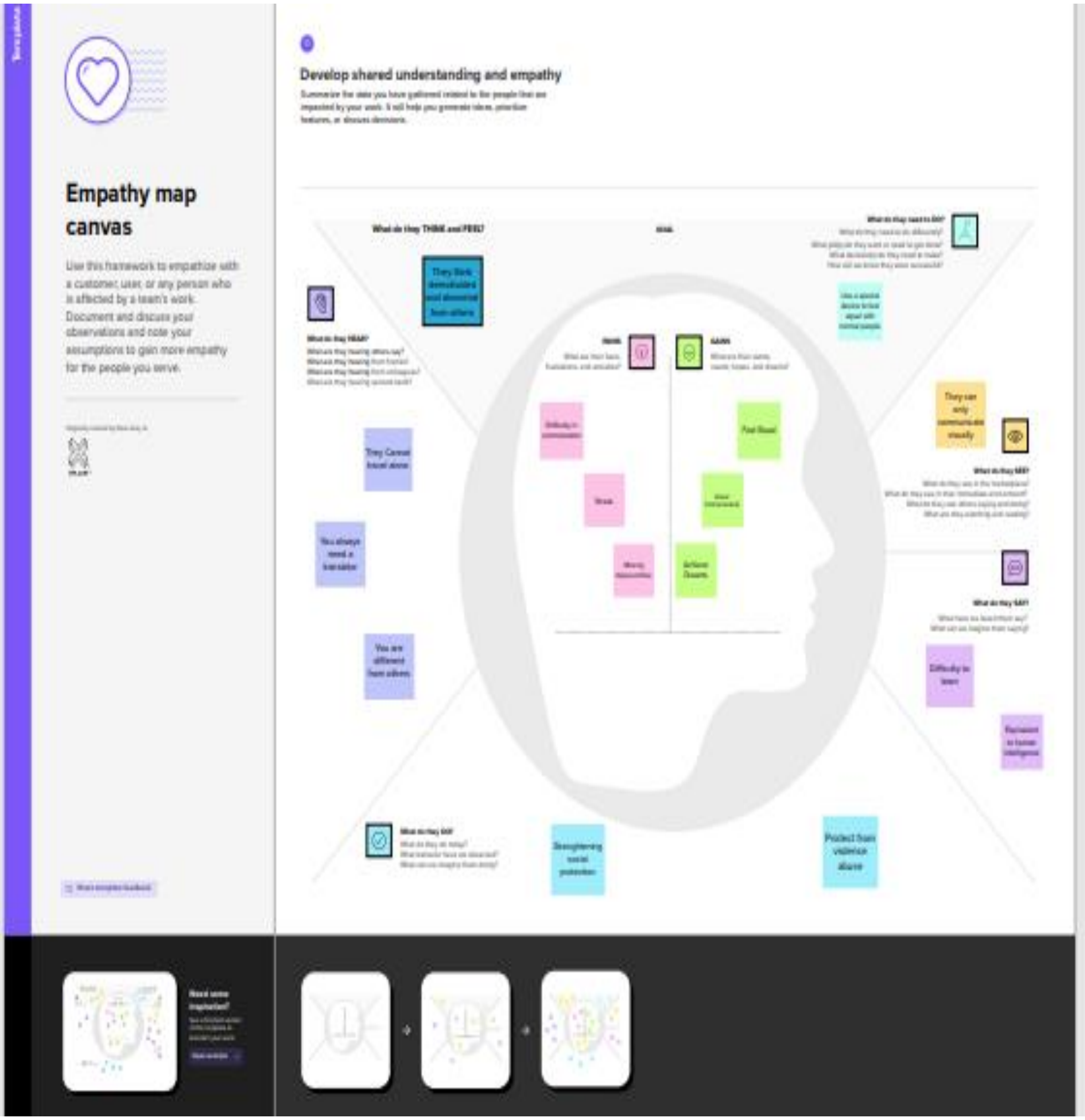
[3] Ivanchenko, V., Coughlan, J., Gerrey, W., & Shen, H. (2008, October). Computer vision-based clear path guidance for blind wheelchair users. In Proceedings of the 10th international ACM SIGACCESS conference on Computers and accessibility (pp. 291-292).

2.3 Problem Statement Definition

Differently abled like dump and mute people can communicate only through sign language,normal people who do not know the sign language feels difficult to communicate with themThere are two methods available in the literature for removing the background to extract the foreground object. We have planned to employ these methods in the design of the proposed Sign Language Converter for identifying the hand region in the input image captured by the camera.

3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



Empathy map canvas

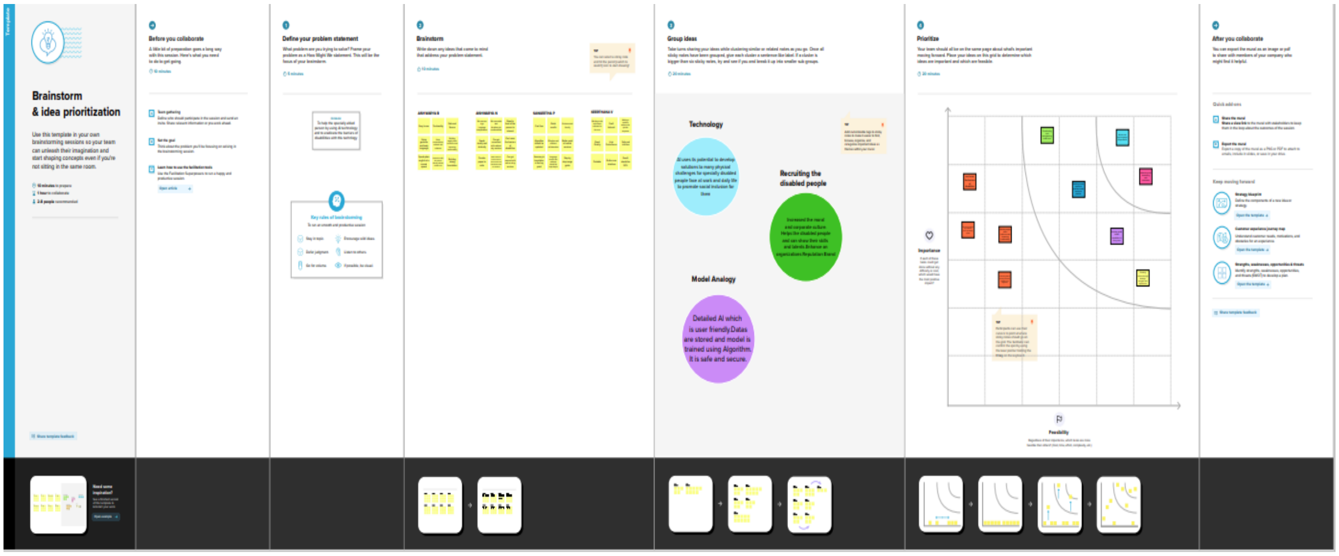
Use this framework to empathize with a customer, user, or any person who is affected by a team's work. Document and discuss your observations and note your assumptions to gain more empathy for the people you serve.

Develop shared understanding and empathy

Summarize the data you have gathered related to the people that are impacted by your work. It will help you generate ideas, prioritize features, or discuss decisions.

What do they THINK and FEEL?
GOAL
What do they need to DO?
They think demotivated and abnormal from others
What do they HEAR?
What are they hearing others say?
What are they hearing from friends?
What are they hearing from colleagues?
What are they hearing second-hand?
PAINS
GAINS
Use a special device to live equal with normal people
Difficulty in communication
Feel Bored
They can only communicate visually
They Cannot travel alone
Stress
Achieve Dreams
What do they SEE?
You always need a translator
Worry about
What do they SAY?
You are different from others
Difficulty to learn
Equivalent to human intelligence
What do they DO?
Strengthening social protection
Protect from violence abuse
Need some inspiration?

l.3.2 Ideation & Brainstorming



AI uses its potential to develop solutions to many physical challenges for specially disabled people face at work and daily life to promote social inclusion for them

Increased the moral and corporate culture. Helps the disabled people and can show their skills and talents.Enhance an organizations Reputation Brand

Detailed AI which is user friendly.Datas are stored and model is trained using Algorithm. It is safe and secure.

3.3 Proposed Solution

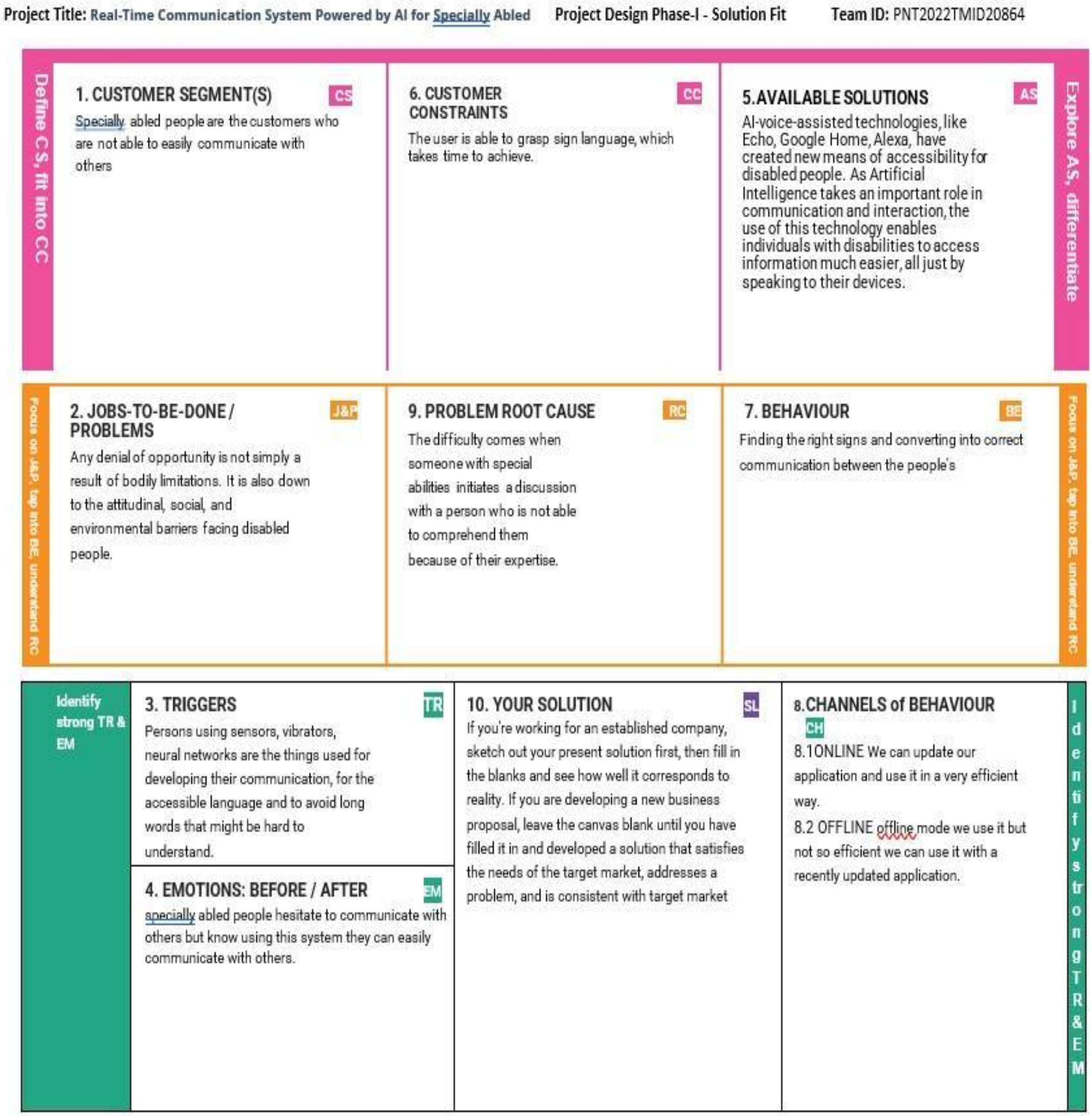
There are two methods available in the literature for removing the background to extract the foreground object. We have planned to employ these methods in the design of the proposed Sign Language Converter for identifying the hand region in the input image captured by the camera

We use a convolution neural network to build a model trained on different hand gestures. An application has been developed that uses this model. The app enables deaf and hard of hearing people to communicate their information using signs that are converted into human understandable language and given as speech output.

The main purpose of this application is to make deaf-mute people feel independent and more confident

The implemented end product will be marketed as a Retailer model, in which the product will be assigned an initial base price and will be updated once we bring new features to it

3.4 Problem Solution fit



Project Title: Real-Time Communication System Powered by AI for Specially Abled **Project Design Phase-I - Solution Fit** **Team ID:** PNT2022TMID20864

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

Specially abled people are the customers who are not able to easily communicate with others

6. CUSTOMER CONSTRAINTS CC

The user is able to grasp sign language, which takes time to achieve.

5.AVAILABLE SOLUTIONS AS

AI-voice-assisted technologies, like Echo, Google Home, Alexa, have created new means of accessibility for disabled people. As Artificial Intelligence takes an important role in communication and interaction, the use of this technology enables individuals with disabilities to access information much easier, all just by speaking to their devices.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS J&P

Any denial of opportunity is not simply a result of bodily limitations. It is also down to the attitudinal, social, and environmental barriers facing disabled people.

9. PROBLEM ROOT CAUSE RC

The difficulty comes when someone with special abilities initiates a discussion with a person who is not able to comprehend them because of their expertise.

7. BEHAVIOUR BE

Finding the right signs and converting into correct communication between the people's

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS TR

Persons using sensors, vibrators, neural networks are the things used for developing their communication, for the accessible language and to avoid long words that might be hard to understand.

4. EMOTIONS: BEFORE / AFTER EM

specially abled people hesitate to communicate with others but know using this system they can easily communicate with others.

10. YOUR SOLUTION SL

If you're working for an established company, sketch out your present solution first, then fill in the blanks and see how well it corresponds to reality. If you are developing a new business proposal, leave the canvas blank until you have filled it in and developed a solution that satisfies the needs of the target market, addresses a problem, and is consistent with target market

8.CHANNELS of BEHAVIOUR CH

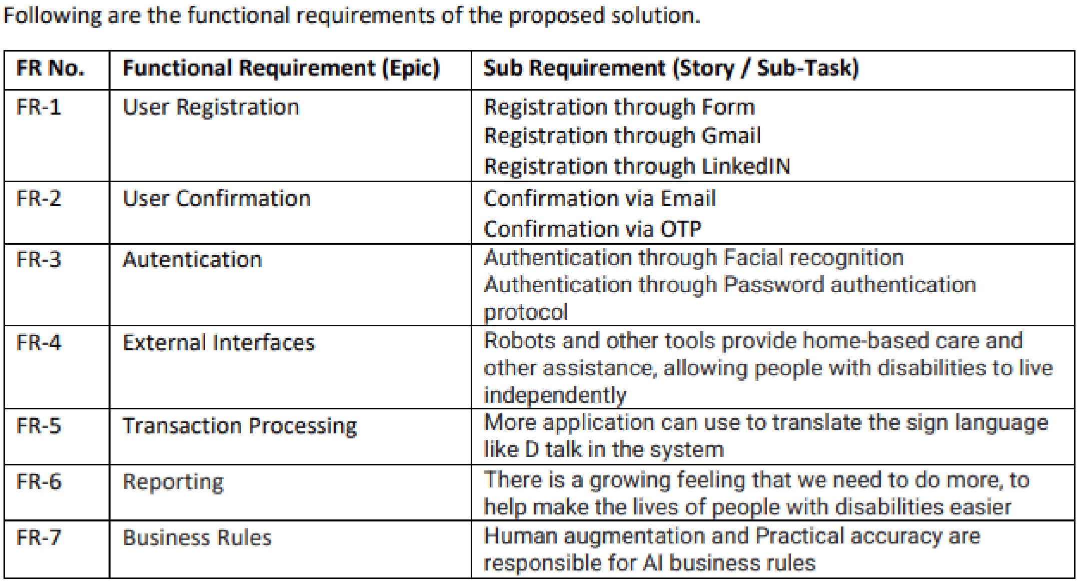
8.1ONLINE We can update our application and use it in a very efficient way.

8.2 OFFLINE offline mode we use it but not so efficient we can use it with a recently updated application.

Identify strong TR & EM

4.REQUIREMENT ANALYSIS

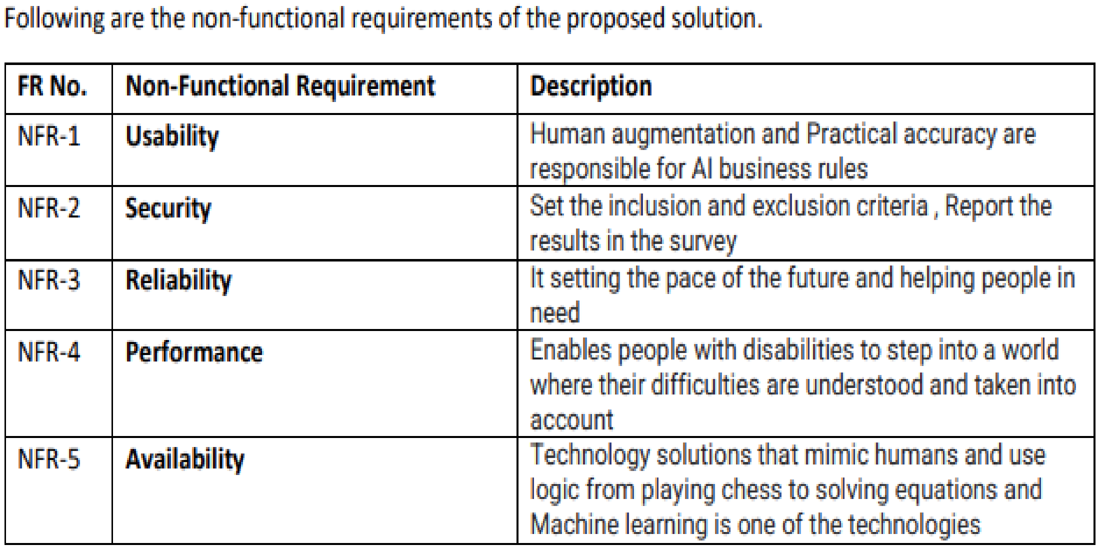
4.1 Functional requirement



Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Autentication	Authentication through Facial recognition Authentication through Password authentication protocol
FR-4	External Interfaces	Robots and other tools provide home-based care and other assistance, allowing people with disabilities to live independently
FR-5	Transaction Processing	More application can use to translate the sign language like D talk in the system
FR-6	Reporting	There is a growing feeling that we need to do more, to help make the lives of people with disabilities easier
FR-7	Business Rules	Human augmentation and Practical accuracy are responsible for AI business rules

4.2 Non-Functional requirements



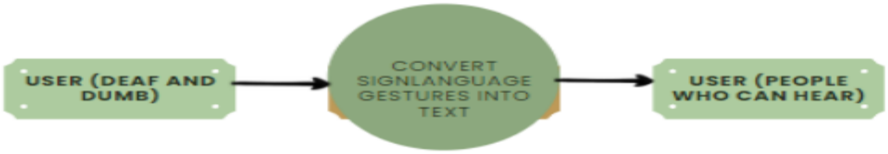
Following are the non-functional requirements of the proposed solution.

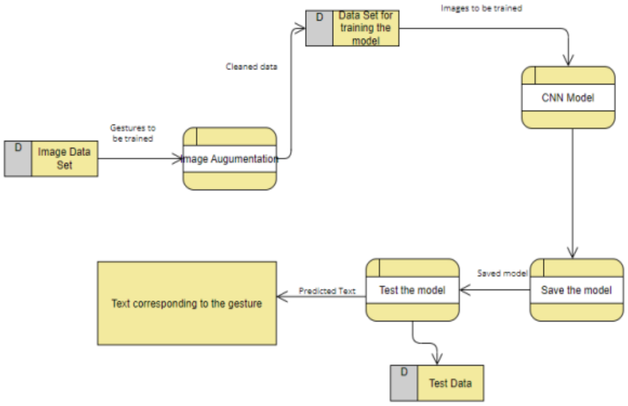
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Human augmentation and Practical accuracy are responsible for AI business rules
NFR-2	**Security**	Set the inclusion and exclusion criteria , Report the results in the survey
NFR-3	**Reliability**	It setting the pace of the future and helping people in need
NFR-4	**Performance**	Enables people with disabilities to step into a world where their difficulties are understood and taken into account
NFR-5	**Availability**	Technology solutions that mimic humans and use logic from playing chess to solving equations and Machine learning is one of the technologies

5.PROJECT DESIGN

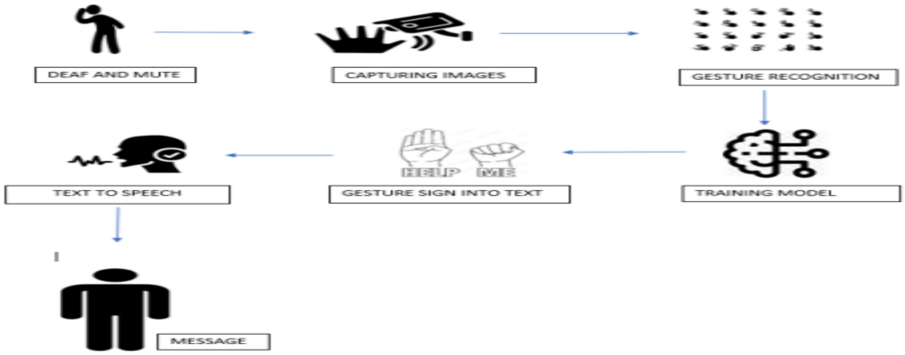
5.1 Data Flow Diagrams

DFD - 0 level diagram


USER (DEAF AND DUMB)
CONVERT SIGNLANGUAGE GESTURES INTO TEXT
USER (PEOPLE WHO CAN HEAR)

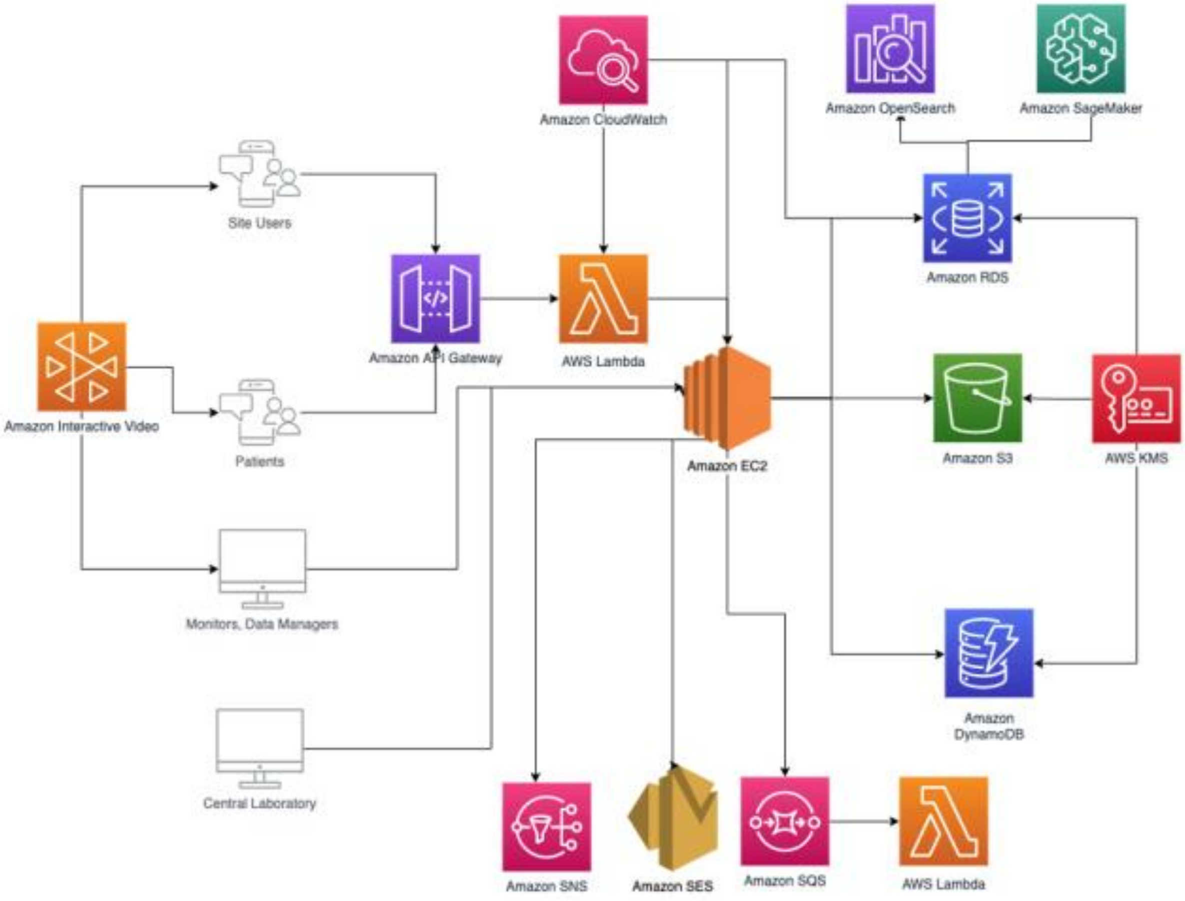


Simplified flow diagram

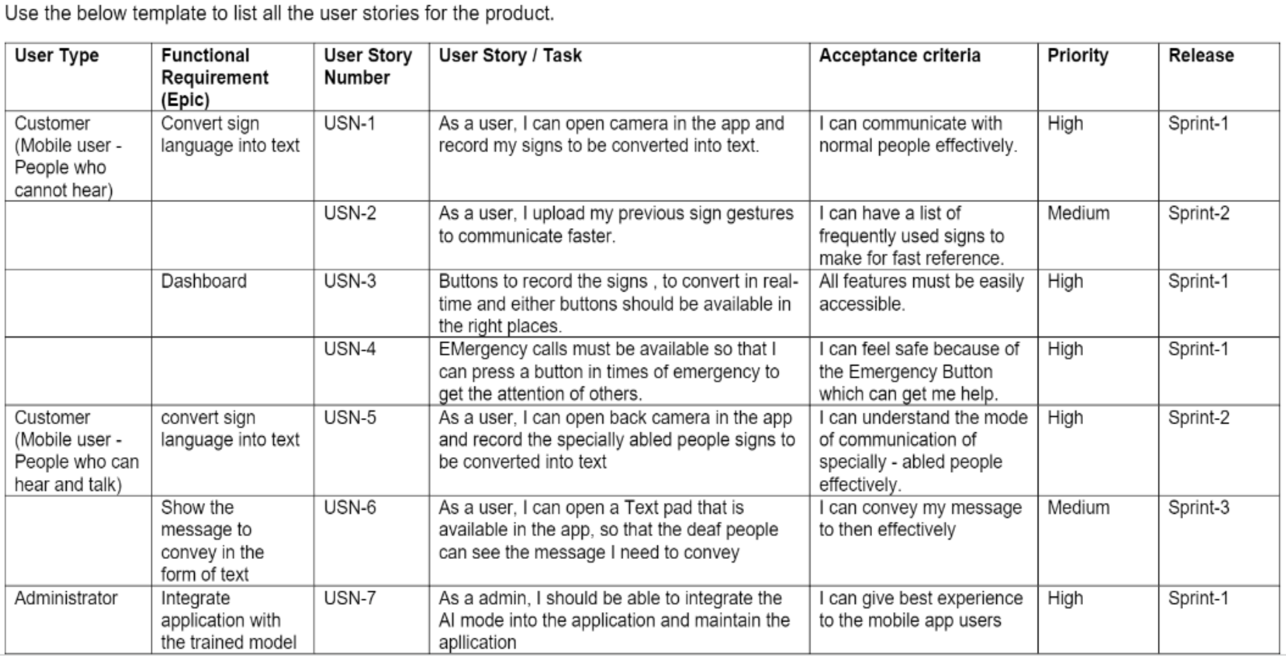


5.2 Solution & Technical Architecture

Solution Architecture Diagram:



5.3UserStories

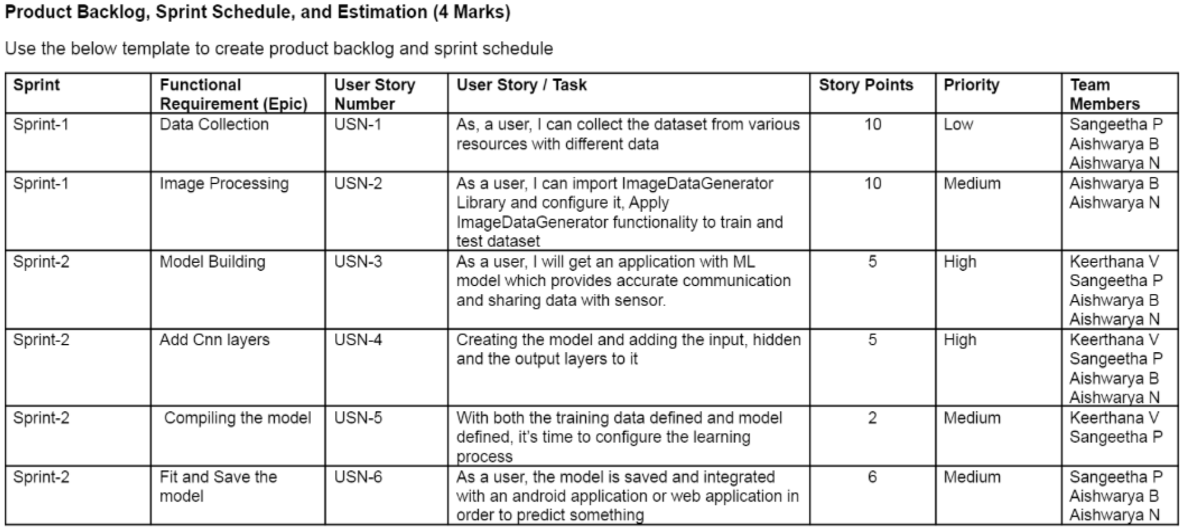


Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user - People who cannot hear)	Convert sign language into text	USN-1	As a user, I can open camera in the app and record my signs to be converted into text.	I can communicate with normal people effectively.	High	Sprint-1
		USN-2	As a user, I upload my previous sign gestures to communicate faster.	I can have a list of frequently used signs to make for fast reference.	Medium	Sprint-2
	Dashboard	USN-3	Buttons to record the signs , to convert in real-time and either buttons should be available in the right places.	All features must be easily accessible.	High	Sprint-1
		USN-4	EMergency calls must be available so that I can press a button in times of emergency to get the attention of others.	I can feel safe because of the Emergency Button which can get me help.	High	Sprint-1
Customer (Mobile user - People who can hear and talk)	convert sign language into text	USN-5	As a user, I can open back camera in the app and record the specially abled people signs to be converted into text	I can understand the mode of communication of specially - abled people effectively.	High	Sprint-2
	Show the message to convey in the form of text	USN-6	As a user, I can open a Text pad that is available in the app, so that the deaf people can see the message I need to convey	I can convey my message to then effectively	Medium	Sprint-3
Administrator	Integrate application with the trained model	USN-7	As a admin, I should be able to integrate the AI mode into the application and maintain the apllication	I can give best experience to the mobile app users	High	Sprint-1

6.PROJECT PLANNING & SCHEDULING

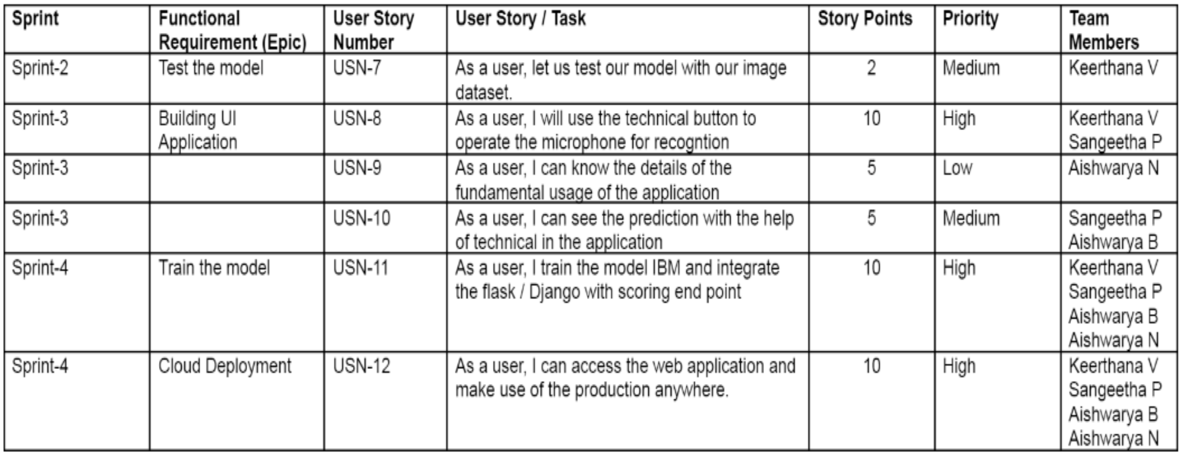
6.1 Sprint Planning & Estimation



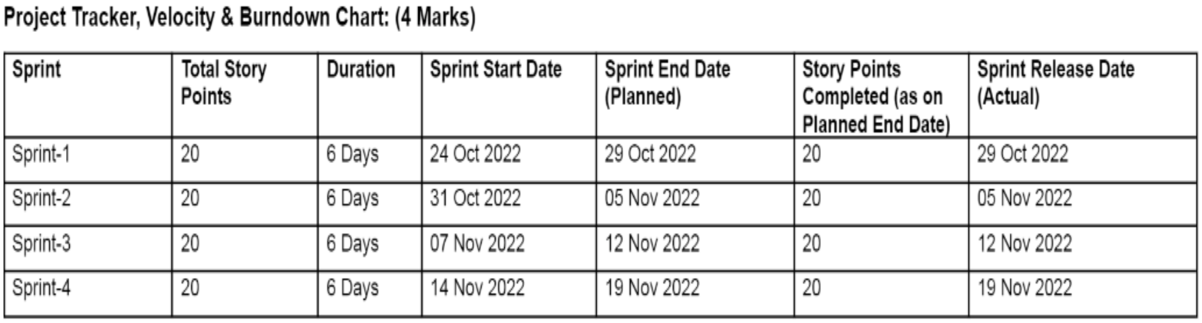
Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	As, a user, I can collect the dataset from various resources with different data	10	Low	Sangeetha P Aishwarya B Aishwarya N
Sprint-1	Image Processing	USN-2	As a user, I can import ImageDataGenerator Library and configure it, Apply ImageDataGenerator functionality to train and test dataset	10	Medium	Aishwarya B Aishwarya N
Sprint-2	Model Building	USN-3	As a user, I will get an application with ML model which provides accurate communication and sharing data with sensor.	5	High	Keerthana V Sangeetha P Aishwarya B Aishwarya N
Sprint-2	Add Cnn layers	USN-4	Creating the model and adding the input, hidden and the output layers to it	5	High	Keerthana V Sangeetha P Aishwarya B Aishwarya N
Sprint-2	Compiling the model	USN-5	With both the training data defined and model defined, it's time to configure the learning process	2	Medium	Keerthana V Sangeetha P
Sprint-2	Fit and Save the model	USN-6	As a user, the model is saved and integrated with an android application or web application in order to predict something	6	Medium	Sangeetha P Aishwarya B Aishwarya N



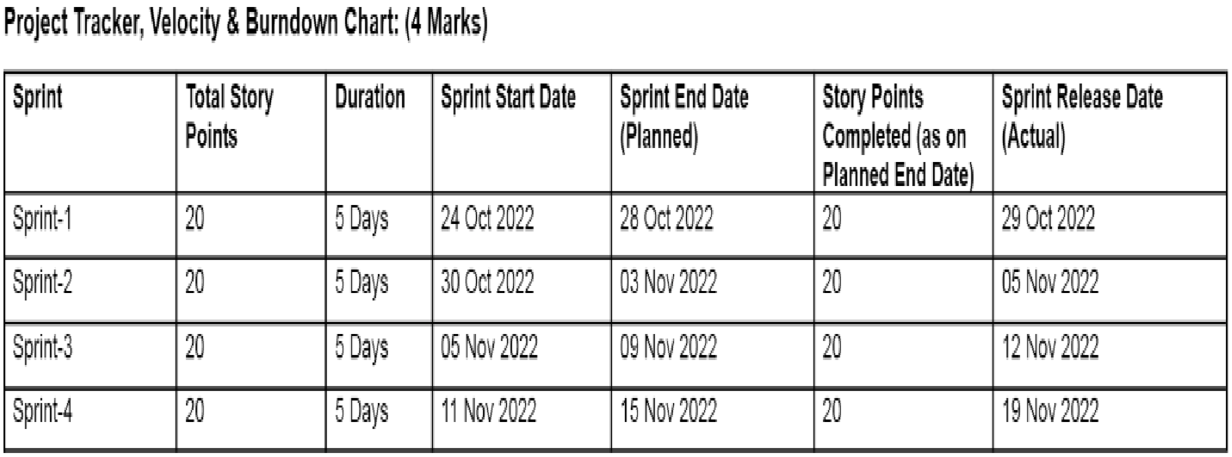
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2	Test the model	USN-7	As a user, let us test our model with our image dataset.	2	Medium	Keerthana V
Sprint-3	Building UI Application	USN-8	As a user, I will use the technical button to operate the microphone for recogntion	10	High	Keerthana V Sangeetha P
Sprint-3		USN-9	As a user, I can know the details of the fundamental usage of the application	5	Low	Aishwarya N
Sprint-3		USN-10	As a user, I can see the prediction with the help of technical in the application	5	Medium	Sangeetha P Aishwarya B
Sprint-4	Train the model	USN-11	As a user, I train the model IBM and integrate the flask / Django with scoring end point	10	High	Keerthana V Sangeetha P Aishwarya B Aishwarya N
Sprint-4	Cloud Deployment	USN-12	As a user, I can access the web application and make use of the production anywhere.	10	High	Keerthana V Sangeetha P Aishwarya B Aishwarya N



Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

6.2 Sprint Delivery Schedule



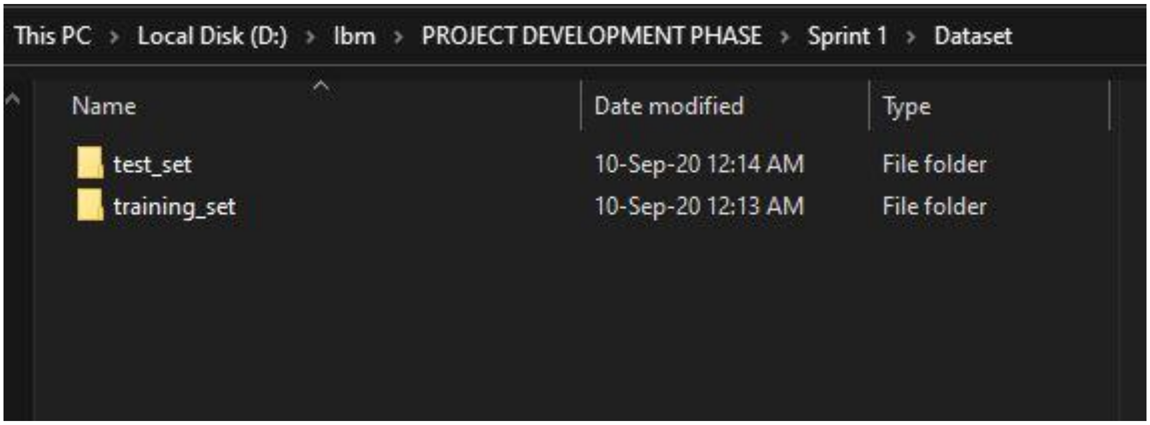
Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	5 Days	24 Oct 2022	28 Oct 2022	20	29 Oct 2022
Sprint-2	20	5 Days	30 Oct 2022	03 Nov 2022	20	05 Nov 2022
Sprint-3	20	5 Days	05 Nov 2022	09 Nov 2022	20	12 Nov 2022
Sprint-4	20	5 Days	11 Nov 2022	15 Nov 2022	20	19 Nov 2022

6.3 Reports from JIRA

7. CODING & SOLUTIONING

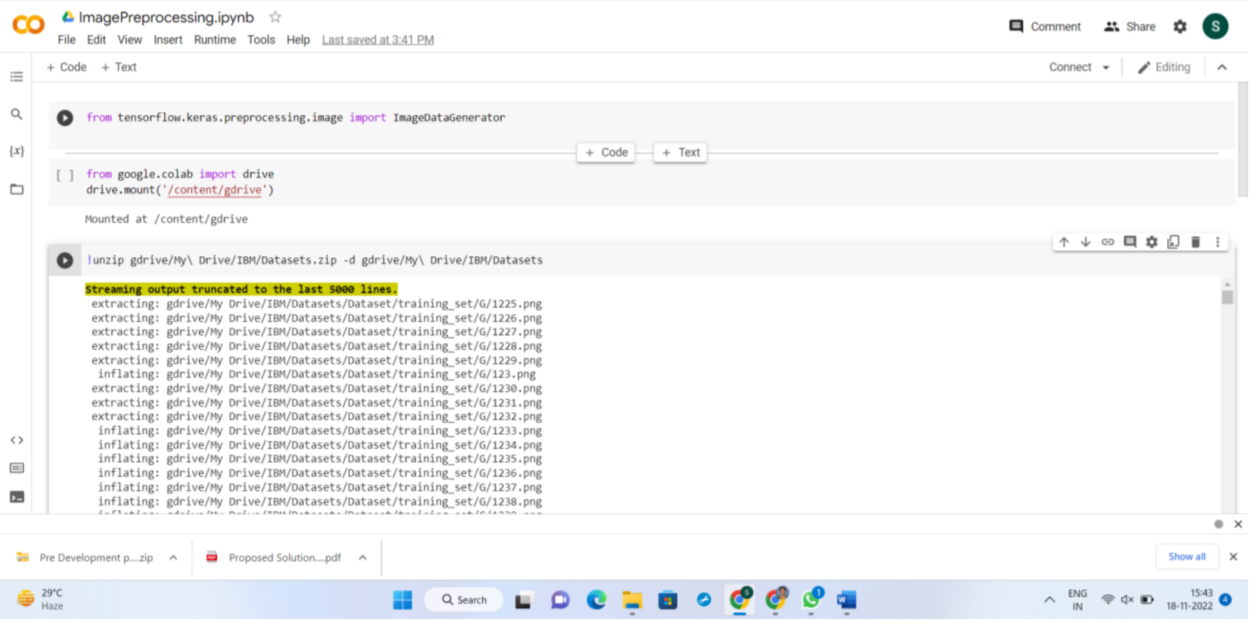
Data Collection



This PC > Local Disk (D:) > Ibm > PROJECT DEVELOPMENT PHASE > Sprint 1 > Dataset

Name	Date modified	Type
test_set	10-Sep-20 12:14 AM	File folder
training_set	10-Sep-20 12:13 AM	File folder

Image Preprocessing



```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
from google.colab import drive
drive.mount('/content/gdrive')
```

```
Mounted at /content/gdrive
```

```
!unzip gdrive/My\ Drive/IBM/Datasets.zip -d gdrive/My\ Drive/IBM/Datasets
```

```
Streaming output truncated to the last 5000 lines.
 extracting: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1225.png
 extracting: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1226.png
 extracting: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1227.png
 extracting: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1228.png
 extracting: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1229.png
  inflating: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/123.png
 extracting: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1230.png
 extracting: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1231.png
 extracting: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1232.png
  inflating: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1233.png
  inflating: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1234.png
  inflating: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1235.png
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  inflating: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1237.png
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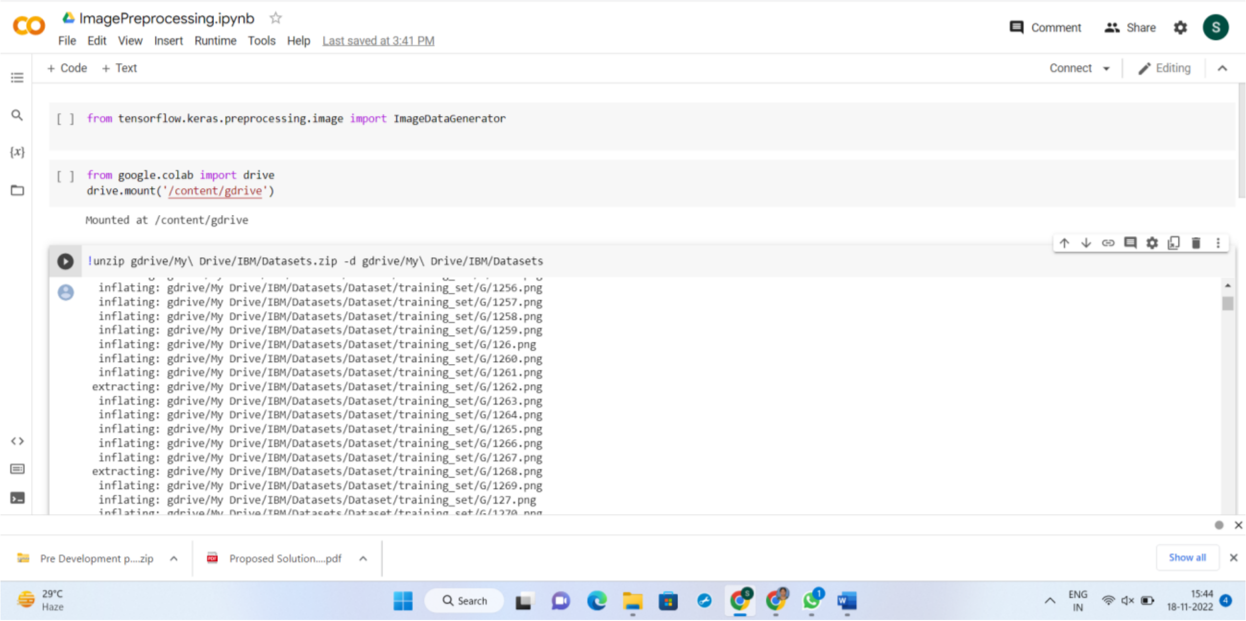

```
[ ] from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
[ ] from google.colab import drive
    drive.mount('/content/gdrive')

    Mounted at /content/gdrive
```

```
!unzip gdrive/My\ Drive/IBM/Datasets.zip -d gdrive/My\ Drive/IBM/Datasets
  inflating: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1256.png
  inflating: gdrive/My Drive/IBM/Datasets/Dataset/training_set/G/1257.png
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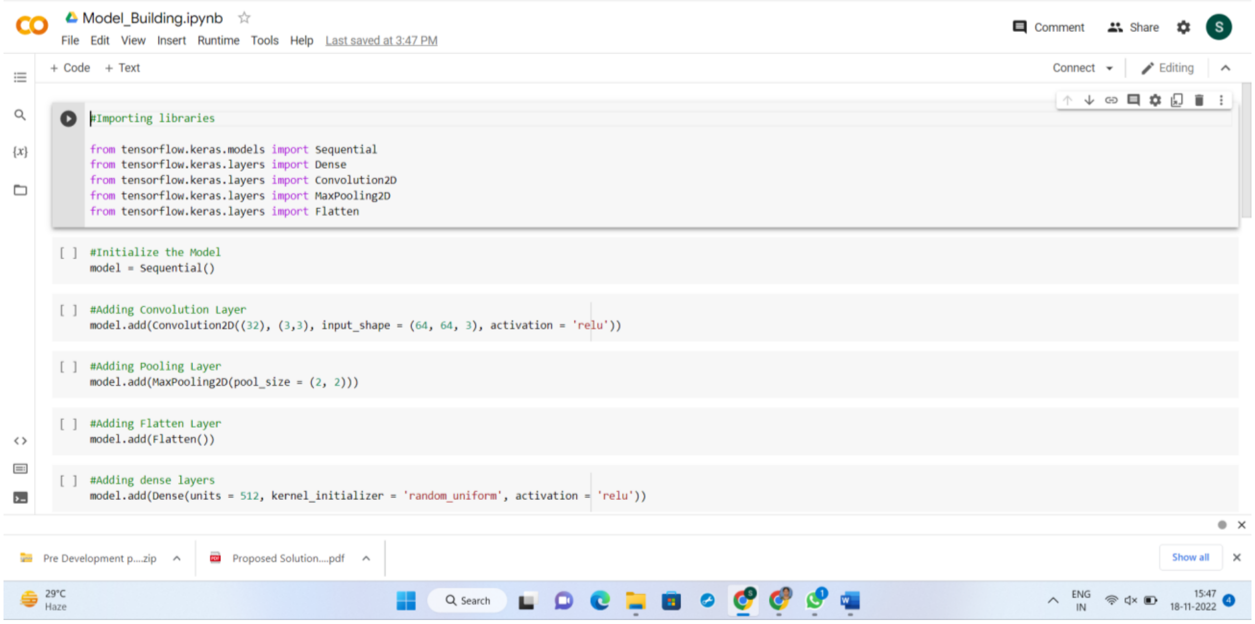
Model Building



```
#Importing libraries

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import Convolution2D
from tensorflow.keras.layers import MaxPooling2D
from tensorflow.keras.layers import Flatten
```

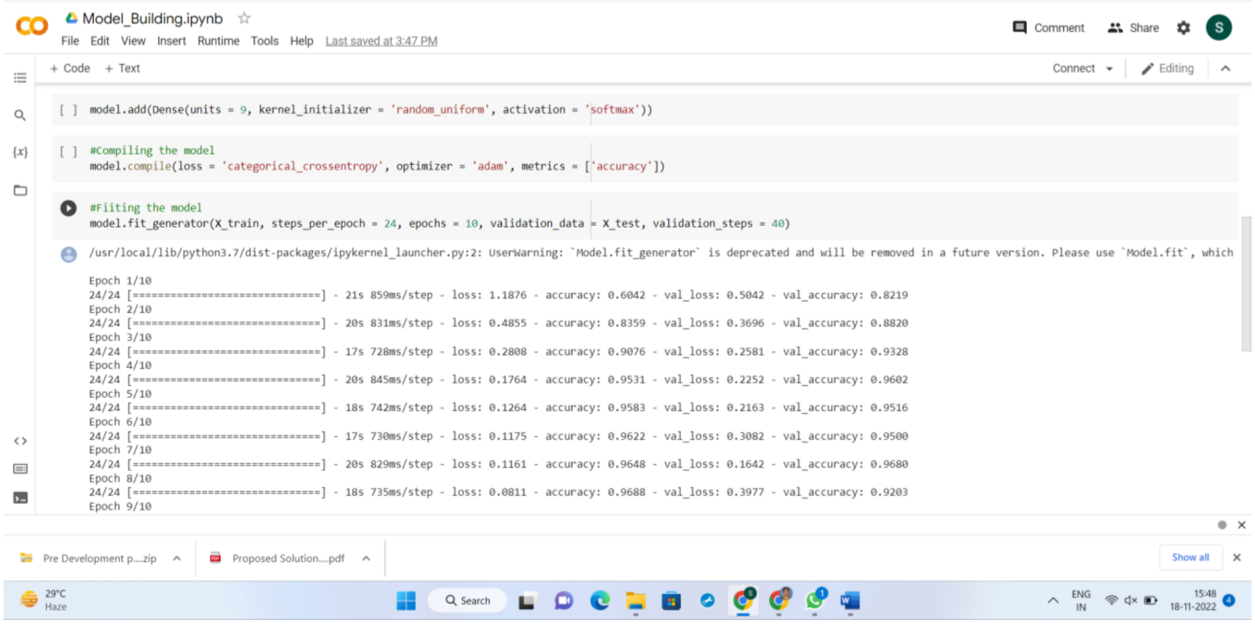
```
[ ] #Initialize the Model
    model = Sequential()
```

```
[ ] #Adding Convolution Layer
    model.add(Convolution2D((32), (3,3), input_shape = (64, 64, 3), activation = 'relu'))
```

```
[ ] #Adding Pooling Layer
    model.add(MaxPooling2D(pool_size = (2, 2)))
```

```
[ ] #Adding Flatten Layer
    model.add(Flatten())
```

```
[ ] #Adding dense layers
    model.add(Dense(units = 512, kernel_initializer = 'random_uniform', activation = 'relu'))
```



```
model.add(Dense(units = 9, kernel_initializer = 'random_uniform', activation = 'softmax'))
```

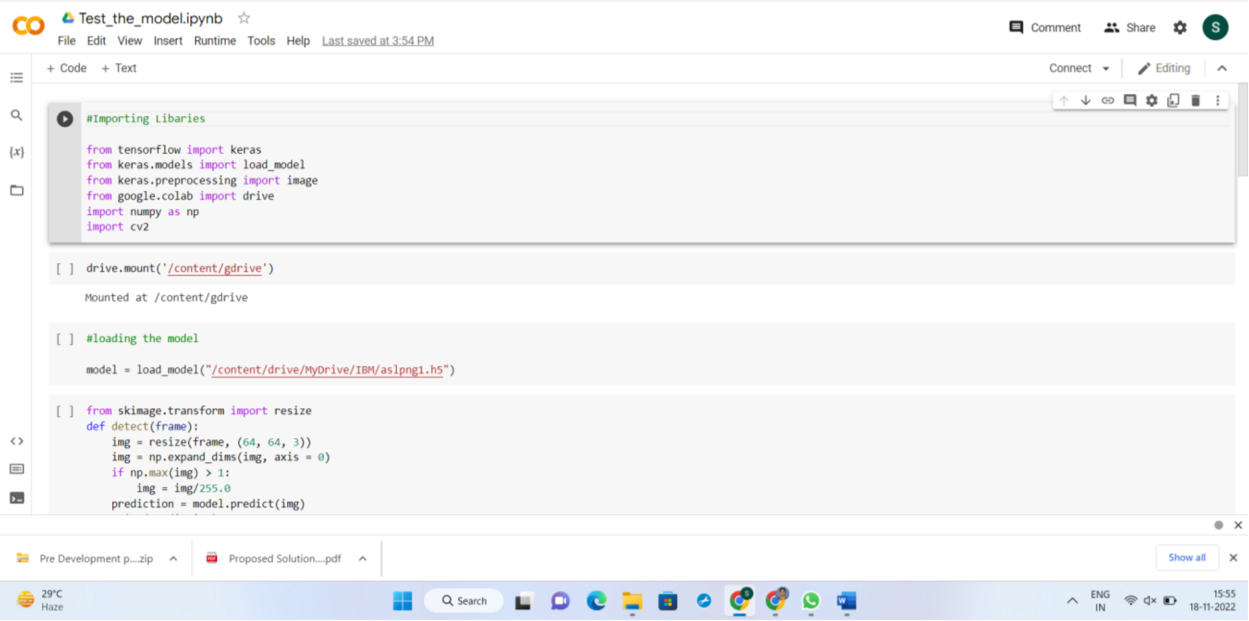
```
#Compiling the model
model.compile(loss = 'categorical_crossentropy', optimizer = 'adam', metrics = ['accuracy'])
```

```
#Fiiting the model
model.fit_generator(X_train, steps_per_epoch = 24, epochs = 10, validation_data = X_test, validation_steps = 40)
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:2: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Please use `Model.fit`, which

Epoch 1/10
24/24 [==============================] - 21s 859ms/step - loss: 1.1876 - accuracy: 0.6042 - val_loss: 0.5042 - val_accuracy: 0.8219
Epoch 2/10
24/24 [==============================] - 20s 831ms/step - loss: 0.4855 - accuracy: 0.8359 - val_loss: 0.3696 - val_accuracy: 0.8820
Epoch 3/10
24/24 [==============================] - 17s 728ms/step - loss: 0.2808 - accuracy: 0.9076 - val_loss: 0.2581 - val_accuracy: 0.9328
Epoch 4/10
24/24 [==============================] - 20s 845ms/step - loss: 0.1764 - accuracy: 0.9531 - val_loss: 0.2252 - val_accuracy: 0.9602
Epoch 5/10
24/24 [==============================] - 18s 742ms/step - loss: 0.1264 - accuracy: 0.9583 - val_loss: 0.2163 - val_accuracy: 0.9516
Epoch 6/10
24/24 [==============================] - 17s 730ms/step - loss: 0.1175 - accuracy: 0.9622 - val_loss: 0.3082 - val_accuracy: 0.9500
Epoch 7/10
24/24 [==============================] - 20s 829ms/step - loss: 0.1161 - accuracy: 0.9648 - val_loss: 0.1642 - val_accuracy: 0.9680
Epoch 8/10
24/24 [==============================] - 18s 735ms/step - loss: 0.0811 - accuracy: 0.9688 - val_loss: 0.3977 - val_accuracy: 0.9203
Epoch 9/10
```

8.TESTING



```
#Importing Libaries

from tensorflow import keras
from keras.models import load_model
from keras.preprocessing import image
from google.colab import drive
import numpy as np
import cv2
```

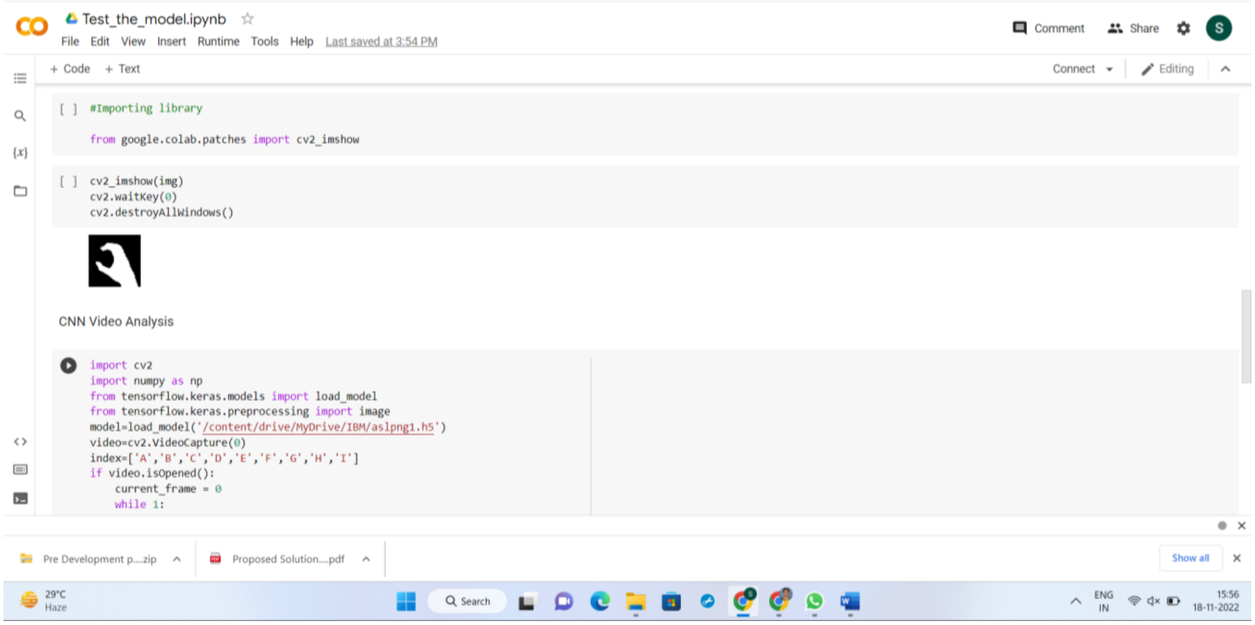
```
drive.mount('/content/gdrive')
```

```
Mounted at /content/gdrive
```

```
#loading the model

model = load_model("/content/drive/MyDrive/IBM/aslpng1.h5")
```

```
from skimage.transform import resize
def detect(frame):
    img = resize(frame, (64, 64, 3))
    img = np.expand_dims(img, axis = 0)
    if np.max(img) > 1:
        img = img/255.0
    prediction = model.predict(img)
```



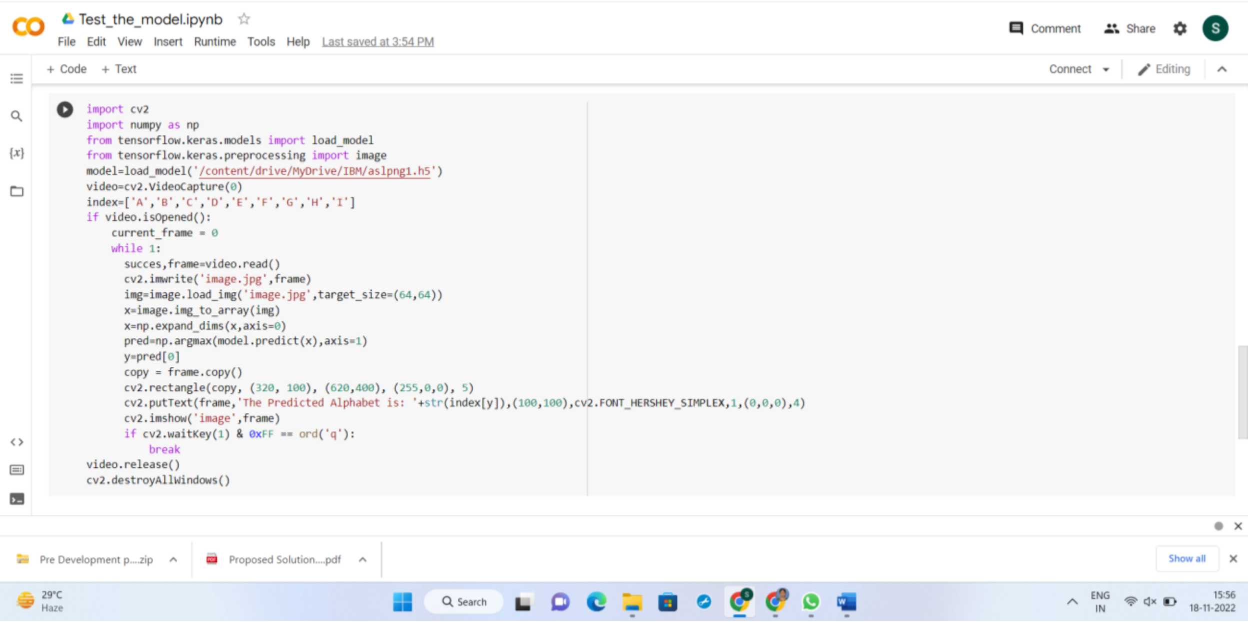
```
#Importing library

from google.colab.patches import cv2_imshow
```

```
cv2_imshow(img)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

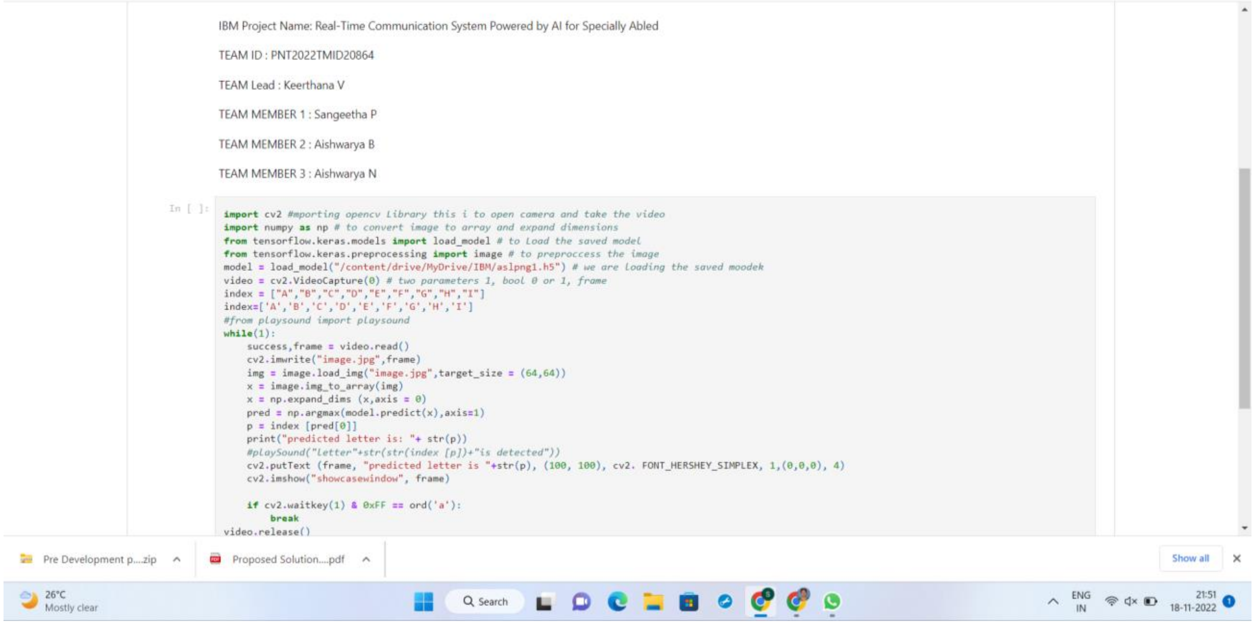
CNN Video Analysis

```
import cv2
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
model=load_model('/content/drive/MyDrive/IBM/aslpng1.h5')
video=cv2.VideoCapture(0)
index=['A','B','C','D','E','F','G','H','I']
if video.isOpened():
    current_frame = 0
    while 1:
```



```
import cv2
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
model=load_model('/content/drive/MyDrive/IBM/aslpng1.h5')
video=cv2.VideoCapture(0)
index=['A','B','C','D','E','F','G','H','I']
if video.isOpened():
    current_frame = 0
    while 1:
      succes,frame=video.read()
      cv2.imwrite('image.jpg',frame)
      img=image.load_img('image.jpg',target_size=(64,64))
      x=image.img_to_array(img)
      x=np.expand_dims(x,axis=0)
      pred=np.argmax(model.predict(x),axis=1)
      y=pred[0]
      copy = frame.copy()
      cv2.rectangle(copy, (320, 100), (620,400), (255,0,0), 5)
      cv2.putText(frame,'The Predicted Alphabet is: '+str(index[y]),(100,100),cv2.FONT_HERSHEY_SIMPLEX,1,(0,0,0),4)
      cv2.imshow('image',frame)
      if cv2.waitKey(1) & 0xFF == ord('q'):
          break
video.release()
cv2.destroyAllWindows()
```

9.RESULTS



IBM Project Name: Real-Time Communication System Powered by AI for Specially Abled

TEAM ID : PNT2022TMID20864

TEAM Lead : Keerthana V

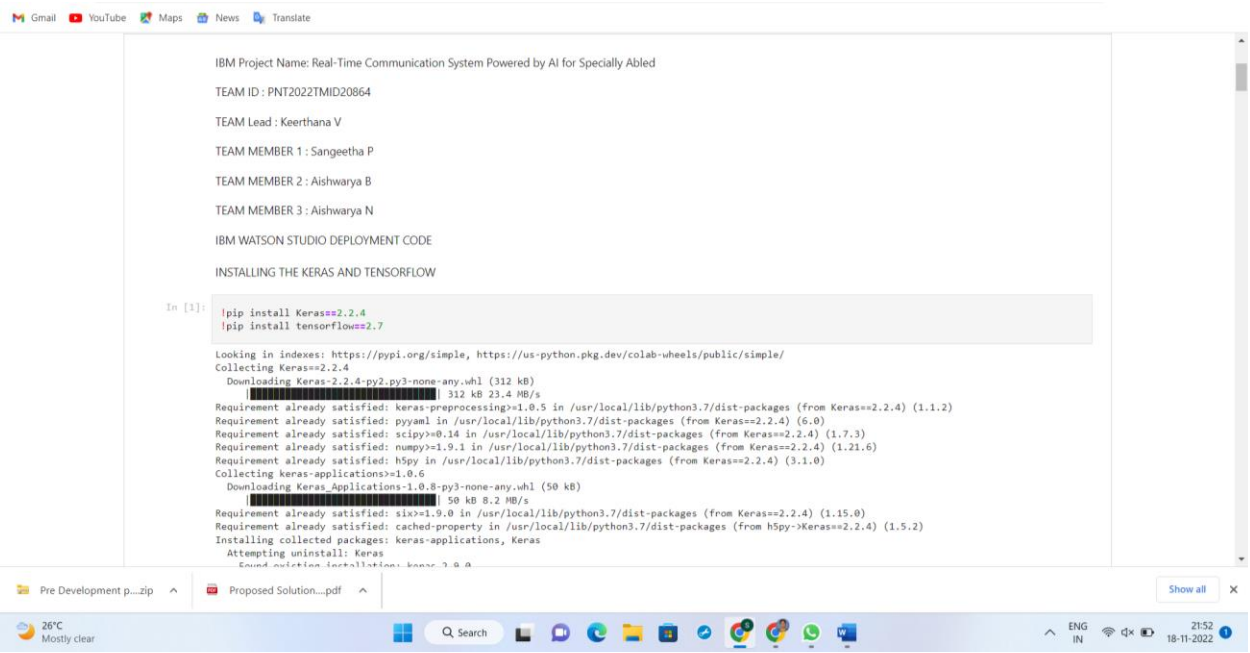
TEAM MEMBER 1 : Sangeetha P

TEAM MEMBER 2 : Aishwarya B

TEAM MEMBER 3 : Aishwarya N

```
In [ ]:
import cv2 #mporting opencv Library this i to open camera and take the video
import numpy as np # to convert image to array and expand dimensions
from tensorflow.keras.models import load_model # to Load the saved model
from tensorflow.keras.preprocessing import image # to preproccess the image
model = load_model("/content/drive/MyDrive/IBM/aslpng1.h5") # we are Loading the saved moodek
video = cv2.VideoCapture(0) # two parameters 1, bool 0 or 1, frame
index = ["A","B","C","D","E","F","G","H","I"]
index=['A','B','C','D','E','F','G','H','I']
#from playsound import playsound
while(1):
    success,frame = video.read()
    cv2.imwrite("image.jpg",frame)
    img = image.load_img("image.jpg",target_size = (64,64))
    x = image.img_to_array(img)
    x = np.expand_dims (x,axis = 0)
    pred = np.argmax(model.predict(x),axis=1)
    p = index [pred[0]]
    print("predicted letter is: "+ str(p))
    #playSound("Letter"+str(str(index [p])+"is detected"))
    cv2.putText (frame, "predicted letter is "+str(p), (100, 100), cv2. FONT_HERSHEY_SIMPLEX, 1,(0,0,0), 4)
    cv2.imshow("showcasewindow", frame)

    if cv2.waitkey(1) & 0xFF == ord('a'):
        break
video.release()
```



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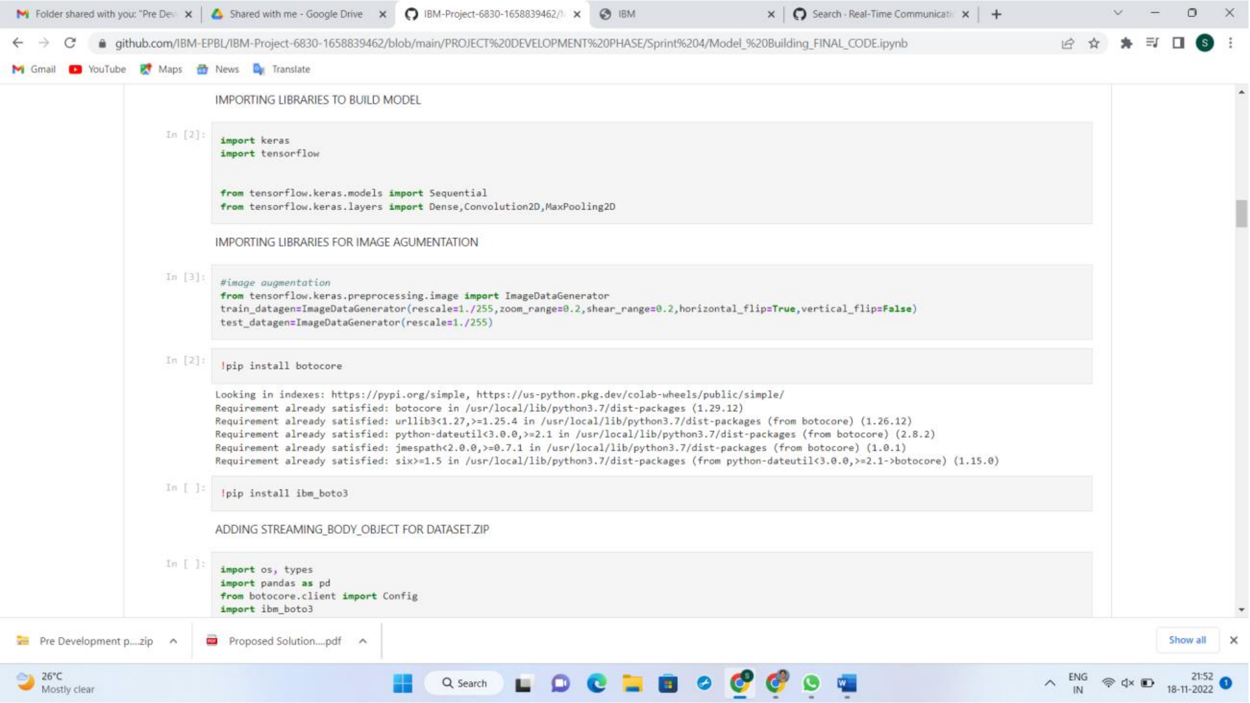
IBM WATSON STUDIO DEPLOYMENT CODE

INSTALLING THE KERAS AND TENSORFLOW

```
In [1]:
!pip install Keras==2.2.4
!pip install tensorflow==2.7
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting Keras==2.2.4
  Downloading Keras-2.2.4-py2.py3-none-any.whl (312 kB)
     |████████████████████████████████| 312 kB 23.4 MB/s
Requirement already satisfied: keras-preprocessing>=1.0.5 in /usr/local/lib/python3.7/dist-packages (from Keras==2.2.4) (1.1.2)
Requirement already satisfied: pyyaml in /usr/local/lib/python3.7/dist-packages (from Keras==2.2.4) (6.0)
Requirement already satisfied: scipy>=0.14 in /usr/local/lib/python3.7/dist-packages (from Keras==2.2.4) (1.7.3)
Requirement already satisfied: numpy>=1.9.1 in /usr/local/lib/python3.7/dist-packages (from Keras==2.2.4) (1.21.6)
Requirement already satisfied: h5py in /usr/local/lib/python3.7/dist-packages (from Keras==2.2.4) (3.1.0)
Collecting keras-applications>=1.0.6
  Downloading Keras_Applications-1.0.8-py3-none-any.whl (50 kB)
     |████████████████████████████████| 50 kB 8.2 MB/s
Requirement already satisfied: six>=1.9.0 in /usr/local/lib/python3.7/dist-packages (from Keras==2.2.4) (1.15.0)
Requirement already satisfied: cached-property in /usr/local/lib/python3.7/dist-packages (from h5py->Keras==2.2.4) (1.5.2)
Installing collected packages: keras-applications, Keras
  Attempting uninstall: Keras
    Found existing installation: keras 2.9.0
```


Folder shared with you: "Pre Dev
Shared with me - Google Drive
IBM-Project-6830-1658839462/
IBM
Search · Real-Time Communicati
github.com/IBM-EPBL/IBM-Project-6830-1658839462/blob/main/PROJECT%20DEVELOPMENT%20PHASE/Sprint%204/Model_%20Building_FINAL_CODE.ipynb
Gmail
YouTube
Maps
News
Translate
Pre Development p....zip
Proposed Solution....pdf
Show all
26°C
Mostly clear
Search
ENG
IN
21:52
18-11-2022

IMPORTING LIBRARIES TO BUILD MODEL

```
In [2]:
import keras
import tensorflow


from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense,Convolution2D,MaxPooling2D
```

IMPORTING LIBRARIES FOR IMAGE AGUMENTATION

```
In [3]:
#image augmentation
from tensorflow.keras.preprocessing.image import ImageDataGenerator
train_datagen=ImageDataGenerator(rescale=1./255,zoom_range=0.2,shear_range=0.2,horizontal_flip=True,vertical_flip=False)
test_datagen=ImageDataGenerator(rescale=1./255)
```

```
In [2]:
!pip install botocore
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: botocore in /usr/local/lib/python3.7/dist-packages (1.29.12)
Requirement already satisfied: urllib3<1.27,>=1.25.4 in /usr/local/lib/python3.7/dist-packages (from botocore) (1.26.12)
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /usr/local/lib/python3.7/dist-packages (from botocore) (2.8.2)
Requirement already satisfied: jmespath<2.0.0,>=0.7.1 in /usr/local/lib/python3.7/dist-packages (from botocore) (1.0.1)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from python-dateutil<3.0.0,>=2.1->botocore) (1.15.0)
```

```
In [ ]:
!pip install ibm_boto3
```

ADDING STREAMING_BODY_OBJECT FOR DATASET.ZIP

```
In [ ]:
import os, types
import pandas as pd
from botocore.client import Config
import ibm_boto3
```

10.ADVANTAGES

This app enables deaf and dumb people to convey their information using signs which get converted to human-understandable language and speech is given as output.

They feel equal and independent in society.

Easier communication

They can achieve their own dreams.

DISADVANTAGES

It is quite challenging for silent persons to communicate with non-mute people. because hand sign language is not taught to the general public. It might be quite challenging for them to communicate at times of crisis.

Missing of opportunities

11.CONCLUSION

This study's primary goal has been successfully accomplished. When users who are familiar with sign language interact with those who are not, gesture interpretation works best. For non-speakers of sign language who want the accompanying hand sign to be understood, speech interpretation is useful. Inaccurate hand segmentation and inaccurate gesture prediction result from light that is either too bright or too dim. The type of inaccuracy may result from the user's accessories, such as a subpar web camera or a subpar microphone. In a nutshell, technological advancement is crucial, and the use of technology in sign language is crucial.

12.FUTURE SCOPE

It will help improve communication for everyone, including those who can hear and speak as well as the deaf and dumb. Through effective communication, it will improve their social lives in addition to providing opportunities for professional growth.

The innovation of the year will be one that impacts and improves the lives of the deaf and hard of hearing through technology.