REAL -TIME COMMUNICATION SYSTEM POWERED BY AI FOR SPECIALLY ABLED

NALAIYA THIRAN PROJECT BASED LEARNING

on

HX8001 -PROFESSIONAL READINESS FOR INNOVATION EMPLOYABILITY AND ENTREPRENEURESHIP (PRIEE)

TEAM ID: PNT2022TMID23501

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BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

VELAMMAL
ENGINEERING COLLEGE
The Wheel of Knowledge rolls on!

VELAMMAL ENGINEERING COLLEGE,CHENNAI-66

(An Autonomous Institution,Affiliated to Anna University, Chennai)

November 2022

VELAMMAL ENGINEERING COLLEGE
CHENNAI-66

BONAFIDE CERTIFICATE

Certified that this project report, **" REAL-TIME COMMUNICATION SYSTEM POWERED BY AI FOR SPECIALLY ABLED"** is the bonafide work of **"AMISHA KUMARI.A,ASWINI.M,GUNUPUDI VENKATA LAKSHMI DURGA SUNAINA,KHAVYA.P"** who carried out the project work under my supervision and industry mentor.

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The report of the project work submitted by the above students in the partial fulfillment for the award of Bachelor of Engineering Degree in **ELECTRONICS AND COMMUNICATION ENGINEERING** of Anna University, Chennai was evaluated and confirmed to be the report of the work done by the above students and then evaluated.

Submitted for Internal Evaluation held on___/____/2022.

MENTOR **EVALUATOR**

ABSTRACT :

In our society, we have people with disabilities. The technology is developing day by day but no significant developments are undertaken for the betterment of these people. Communications between deaf-mute and a normal person has always been a challenging task. It is very difficult for mute people to convey their message to normal people. Since normal people are not trained on hand sign language. In emergency times conveying their message is very difficult. The human hand has remained a popular choice to convey information in situations where other forms like speech cannot be used. Voice Conversion System with Hand Gesture Recognition and translation will be very useful to have a proper conversation between a normal person and an impaired person in any language.

The project aims to develop a system that converts the sign language into a human hearing voice in the desired language to convey a message to normal people, as well as convert speech into understandable sign language for the deaf and dumb. We are making use of a convolution neural network to create a model that is trained on different hand gestures. An app is built which uses this model. 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.

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LINKS:

1.GITHUB - https://github.com/IBM-EPBL/IBM-Project-22773-1659857836

2.VIDEO LINK

https://drive.google.com/file/d/1yhxJrevoME7vLkmcCJyRDrHzD29tni9U/view?usp=share_link

1. INTRODUCTION

1.1Project Overview

Real-time communications (RTC) are any mode of telecommunications in which all users can exchange information instantly. Communication plays a significant role in making the world better place. It creates a bonding and relations among the people. People get to know one another by sharing their ideas, thoughts, and experiences with those around them. There are numerous ways to accomplish this, the best of which is the gift of "Speech." Everyone can very convincingly transfer their thoughts and understand each other through speech. It will be unjust if we overlook those who are denied this priceless gift: the deaf and dumb. In such cases, the human hand has remained the preferred method of communication.

1.2Purpose

The Project's purpose is to create a system that translates sign language into a human understandable language so that ordinary people may understand it. In our society, we have people with disabilities. The technology is developing day by day but no significant developments are undertaken for the betterment of these people. Communications between deaf-mute and a normal person has always been a challenging task. It is very difficult for mute people to convey their message to normal people. Since normal people are not trained on hand sign language. In emergency times conveying their message is very difficult. The human hand has remained a popular choice to convey information in situations where other forms like speech cannot be used. Voice Conversion System with Hand Gesture Recognition and translation will be very useful to have a proper conversation between a normal person and an impaired person in any language. The project aims to develop a system that converts the sign language into a human hearing voice in the desired language to convey a message to normal people, as well as convert speech into understandable sign language for the deaf and dumb. We are making use of a convolution neural network to create a model that is trained on different hand gestures. An app is built which uses this model. 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.

2.LITERATURE SURVEY

A literature review is **a comprehensive summary of previous research on a topic**. The literature review surveys scholarly articles, books, and other sources relevant to a area of research. The review should enumerate, describe, summarize ,objectively evaluate and clarify this previous research.

In our project, We have taken the literature survey on IEEE papers. An intelligent communication device is developed to assist nonverbal, motor-disabled persons in the generation of written and spoken messages. The device is centered on knowledge base of the grammatical rules and message elements. A belief reasoning scheme based on both the information from external sources and the embedded knowledge issued to optimize the process of message search

2.1 Existing problem

Some of the existing solutions for solving this problem are:

Communications between deaf-mute and a normal person has always been a challenging task.It is very difficult for mute people to convey their message to normal people.

Technology

One of the easiest ways to communicate is through technology such as a phone or laptop. A deaf person can type out what they want to say and a person who is blind orhas low vision can use a screen reader to read the text out loud.

A blind person can also use voice recognition software to convert what they are saying in to text so that a person who is Deaf can then read it.

Interpreter

If a sign language interpreter is available, this facilitates easy communication if the person who is deaf is fluent in sign language. The deaf person and person who is blindcan communicate with each other via the interpreter. The deaf person can use sign language and the interpreter can speak what has been said to the person who is blind and then translate anything spoken by the blind person into sign language for the deaf person.

However, this is often not the most effective form of communication, as it is very dependent on the individual circumstances of both people and their environment (for

example, some places may have too much background noise).

2.2 References

1. Upendran, S., and Thamizharasi, A., "American Sign Language interpreter system for deaf and dumb individuals", In the Proceedings of the International Conference on Control, Instrumentation, Communication and Computational Technologies (ICCICCT), pp. 1477-1481, 2014

2. Rajamohan, A., Hemavathy, R., andDhanalakshmi, M., "Deaf-Mute Communication Interpreter", International Journal of Scientific Engineering and Technology, Vol.2, No.5, pp.336-341, 2013.

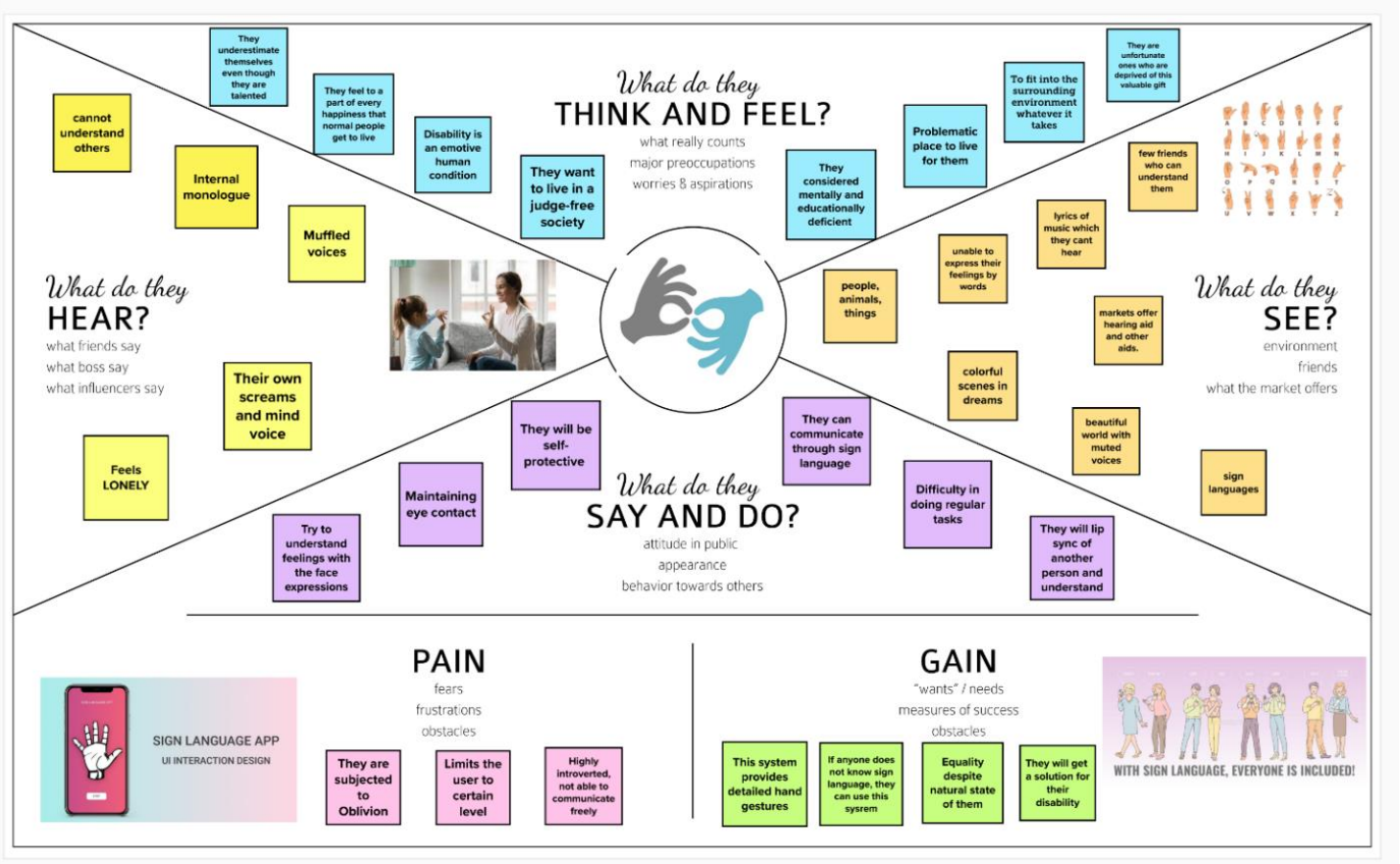
2.3 Problem statement definition

Only specially abled people are taught sign language and the common person is unaware its working causing a communication gap. Under emergency situations, it is even more difficult for specially abled people to get help. Non-Emergency normal environments can also be hard for them to navigate needing special assistance. In this project we have designed and developed a system which lowers the communication gap between speech hearing impaired people and normal people that is we have built a system that enables communications between deaf-dumb person and a normal person. A convolution neural network is being used to develop a model that is trained on various hand movements. This model is used to create an app. This program allows deaf and hard of hearing persons to communicate using signs that are then translated into human readable text.

3.IDEATION AND PROPOSED SOLUTION

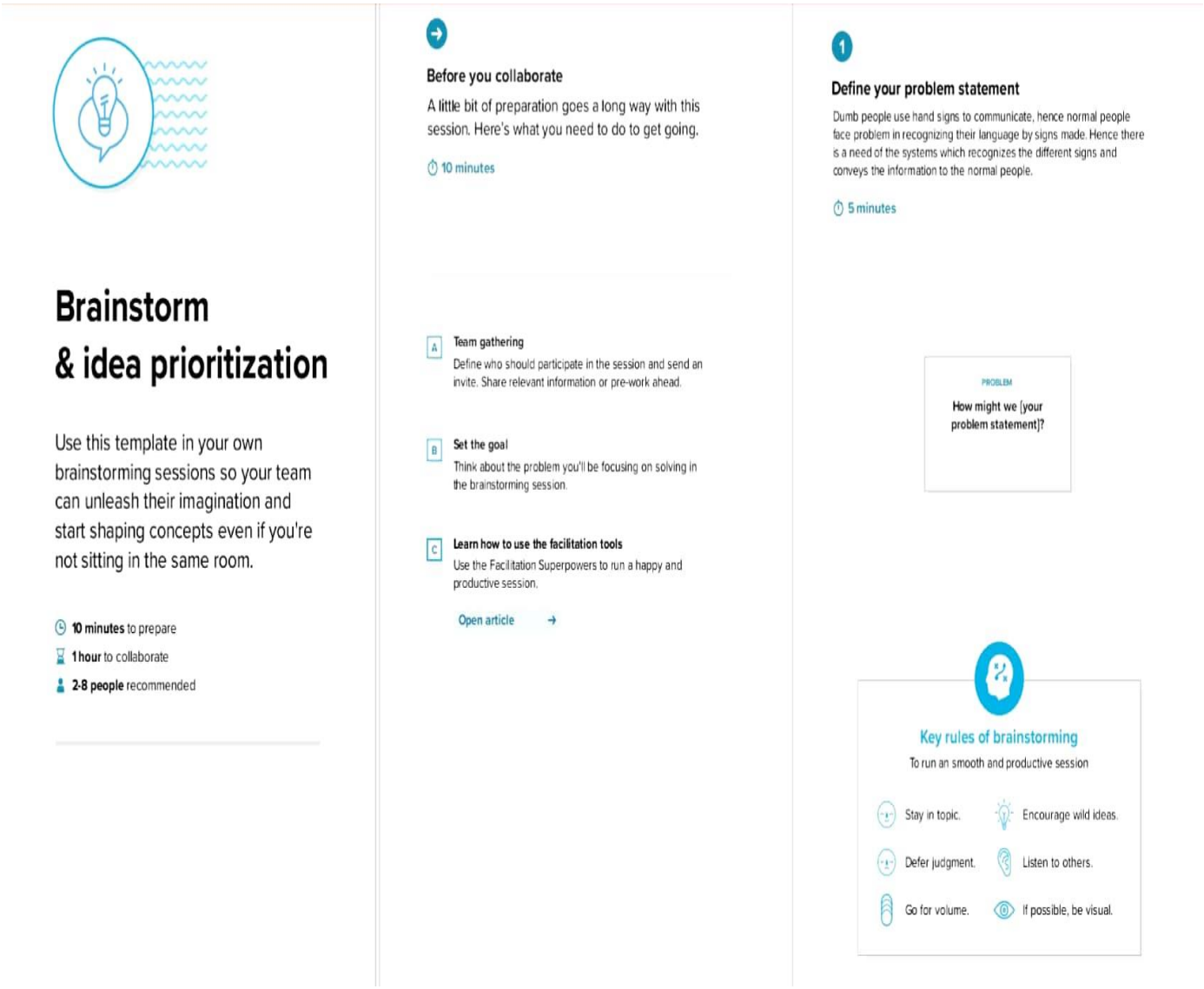
Ideation is the process where you generate ideas and solutions through techniques such as Empathy Map Canvas, Brainstorming. Ideation is also the third stage in the Design Thinking Process.

3.1 Empathy map canvas



3.2 Ideation & Brainstorming

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

Khavya

- normal people can try to understand dumb people by their lip movement
- they can communicate by hand gesture
- American sign language (ASL)can be implemented
- sign language must be learnt by both the persons for understanding
- a translator can also be used as an intermediary
- these people can also write and communicate to normal people
- dumb people can also use text messages to convey their needs and video calls to express their facial gestures and sign languages.
- The app should be easy to use like whatsapp, messenger,etc
- These messaging apps are really helpful but can be enhanced with few more features.

Amisha kumari

- Sign language
- using their visual sense
- sign language must be tolerable
- They must also learnt sign language to uderstand
- they can use ear machine to hear
- having the sense to use new software can be handy
- Eye language can also be introduced
- Facial expressions can be introduced for actions
- sensory techniques can be used

Aswini

- Learn how they prefer to communicate
- The app should be user-friendly even an illiterate person can use it
- Google speech recognition Module can be used
- The Text Messaging Module helps the user to send the SMS/Text messages to any user.
- The emergency module, helps the person to send an emergency message along with present GPS location to the added emergency contact.
- The Help Center option can be introduced which is a learning tool that teaches Indian sign Language.
- The app uses Google- speech API to achieve that result
- This application has user login for the first time and they can customize their app accordingly
- Different options like sending text message, voice to text message, emergency message, sending GPS location and also a feature that assists the Indian Sign Language to the normal people

Gunupudi Venkata Lakshmi Durga Sunaina

- Images taken and processed by web camera will avoid the background disturbance and objects.
- Translation should be faultless.
- Step by step usage guide and FAQs are provided.
- The user flow must be easy to understand by urban users too.
- Making a modular software for quicker response.
- Design the application with inclusivity to all types of people.
- After Sign recognition , Voice translation should be provided in user preferred language.
- Figure out if the user is showing a wrong sign and show error.
- 

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

Step-3: Idea Prioritization

3.3 Proposed Solution

Proposed Solution Template:

S.No	Parameter	Description
1.	Problem Statement (Problem to besolved)	Dumb people use hand signs to communicate, hence normal people face problem in recognizing their language by signs made. Hence there is a need of the systems which recognizes the different signs and conveys the information to the normal people in a two way communication.
2.	Idea / Solution description	Developing a system that converts the sign language into a human hearing voice in the desired language to convey a message to normal people, as well as convert speech into understandable sign language for the deaf and dumb. The idea is to create an end-end application that predicts the ISL signs from a live video and translates the same to voice such that conversing is at ease
3.	Novelty / Uniqueness	Since the application is AI based, it adjusts to human input accordingly, and communication becomes easier. We are making use of a convolution neural network to create a model that is trained on different hand gestures.
4.	Social Impact / Customer Satisfaction	• This device also eliminates the need of the interpreter and also avoids miscommunication. • No additional hardware support is needed to use the application • Improve their career opportunities in the industry • Can provide instant results to users

5.	Business Model (Revenue Model)	Our proposed system includes a number of technologies like voice to text conversion speech to text conversion The product will be assigned an initial margin price and price will be updated as we add new updates to it.
6.	Scalability of the Solution	By virtue of this device the communication of the deaf and dumb person with normal person is made possible. This device also eliminates the need of the interpreter and also avoids miscommunication. Thus, the final system will not be much expensive making it accessible to every needful person. With proper planning this system can be used in different organizations. Different types of sign conventions can be stored in the device.

Proposed solution is the one in which we are making use of a convolution neural network to create a model that is trained on different hand gestures. A website is built which uses this model. The proposed solution section should offer the solution specifically, with enough detail so that the reader understands exactly what we're proposing.

3.4 Problem solution fit:

Project Design Phase-I - Solution Fit Template

Project Title:Real time communication powered byAI for specially abled **Team ID:** PNT2022TMID23501

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

-The Deaf and dumb person who can't able to communicate with the normal people.

-Normal persons who can't understand the sign language of the deaf and dumb persons..

6. CUSTOMER CONSTRAINTS CC

-Have a cell phone.
-Have an sign translation app
-Normal people have an headset to hear the translated signs as voice.

5. AVAILABLE SOLUTIONS AS

-Sign detection and translation is there.But if the normal person don't know the sign langauge it is difficult to communicate with deaf and dumb.
-Sometimes the translation should be fault.
-It doesn't convert to the users preferred language.

Explore AS, differentiate

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

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

-Deaf and dumb persons are highly introverted not able to communicate freely.

-Voice Conversion System with Hand Gesture Recognition and translation will be very useful to have a proper conversation between a normal person and an impaired person in any language

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

9. PROBLEM ROOT CAUSE RC

-Dumb people use hand signs to communicate, hence normal people face problem in recognizing their language by signs made. Hence there is a need of the systems which recognizes the different signs and conveys the information to the normal people.

7. BEHAVIOUR BE

-People uses a different apps for sign translation , but there is no faultless translation.So our proposed solution will be translated into their preferred language and faultless.

-They will get a solution for their disability.

-They can communicate freely between the deaf and dumb persons and the normal persons.

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

Identify strong TR & EM

3. TRIGGERS TR

- Few friends who can understand them with this proposed system.

-Deaf and dumb people Unable to express their feelings by words.so this sign language will be recognised and translated correctly.

4. EMOTIONS: BEFORE / AFTER EM

Before:They considered themselves mentally and educationally deficient even if they are talented.

-Highly introverted and difficult to communicate.

After: Communicate freely with this solution.

-The app should be user-friendly even an illiterate person can use it.

10. YOUR SOLUTION SL

-Developing a system that converts the sign language into a human hearing voice in the desired language to convey a message to normal people, as well as convert speech into understandable sign language for the deaf and dumb.

-Our proposed system includes a number of technologies like voice to text conversion speech to text conversion. Being a completely software based application, the app uses Google- speech API to achieve that result.

8.CHANNELS OF BEHAVIOUR CH

8.1 ONLINE

-After Sign recognition , Voice translation should be provided in user preferred language.

-Images taken and processed by web camera will avoid the background disturbance and objects.

8.2 OFFLINE

-The Deaf and dumb person can able to understand the normal person speech through the system.They can communicate freely.

Identify strong TR & EM

The Problem-Solution Fit is based on the principles of Lean Startup and User Experience design. It helps us to identify behavioral patterns and recognize what would work and why. It is used to identify solutions with higher chances of solution adoption, reduce time spent on testing.

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	User Verification	The user should receive a verification e-mail which they have to confirm to complete the registration.
FR-4	Compliance to rules or laws	Terms and conditions, Privacy policy, End user licensing agreement.
FR-5	Authorization levels	There are two levels of authorization namely standard access level and advanced access level.
FR-6	Legal Requirements	Medical Certificate is produced

4.2 Non Functional requirement:

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

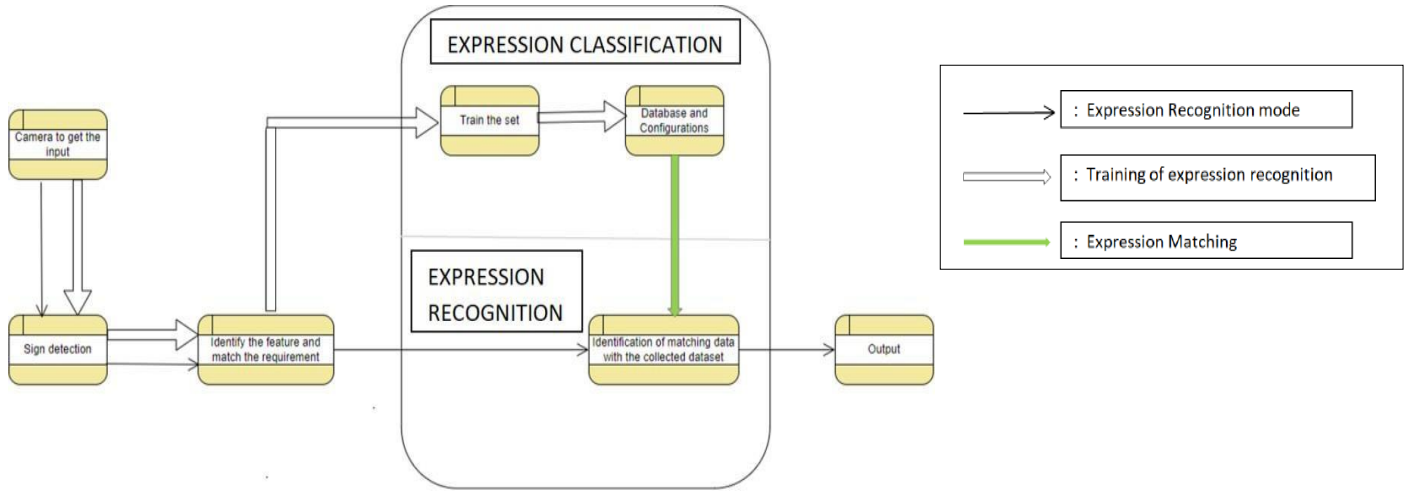
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The designed system is easy to use for specially abled persons as it is portable and platform independent.
NFR-2	**Security**	Converted information using signs into speech is accessed only by the user.
NFR-3	**Reliability**	System is tested with large number of data and Provides insight into issues.
NFR-4	**Performance**	Quick Launch time of application and faster in converting signs into speech
NFR-5	**Availability**	Provides automatic recovery and User access.
NFR-6	**Scalability**	Standard network condition the device should convert information within second.

5.PROJECT DESIGN

Project design is an early phase of the project lifecycle where ideas, processes, resources, and deliverables are planned out. A project design comes before a project plan as it's a broad overview whereas a project plan includes more detailed information.

5.1 Data Flow Diagrams

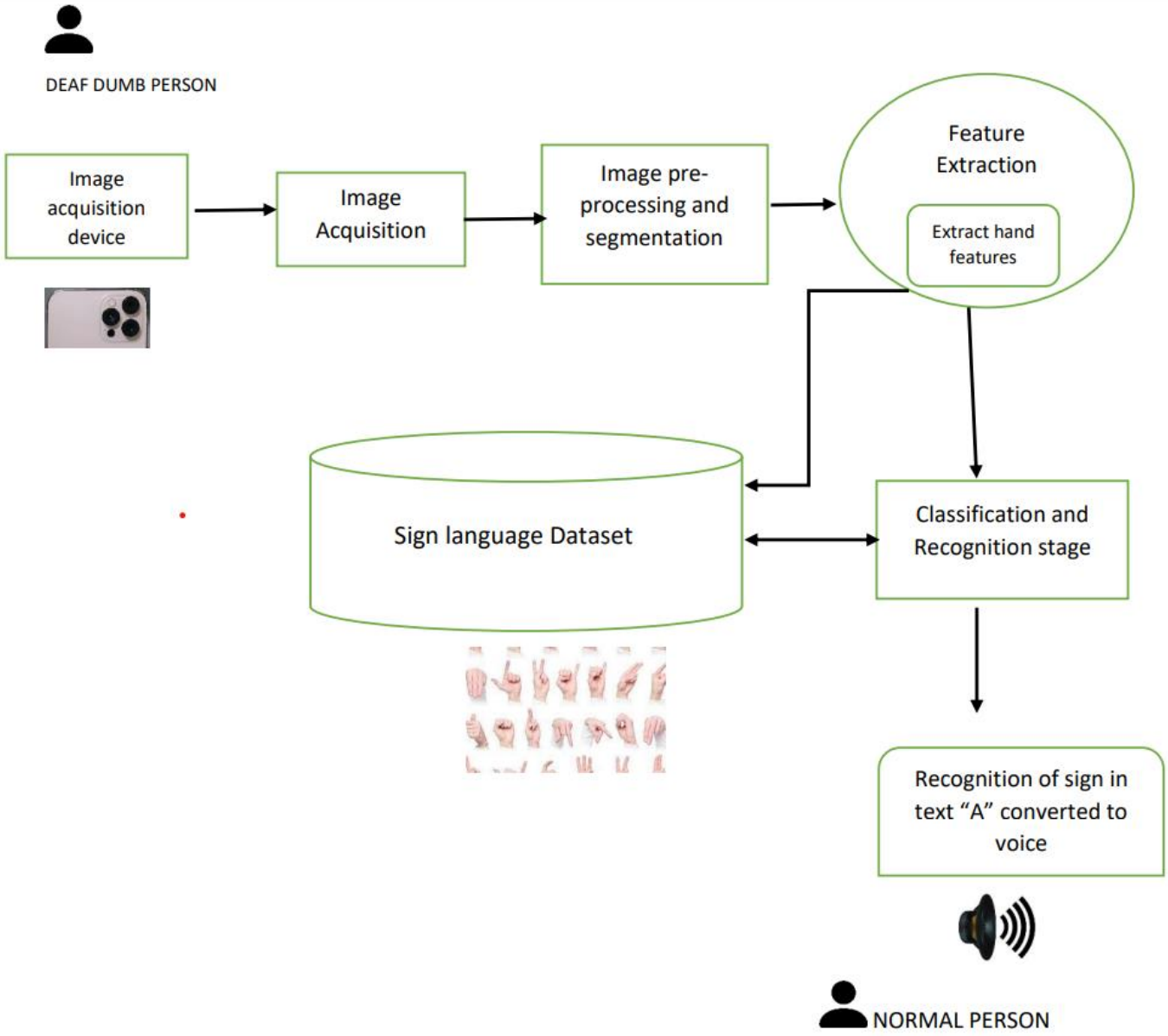
A data flow diagram is a traditional visual representation of the information flow within a system. It shows how data enters and leaves the system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination.



5.2 Solution Architecture & Technical Architecture

Solution Architecture:

FROM DUMB TO NORMAL PERSON:

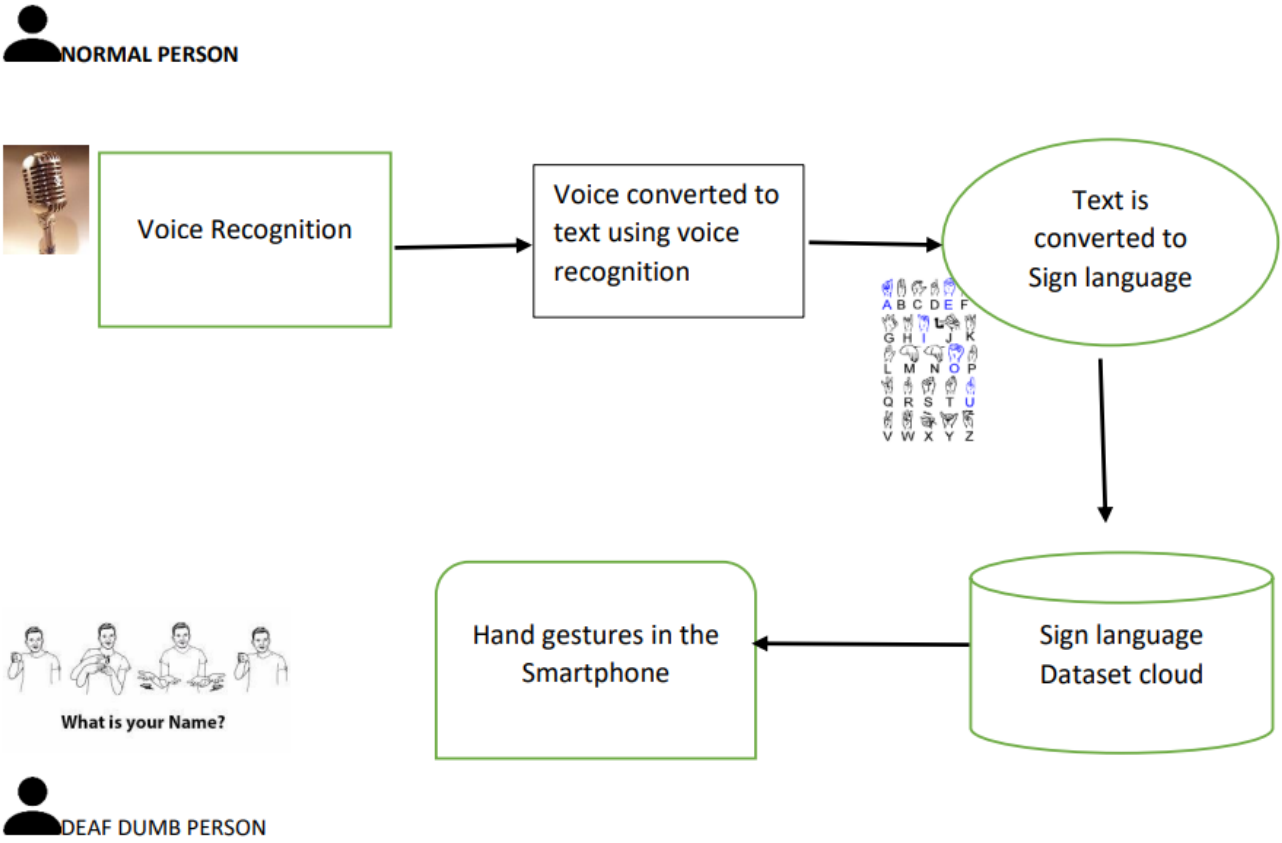


- In this architecture we are developing a system that converts the sign language into a human hearing voice in the desired language to convey a message to normal people, as well as convert speech into understandable sign language for the deaf and dumb.
- Here we are first processing the image through image processing using deep learning technique, then the processed image is segmented and classified based on

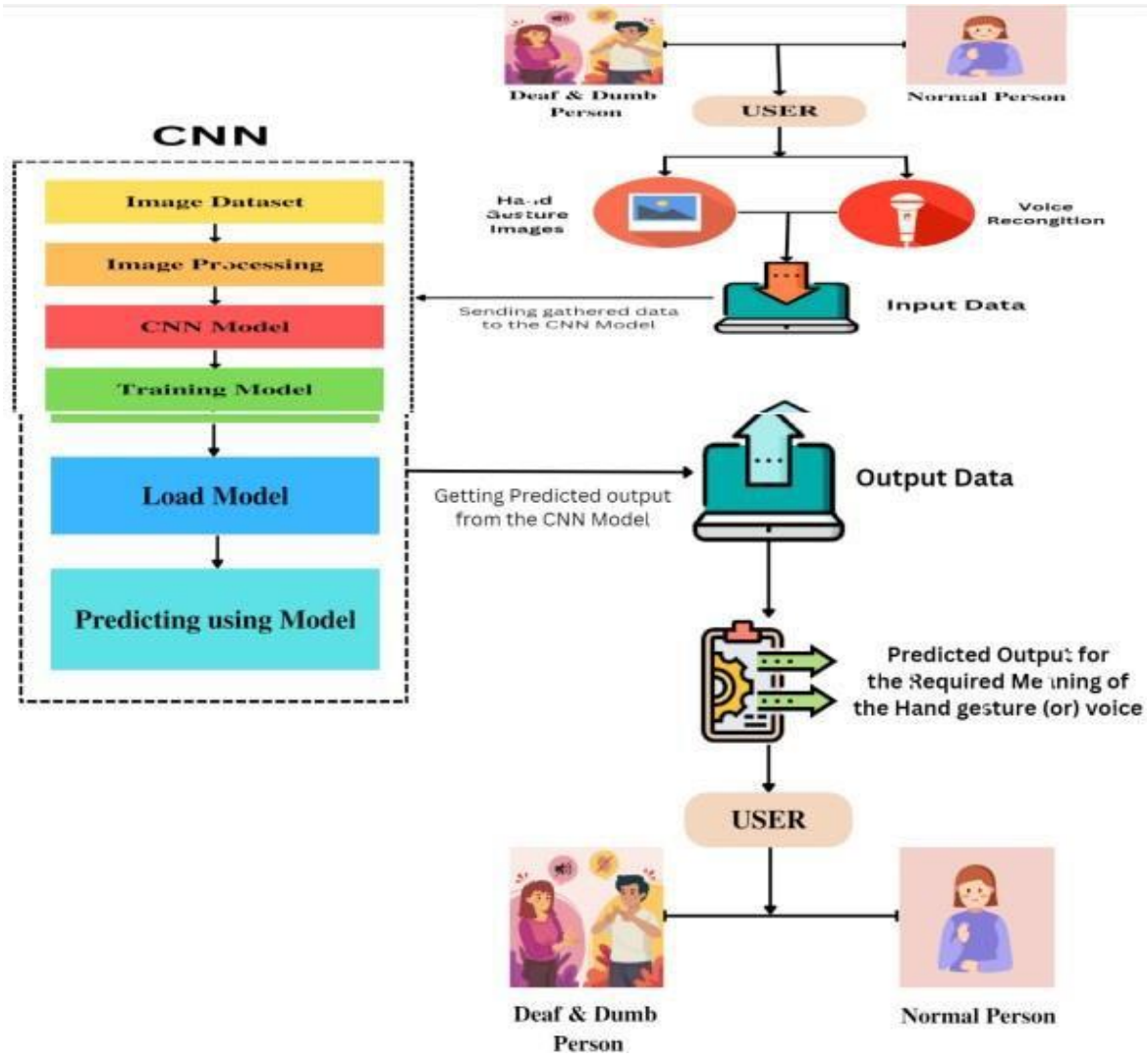
features and gestures.

- Then the classified feature is used to detect what the dumb person has conveyed by using the dataset in the cloud .
- Then the sign language gesture is converted to text by AI and the output is given through speaker . Here the text is converted to voice.

FROM NORMAL TO DEAF PERSON:

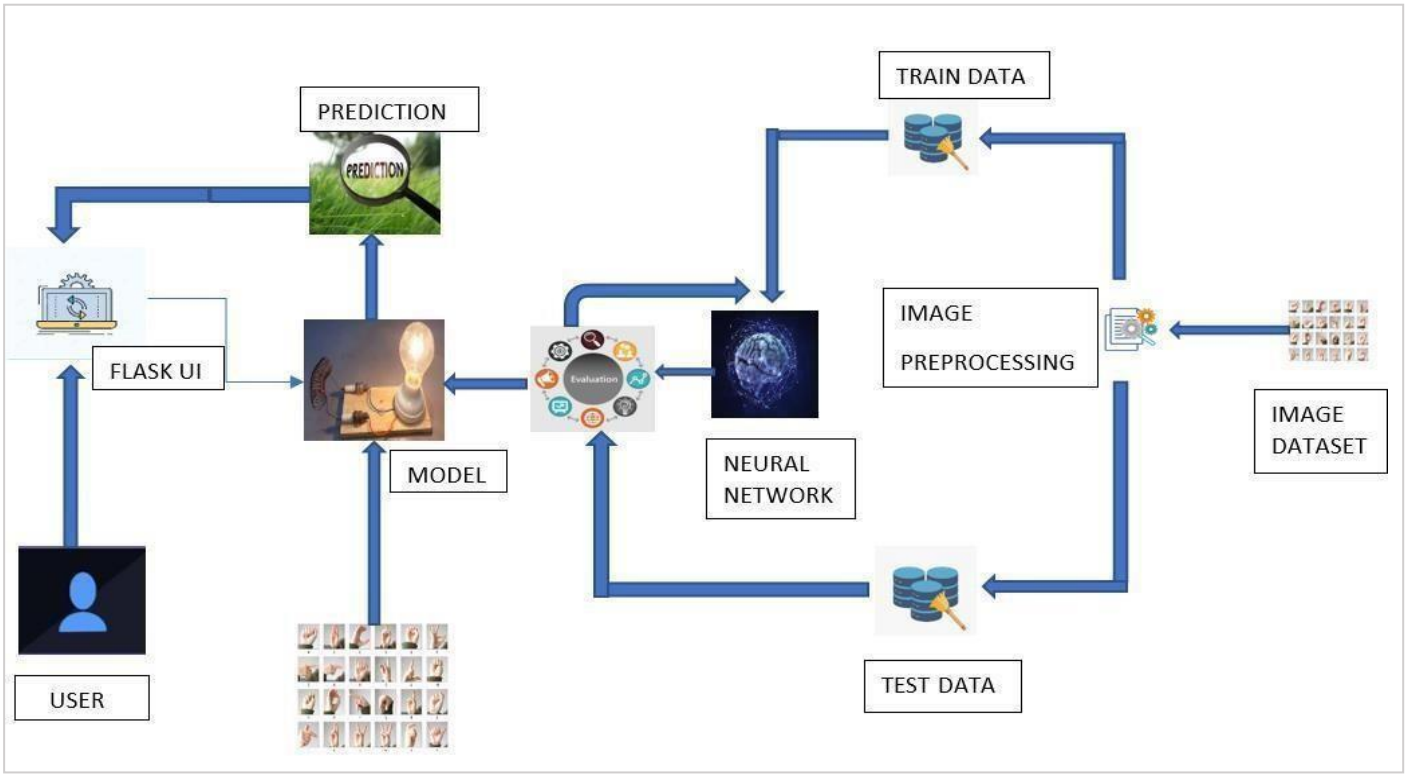


- In this architecture , the normal person is trying to communicate with the deaf person.
- The voice is recognised from the normal person and then converted to text using google speech to text converted .
- Then the text is converted to sign alphabets using dataset in the IBM Watson cloud .



Solution architecture is the process of developing solutions based on predefined processes, guidelines and best practices with the objective that the developed solution fits within the enterprise architecture in terms of information architecture, system portfolios, integration requirements and many more.

Technical Architecture:



Technical Architecture is a form of Information Technology(IT) architecture that is used to design a system. It involves the development of a technical blueprint with regard to the arrangement, interaction, and interdependence of all elements so that system- relevant requirements are met.

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	It deals with variety of frameworks, libraries and supports required to develop the project	Java / Python
3.	Application Logic-2	Helps in converting human voice into written words, In simple it is used to convert speech to text.	IBM Watson STT service
4.	Application Logic-3	Provides fast ,consistent and accurate answers during the execution phase of the project	IBM Watson Assistant
5.	Database	It can be numerical, categorical or time-series data	MySQL, NoSQL, etc.
6.	Cloud Database	Enables the user to use host database without buying the additional hardware	IBM DB2, IBM Cloudant etc.
7.	*File Storage*	*File storage should be highly flexible, scalable and* effective	*IBM Block Storage or Other Storage* Service or Local Filesystem
8.	External API-1	Used to access the information in the cloud	IBM Weather API, etc.
9.	External API-2	Used to access the information for data driven decision making	Aadhar API, etc.
10.	Machine Learning Model	Machine Learning Model deals with various algorithms that are needed for the implementation	Real time communication using AI for specially abled
11.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Install the windows version and execute the installer Select APPACHE to install web server	Local, Cloud Foundry, Kubernetes, etc.
		Cloud Server Configuration : This server deals with the additional storage	

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	The frameworks used are	Tensor flow, Theano, RNN, PyTorch, Caffle 2
2.	Security Implementations	the security / access controls implemented, use of firewalls etc.	Identify, Prevent and Respond
3.	Scalable Architecture	the scalability of architecture (3 – tier, Micro-services)	Data , models, operate at size, speed and complexity
4.	Availability	the availability of application (e.g. use of load balancers, distributed servers etc.)	Image and facial recognition, lip reading, text summarization, real time captioning
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	Full and effective participation , equality of opportunity, accessibility

5.3.User Stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Normal people and Deaf-mute people	Registration	USN-1	As a user, I can register for the application by entering my email, and password, and confirming my password	I can access my account/ dash boar d	High	Sprint-1
		USN-2	As a user, I will receive a confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
Normal people		USN-3	Give access to camera to recognize the gestures Give access to microphone to give our message through voice	I can access messages given by the Deaf- mute people	High	Sprint-1
Deaf-mute people			Give access to display to view the message sent by normal people.	I can access messages given by the Norma l people	High	Sprint-1

Administrator		USN-4	Admin side in the company should take care	all the requirements are there.	High	Sprint 1
Sign up		USN-5	Need to sign up to use it.	Need valid credentials.	High	Sprint-1
Wish list		USN-6	Before availing the service can be kept aside.	As a user can review and use the service.	Low	Sprint-2

A user story is an informal, general explanation of a design feature written from the perspective of the end user. Its purpose is to articulate how a design will provide value to the end user. A key component of agile software development is putting people first, and a user story puts end users at the center of the conversation. These stories use non-technical language to provide context for the development team and their efforts.

6.PROJECT PLANNING & SCHEDULING

Planning and scheduling are distinct but inseparable aspects of managing the successful project. The process of planning primarily deals with selecting the appropriate policies and procedures in order to achieve the objectives of the project. Scheduling converts the project action plans for scope, time cost and quality into an operating timetable.

6.1 Sprint Planning & Estimation

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	Collecting Dataset	5	High	Khavya Amisha Aswini Sunaina
	Image preprocessing	USN-2	Perform preprocessing techniques on the dataset	5	High	Khavya Amisha Aswini Sunaina
Sprint-2	Model Building	USN-3	Model initialisation with required layers	5	High	Khavya Amisha Aswini Sunaina
	Training	USN-4	Training the image classification model using CNN	5	Medium	Khavya Amisha Aswini Sunaina
Sprint-3	Testing	USN-5	Testing the model's performance	10	High	Khavya Amisha Aswini Sunaina
Sprint-4	Application development	USN-6	Converting text to speech using google API	10	Medium	Khavya Amisha Aswini Sunaina

Sprint planning & Estimation is the process for estimating the effort required to complete a

prioritized task in the product backlog. This effort is usually measured with respect to the time it will take to complete that task, which, in turn, leads to accurate sprint planning.

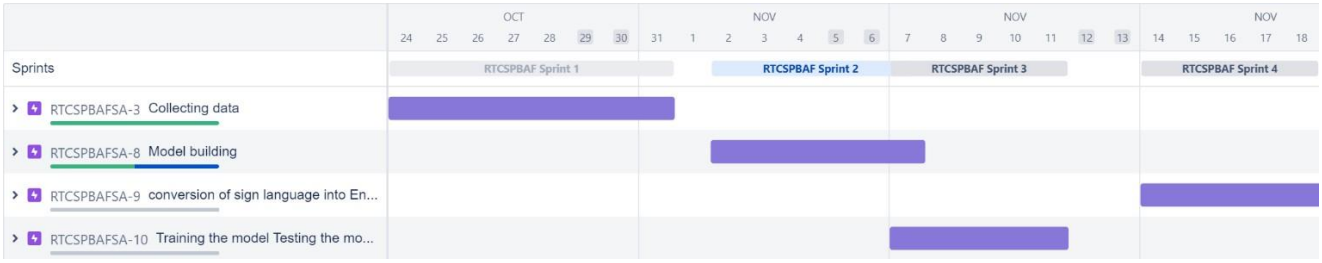
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	10	6 Days	24 Oct 2022	29 Oct 2022	10	29 Oct 2022
Sprint-2	10	6 Days	31 Oct 2022	05 Nov 2022	10	05 Nov 2022
Sprint-3	10	6 Days	07 Nov 2022	12 Nov 2022	10	12 Nov 2022
Sprint-4	10	6 Days	14 Nov 2022	19 Nov 2022	10	19 Nov 2022

6.2 Sprint Delivery Schedule

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

Since sprints take place over a fixed period of time, it's critical to avoid wasting time during planning and development.

6.3 Reports from JIRAROADMAP

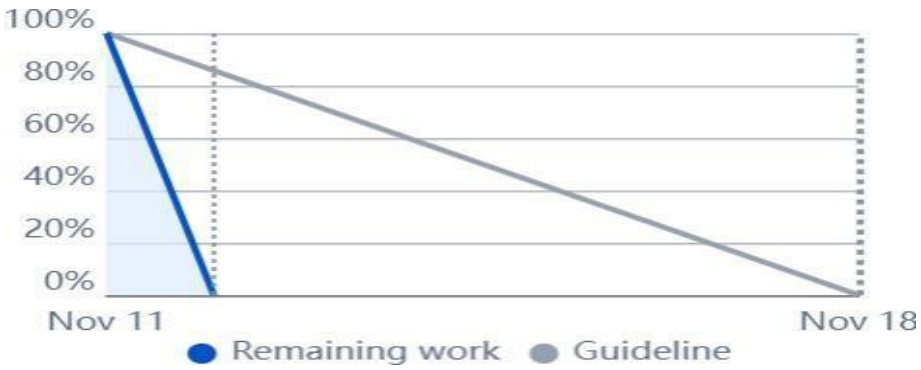


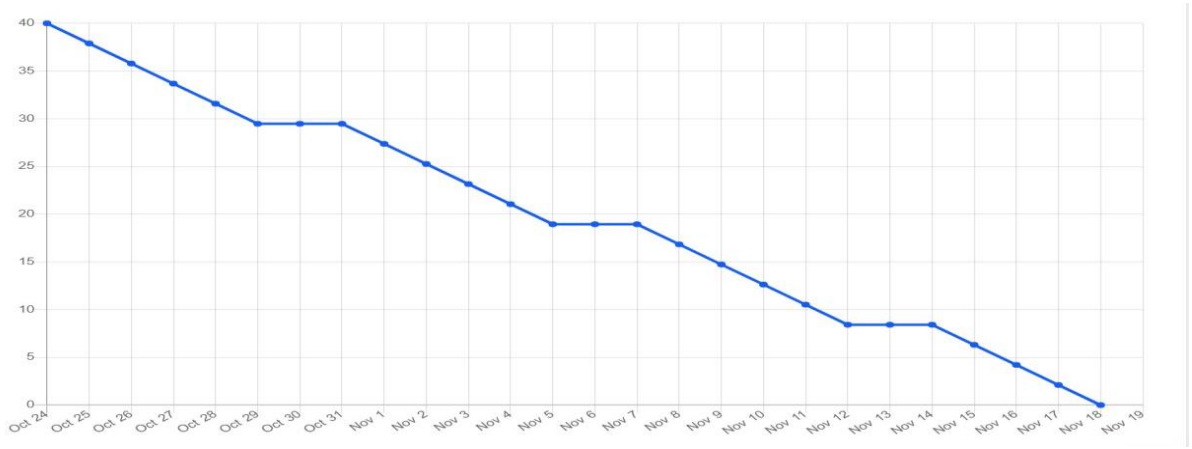
Sprint-1

Sprint-2

Sprint-3

Sprint-4





This are the final reports that is been generated from the jira software. Initially with the help of the jira software we have made a plan for the sprint delivery. By using it so we are getting the four phase sprint report with roadmap.

7.CODING & SOLUTIONING

In order to design website that coverts sign language into English alphabets we need to develop the website.For developing the website, primarly we need a platform that is uesful for developing the code.Coding is nothing that which are the applications developed by the developers in a certain computer language.Here we are using Python language for developing the website.

7.1.Feature 1

Image Preprocessing

In [1]:
```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

In [2]:
```
train_datagen=ImageDataGenerator(rescale=1./255,horizontal_flip=True,vertical_flip=True,zoom_range=0.2)
```

In [3]:
```
test_datagen=ImageDataGenerator(rescale=1./255)
```

In [6]:
```
x_train = train_datagen.flow_from_directory(r"/content/drive/MyDrive/IBM project/training_set",target_size=(64,64),class_mode="categorical",batch_si
```

```
Found 15130 images belonging to 9 classes.
```

In [7]:
```
x_test = test_datagen.flow_from_directory(r"/content/drive/MyDrive/IBM project/test_set",target_size=(64,64),class_mode="categorical",batch_size=30)
```

```
Found 1035 images belonging to 9 classes.
```

Model Building

In [8]:
```
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D
from keras.layers import Dropout
from keras.layers import Flatten
```

In [20]:
```
model.fit(x_train,epochs=10,validation_data=x_test,steps_per_epoch=len(x_train)//10,validation_steps=len(x_test))
```

```
Epoch 1/10
50/50 [==============================] - 407s 8s/step - loss: 0.1036 - accuracy: 0.9707 - val_loss: 0.1421 - val_accuracy: 0.9362
Epoch 2/10
50/50 [==============================] - 75s 1s/step - loss: 0.0937 - accuracy: 0.9767 - val_loss: 0.0786 - val_accuracy: 0.9768
Epoch 3/10
50/50 [==============================] - 74s 1s/step - loss: 0.0833 - accuracy: 0.9740 - val_loss: 0.0380 - val_accuracy: 0.9894
Epoch 4/10
50/50 [==============================] - 65s 1s/step - loss: 0.0493 - accuracy: 0.9853 - val_loss: 0.0354 - val_accuracy: 0.9913
Epoch 5/10
50/50 [==============================] - 56s 1s/step - loss: 0.0514 - accuracy: 0.9851 - val_loss: 0.0484 - val_accuracy: 0.9913
Epoch 6/10
50/50 [==============================] - 58s 1s/step - loss: 0.0661 - accuracy: 0.9813 - val_loss: 0.0597 - val_accuracy: 0.9894
Epoch 7/10
50/50 [==============================] - 50s 1s/step - loss: 0.0488 - accuracy: 0.9872 - val_loss: 0.0888 - val_accuracy: 0.9662
Epoch 8/10
50/50 [==============================] - 48s 958ms/step - loss: 0.0492 - accuracy: 0.9820 - val_loss: 0.0670 - val_accuracy: 0.9874
Epoch 9/10
50/50 [==============================] - 35s 709ms/step - loss: 0.0599 - accuracy: 0.9820 - val_loss: 0.0129 - val_accuracy: 0.9971
Epoch 10/10
50/50 [==============================] - 39s 770ms/step - loss: 0.0582 - accuracy: 0.9770 - val_loss: 0.1378 - val_accuracy: 0.9314
```

Out[20]:

In [21]:
```
model.save("aslpng.h5")
```

7.2 Feature 2

Testing the model

In [22]:
```
from keras.models import load_model
import numpy as np
import cv2
```

In [23]:
```
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import numpy as np
```

In [34]:
```
model=load_model("aslpng.h5")
img = image.load_img(r"/content/drive/MyDrive/IBM project/test_set/D/10.png",target_size=(64,64))
img
```

Out[34]:

In [35]:
```
x = image.img_to_array(img)
x
```

Out[35]:
```
array([[[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.],
        ...,
        [0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]],

       [[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.],
        ...,
        [0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]],

       [[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.],
        ...,
        [0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]],

       ...,

       [[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.],
        ...,
        [0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]],

       [[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.],
        ...,
        [0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]],

       [[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.],
        ...,
        [0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]]], dtype=float32)
```

In [36]:
```
x.shape
```

Out[36]:
```
(64, 64, 3)
```

In [37]:
```
x = np.expand_dims(x,axis=0)
x.shape
```

Out[37]:
```
(1, 64, 64, 3)
```

In [38]:
```
pred = model.predict(x)
```

```
1/1 [==============================] - 0s 63ms/step
```

In [39]:
```
pred
```

Out[39]:
```
array([[0., 0., 0., 1., 0., 0., 0., 0., 0.]], dtype=float32)
```

In [45]:
```
class_name=["A","B","C","D","E","F","G","H","I"]
pred_id = pred.argmax(axis=1)[0]
pred_id
```

Out[45]:
```
3
```

8.TESTING

A Test report is an organized summary of testing objectives, activities, and results. Test Report is a document which contains a summary of all test activities and final test results of a design. Test report is an assessment of how well the Testing is performed. Based on the test report, we understand the designs quality and its performance.

8.1 Test cases

				Date	12-Nov-22							
				Team ID	PNT2022TMID01158							
				Project Name	Project - Real time communication system powered by AI for specially abled							
				Maximum Marks	4 marks							
Test case ID	Feature Type	Component	Test Scenario	Pre Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID
Login Page_TC_001	Functional	Home Page	Verify user is able to see the homepage	Mozilla Firefox Browser	Enter URL in browser and click go	http://127.0.0.1:5000	Homepage should be displayed	Working as expected	Pass	Steps are clear to follow	NO	NA
Login Page_TC_002	UI	Home Page	Verify the UI elements in homepage	Mozilla Firefox Browser	1.Enter URL and click go 2.Verify homepage with given UI elements: Reference,camera access display,Introduction to project	http://127.0.0.1:5000	Application should show below UI elements: a.Reference b.camera access display c.Introduction to project	Working as expected	Pass	Steps are clear to follow	NO	NA
Login Page_TC_003	UI	Home page	Verify whether reference page is working	Mozilla Firefox Browser	1.Enter URL(http://127.0.0.1:5000) and click go 2.Click on reference button	http://127.0.0.1:5000	User should navigate to reference page where all_alphabet images is displayed	working as expected	Pass	Steps are clear to follow	Yes	NA
Login Page_TC_004	Functional	Home Page	Verify Camera access	Mozilla Firefox Browser,Web-Camera	1.Enter URL(http://127.0.0.1:5000) and click go 2.Click allow camera access	Allow camera access	Camera access is allowed and image is displayed	working as expected	Pass	Steps are clear to follow	Yes	NA
Login Page_TC_004	Functional	Home Page	Gesture detection	Mozilla Firefox,CNN	1.Enter URL(http://127.0.0.1:5000) and click go 2.Click camera access 3.Image displayed 4.Detection of gesture occurs	Detection of gestures	Hand gestures needs to be detected and predicted	working as expected	Pass	Steps are clear to follow	Yes	NA
Login Page_TC_005	Functional	Home page	Output prediction	CNN trained model	1.Enter URL(http://127.0.0.1:5000) and click go 2.Click camera access 3.Image displayed 4.Detection of gesture occurs 5.Output prediction	Predicted gestures	Hand gestures are detected and predicted ASL_alphabets are displayed	working as expected	Pass	Predicted output is displayed	Yes	NA

A test case is nothing but a series of step executed on a design, using a predefined set of input data, expected to produce a pre-defined set of outputs, in a given environment. It describes "how" to implement those test cases.

8.2 User Acceptance Testing

User acceptance testing (UAT), also called application testing or end-user testing, is a phase of software development in which the software is tested in the real world by its intended audience.

1. **Purpose of Document**

The purpose of this document is to briefly explain the test coverage and open issues of project-Real Time Communication System Powered By AI For Specially Abled at the time of the release to User Acceptance Testing (UAT).

2. **Defect Analysis**

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	0	0	0	2	2
Duplicate	1	0	0	0	1
External	0	0	1	0	1
Fixed	0	1	1	0	2
Not Reproduced	0	1	0	0	1
Skipped	0	0	0	0	0
Won't Fix	0	1	0	0	1
Totals	1	3	2	2	8

3 Test Case

Analysis This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
View Home Page	7	0	1	6
Click Reference	15	0	3	12
Image displayed	12	0	0	12
Allow camera access	11	0	2	9
PrintEngine	8	0	0	8
ClientApplication	49	0	0	49
Security	4	0	0	4
OutsourceShipping	4	0	0	4
ExceptionReporting	11	0	0	11
FinalReportOutput	2	0	0	2
VersionControl	1	0	0	1

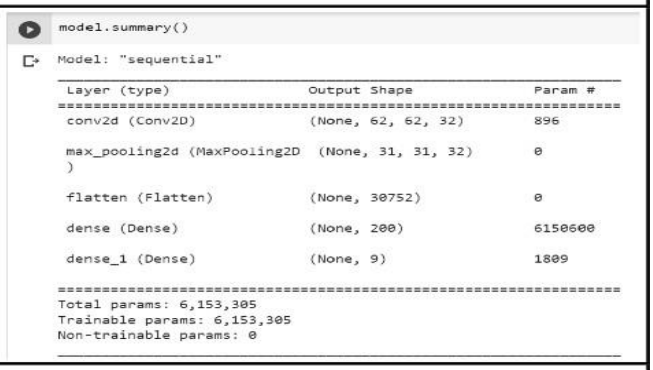
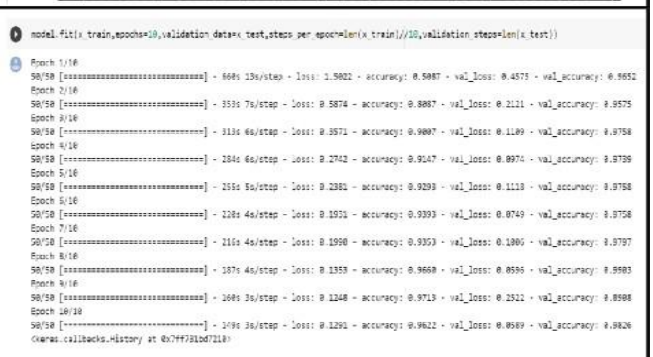
9.RESULT

Finally we got the output for the desired input.our ultimate aim is to covert sign language into English alphanets.We have created the user interface for impleting it so.Thus the website was created successfully.As a result both the deaf and dump alongwith normal people can able to understand the desired language that is required for them.

9.1 Performance metrics

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Values	Screenshot
1.	Model Summary	Model - Sequential model Layers: Conv2D-(None,62,62,32) MaxPooling2D-(None,31,31,32) Flatten-(None,30752) Dense-(None,200) Dense_1 -(None,9)	
2.	Accuracy	Training Accuracy - 0.9622 Validation Accuracy -0.9826	
3	Confidence Score	Class Detected – N/A Confidence Score -N/A	N/A

The proposed procedure was implemented and tested with set of images. The set of15750 images of Alphabets from “A” to “I” are used for training database and a set of 2250 images of Alphabets from “A” to “I” are used for testing database. Once the gesture is recognize the equivalent Alphabet is shown on the screen.

10. ADVANTAGES & DISADVANTAGES

Advantages:

1. Create a mobile application to bridge the communication gap between deaf and dumb persons and the general public.
2. Sign language standards exist, their dataset can be added, and the usercan choose which sign language to read.

Disadvantages:

1. Model only works from alphabets A to I.
2. Absence of gesture recognition, alphabets from J cannot be identified.
3. As the quantity/quality of images in the dataset is low, the accuracy is not great.

11.CONCLUSION

Sign language is a useful tool for facilitating communication between deaf and hearing people. Because it allows for two-way communication, the system aims to bridge the communication gap between deaf people and the rest of society. The proposed methodology translates language into English alphabets that are understandable to humans. This system sends hand gestures to the model, who recognises them and displays the equivalent Alphabet on the screen. Deaf-mute people can use their hands to perform sign language, which will then be converted into alphabets and words.

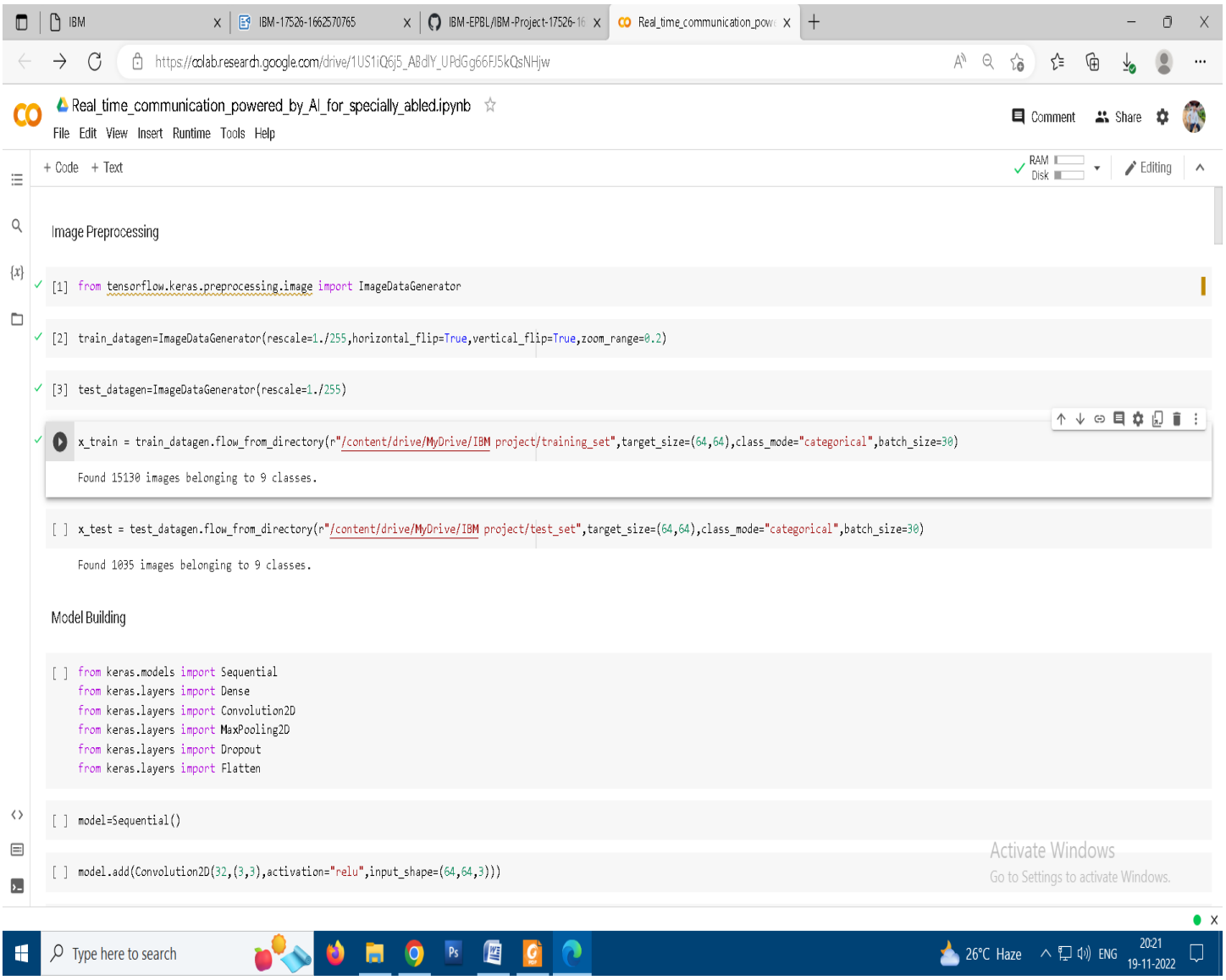
12.FUTURE SCOPE

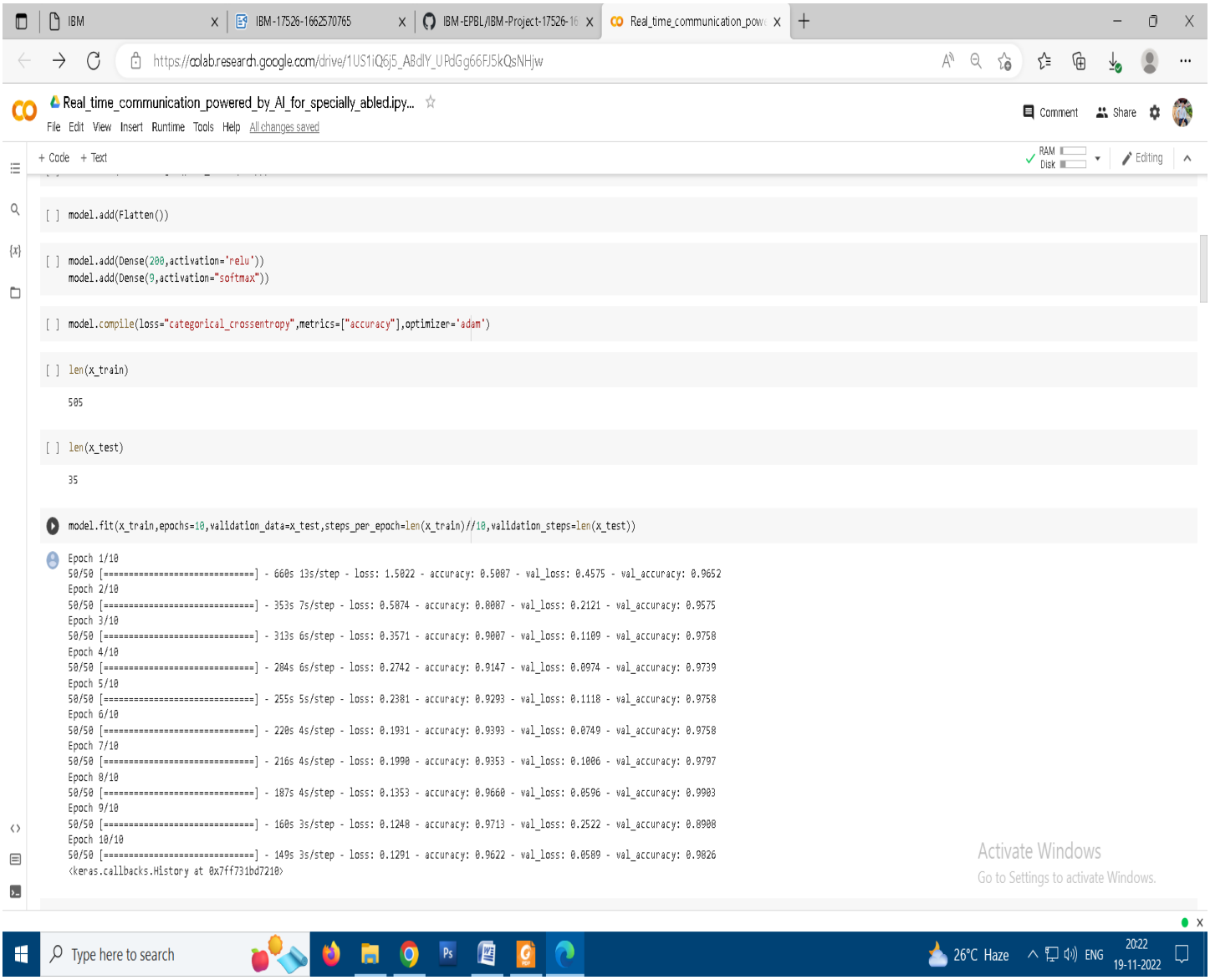
Having a technology that can translate hand sign language to its corresponding alphabet is a game changer in the field of communication and AI for the specially abledpeople such as deaf and dumb. With introduction of gesture recognition, the web app can easily be expanded to recognize letters beyond 'I', digits and other symbols plus
gesture recognition can also allow controlling of software/hardware interfaces.

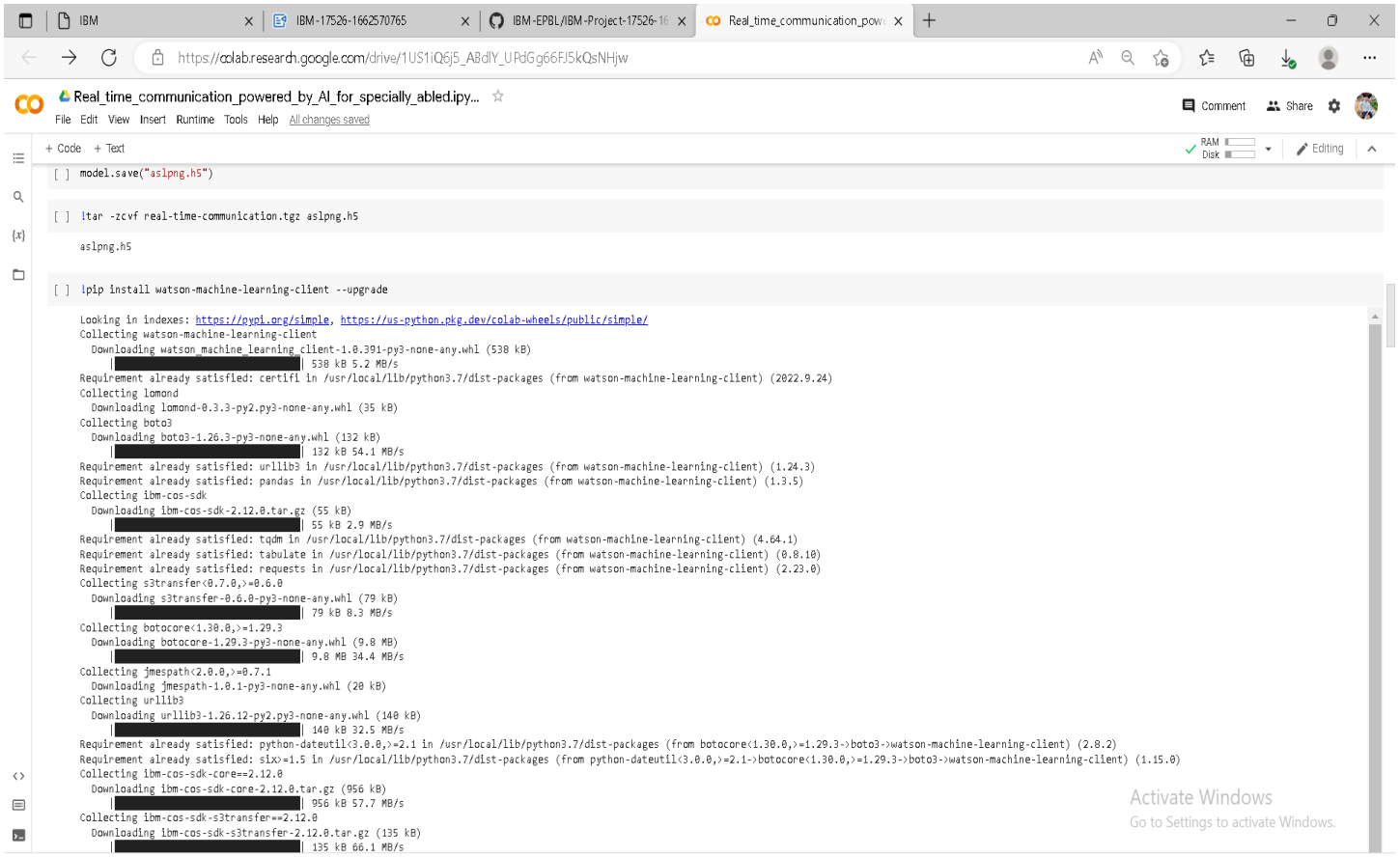
We can develop a model for ISL word and sentence level recognition. This will require a system that can detect changes with respect to the temporal space. We can also
develop a complete product that will help the speech and hearing-impaired people, andthereby reduce the communication gap.

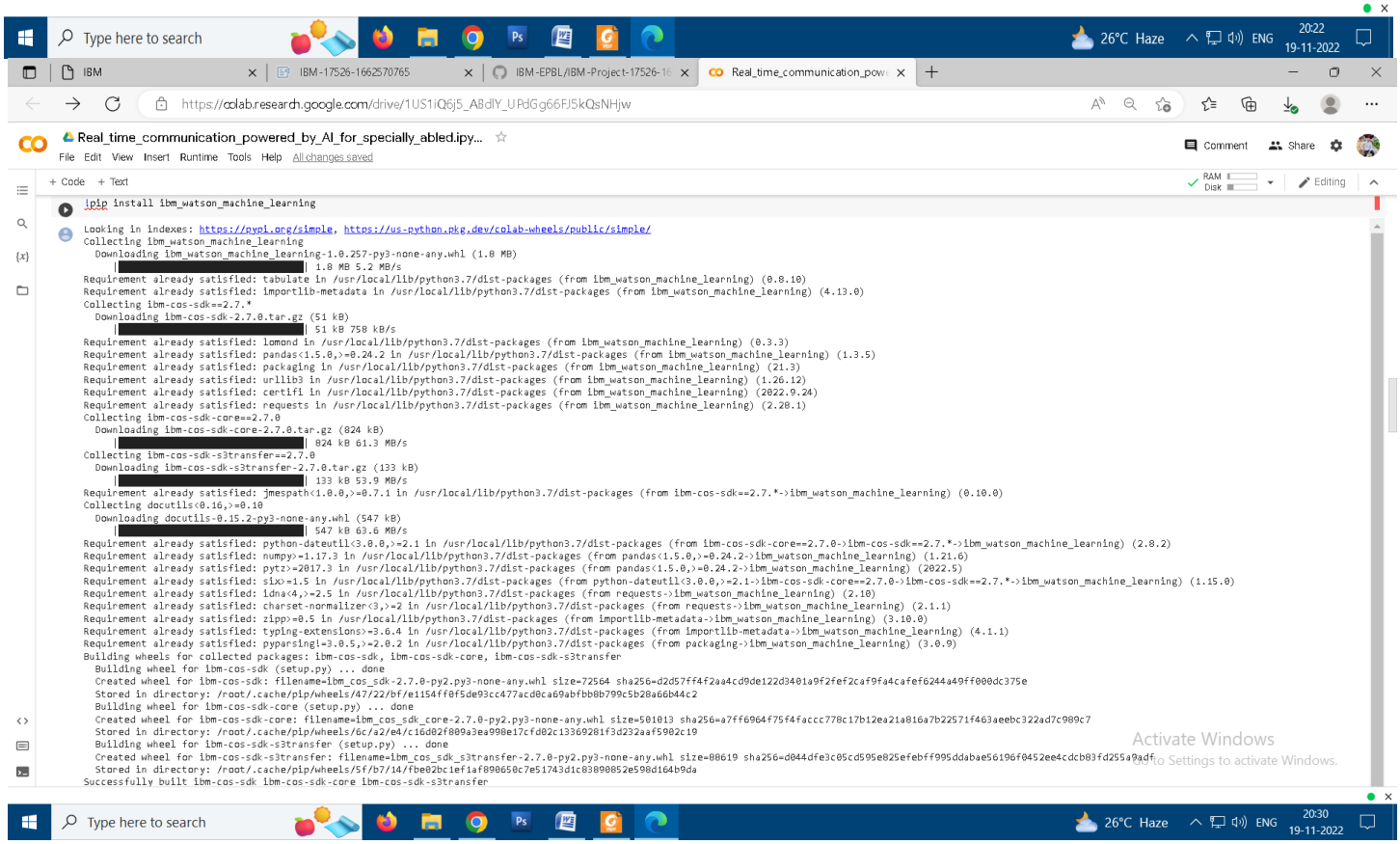
13.APPENDIX

Source Code for Model Training and Saving:




IBM
IBM-17526-1662570765
IBM-EPBL/IBM-Project-17526-16
Real_time_communication_pow
https://colab.research.google.com/drive/1US1iQ6j5_ABdlY_UPdGg66FJ5kQsNHjw
Real_time_communication_powered_by_AI_for_specially_abled.ipy...
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
[ ] model.add(Flatten())
[ ] model.add(Dense(200,activation='relu'))
model.add(Dense(9,activation="softmax"))
[ ] model.compile(loss="categorical_crossentropy",metrics=["accuracy"],optimizer='adam')
[ ] len(x_train)
505
[ ] len(x_test)
35
model.fit(x_train,epochs=10,validation_data=x_test,steps_per_epoch=len(x_train)//10,validation_steps=len(x_test))
Epoch 1/10
50/50 [==============================] - 660s 13s/step - loss: 1.5022 - accuracy: 0.5087 - val_loss: 0.4575 - val_accuracy: 0.9652
Epoch 2/10
50/50 [==============================] - 353s 7s/step - loss: 0.5874 - accuracy: 0.8087 - val_loss: 0.2121 - val_accuracy: 0.9575
Epoch 3/10
50/50 [==============================] - 313s 6s/step - loss: 0.3571 - accuracy: 0.9007 - val_loss: 0.1109 - val_accuracy: 0.9758
Epoch 4/10
50/50 [==============================] - 284s 6s/step - loss: 0.2742 - accuracy: 0.9147 - val_loss: 0.0974 - val_accuracy: 0.9739
Epoch 5/10
50/50 [==============================] - 255s 5s/step - loss: 0.2381 - accuracy: 0.9293 - val_loss: 0.1118 - val_accuracy: 0.9758
Epoch 6/10
50/50 [==============================] - 220s 4s/step - loss: 0.1931 - accuracy: 0.9393 - val_loss: 0.0749 - val_accuracy: 0.9758
Epoch 7/10
50/50 [==============================] - 216s 4s/step - loss: 0.1990 - accuracy: 0.9353 - val_loss: 0.1006 - val_accuracy: 0.9797
Epoch 8/10
50/50 [==============================] - 187s 4s/step - loss: 0.1353 - accuracy: 0.9660 - val_loss: 0.0596 - val_accuracy: 0.9903
Epoch 9/10
50/50 [==============================] - 160s 3s/step - loss: 0.1248 - accuracy: 0.9713 - val_loss: 0.2522 - val_accuracy: 0.8908
Epoch 10/10
50/50 [==============================] - 149s 3s/step - loss: 0.1291 - accuracy: 0.9622 - val_loss: 0.0589 - val_accuracy: 0.9826
<keras.callbacks.History at 0x7ff731bd7210>
Activate Windows
Go to Settings to activate Windows.
Type here to search
26°C Haze
ENG
20:22
19-11-2022


IBM
IBM-17526-1662570765
IBM-EPBL/IBM-Project-17526-16
Real_time_communication_pow
https://colab.research.google.com/drive/1US1iQ6j5_ABdlY_UPdGg66FJ5kQsNHjw
Real_time_communication_powered_by_AI_for_specially_abled.ipy...
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
[ ] model.save("aslpng.h5")
[ ] !tar -zcvf real-time-communication.tgz aslpng.h5
aslpng.h5
[ ] !pip install watson-machine-learning-client --upgrade
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting watson-machine-learning-client
Downloading watson_machine_learning_client-1.0.391-py3-none-any.whl (538 kB)
538 kB 5.2 MB/s
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (2022.9.24)
Collecting lomond
Downloading lomond-0.3.3-py2.py3-none-any.whl (35 kB)
Collecting boto3
Downloading boto3-1.26.3-py3-none-any.whl (132 kB)
132 kB 54.1 MB/s
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (1.24.3)
Requirement already satisfied: pandas in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (1.3.5)
Collecting ibm-cos-sdk
Downloading ibm-cos-sdk-2.12.0.tar.gz (55 kB)
55 kB 2.9 MB/s
Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (4.64.1)
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (0.8.10)
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (2.23.0)
Collecting s3transfer<0.7.0,>=0.6.0
Downloading s3transfer-0.6.0-py3-none-any.whl (79 kB)
79 kB 8.3 MB/s
Collecting botocore<1.30.0,>=1.29.3
Downloading botocore-1.29.3-py3-none-any.whl (9.8 MB)
9.8 MB 34.4 MB/s
Collecting jmespath<2.0.0,>=0.7.1
Downloading jmespath-1.0.1-py3-none-any.whl (20 kB)
Collecting urllib3
Downloading urllib3-1.26.12-py2.py3-none-any.whl (140 kB)
140 kB 32.5 MB/s
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /usr/local/lib/python3.7/dist-packages (from botocore<1.30.0,>=1.29.3->boto3->watson-machine-learning-client) (2.8.2)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from python-dateutil<3.0.0,>=2.1->botocore<1.30.0,>=1.29.3->boto3->watson-machine-learning-client) (1.15.0)
Collecting ibm-cos-sdk-core==2.12.0
Downloading ibm-cos-sdk-core-2.12.0.tar.gz (956 kB)
956 kB 57.7 MB/s
Collecting ibm-cos-sdk-s3transfer==2.12.0
Downloading ibm-cos-sdk-s3transfer-2.12.0.tar.gz (135 kB)
135 kB 66.1 MB/s
Activate Windows
Go to Settings to activate Windows.
Type here to search
26°C Haze
ENG
20:22
19-11-2022


IBM
IBM-17526-1662570765
IBM-EPBL/IBM-Project-17526-16
Real_time_communication_pow
https://colab.research.google.com/drive/1US1iQ6j5_ABdlY_UPdGg66FJ5kQsNHjw
Real_time_communication_powered_by_AI_for_specially_abled.ipy...
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
!pip install ibm_watson_machine_learning
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting ibm_watson_machine_learning
Downloading ibm_watson_machine_learning-1.0.257-py3-none-any.whl (1.8 MB)
1.8 MB 5.2 MB/s
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (from ibm_watson_machine_learning) (0.8.10)
Requirement already satisfied: importlib-metadata in /usr/local/lib/python3.7/dist-packages (from ibm_watson_machine_learning) (4.13.0)
Collecting ibm-cos-sdk==2.7.*
Downloading ibm-cos-sdk-2.7.0.tar.gz (51 kB)
51 kB 758 kB/s
Requirement already satisfied: lomond in /usr/local/lib/python3.7/dist-packages (from ibm_watson_machine_learning) (0.3.3)
Requirement already satisfied: pandas<1.5.0,>=0.24.2 in /usr/local/lib/python3.7/dist-packages (from ibm_watson_machine_learning) (1.3.5)
Requirement already satisfied: packaging in /usr/local/lib/python3.7/dist-packages (from ibm_watson_machine_learning) (21.3)
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-packages (from ibm_watson_machine_learning) (1.26.12)
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (from ibm_watson_machine_learning) (2022.9.24)
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-packages (from ibm_watson_machine_learning) (2.28.1)
Collecting ibm-cos-sdk-core==2.7.0
Downloading ibm-cos-sdk-core-2.7.0.tar.gz (824 kB)
824 kB 61.3 MB/s
Collecting ibm-cos-sdk-s3transfer==2.7.0
Downloading ibm-cos-sdk-s3transfer-2.7.0.tar.gz (133 kB)
133 kB 53.9 MB/s
Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in /usr/local/lib/python3.7/dist-packages (from ibm-cos-sdk==2.7.*->ibm_watson_machine_learning) (0.10.0)
Collecting docutils<0.16,>=0.10
Downloading docutils-0.15.2-py3-none-any.whl (547 kB)
547 kB 63.6 MB/s
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /usr/local/lib/python3.7/dist-packages (from ibm-cos-sdk-core==2.7.0->ibm-cos-sdk==2.7.*->ibm_watson_machine_learning) (2.8.2)
Requirement already satisfied: numpy>=1.17.3 in /usr/local/lib/python3.7/dist-packages (from pandas<1.5.0,>=0.24.2->ibm_watson_machine_learning) (1.21.6)
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages (from pandas<1.5.0,>=0.24.2->ibm_watson_machine_learning) (2022.5)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from python-dateutil<3.0.0,>=2.1->ibm-cos-sdk-core==2.7.0->ibm-cos-sdk==2.7.*->ibm_watson_machine_learning) (1.15.0)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests->ibm_watson_machine_learning) (2.10)
Requirement already satisfied: charset-normalizer<3,>=2 in /usr/local/lib/python3.7/dist-packages (from requests->ibm_watson_machine_learning) (2.1.1)
Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata->ibm_watson_machine_learning) (3.10.0)
Requirement already satisfied: typing-extensions>=3.6.4 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata->ibm_watson_machine_learning) (4.1.1)
Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in /usr/local/lib/python3.7/dist-packages (from packaging->ibm_watson_machine_learning) (3.0.9)
Building wheels for collected packages: ibm-cos-sdk, ibm-cos-sdk-core, ibm-cos-sdk-s3transfer
Building wheel for ibm-cos-sdk (setup.py) ... done
Created wheel for ibm-cos-sdk: filename=ibm_cos_sdk-2.7.0-py2.py3-none-any.whl size=72564 sha256=d2d57ff4f2aa4cd9de122d3401a9f2fef2caf9fa4cafef6244a49ff000dc375e
Stored in directory: /root/.cache/pip/wheels/47/22/bf/e1154ff0f5de93cc477acd0ca69abfbb8b799c5b28a66b44c2
Building wheel for ibm-cos-sdk-core (setup.py) ... done
Created wheel for ibm-cos-sdk-core: filename=ibm_cos_sdk_core-2.7.0-py2.py3-none-any.whl size=501013 sha256=a7ff6964f75f4faccc778c17b12ea21a816a7b22571f463aeebc322ad7c989c7
Stored in directory: /root/.cache/pip/wheels/6c/a2/e4/c16d02f809a3ea998e17cfd02c13369281f3d232aaf5902c19
Building wheel for ibm-cos-sdk-s3transfer (setup.py) ... done
Created wheel for ibm-cos-sdk-s3transfer: filename=ibm_cos_sdk_s3transfer-2.7.0-py2.py3-none-any.whl size=88619 sha256=d044dfe3c05cd595e825efebff995ddabae56196f0452ee4cdcb03fd255a9adf
Stored in directory: /root/.cache/pip/wheels/5f/b7/14/fbe02bc1ef1af890650c7e51743d1c83890852e598d164b9da
Successfully built ibm-cos-sdk ibm-cos-sdk-core ibm-cos-sdk-s3transfer
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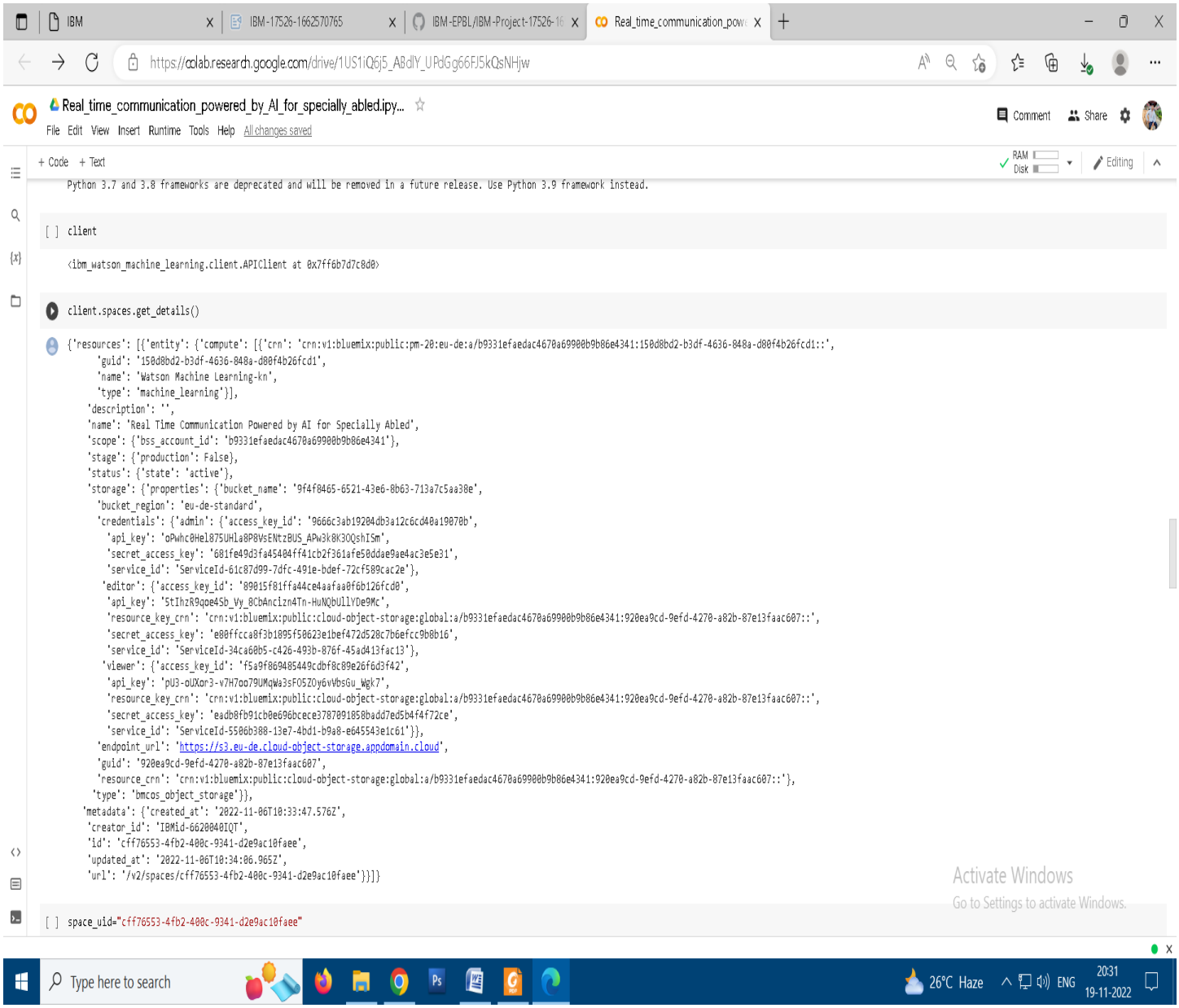
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IBM-EPBL/IBM-Project-17526-16
Real_time_communication_powe
https://colab.research.google.com/drive/1US1iQ6j5_ABdlY_UPdGg66FJ5kQsNHjw
Real_time_communication_powered_by_AI_for_specially_abled.ipy...
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
RAM
Disk
Editing
Python 3.7 and 3.8 frameworks are deprecated and will be removed in a future release. Use Python 3.9 framework instead.
[ ] client
<ibm_watson_machine_learning.client.APIClient at 0x7ff6b7d7c8d0>
client.spaces.get_details()
{'resources': [{'entity': {'compute': [{'crn': 'crn:v1:bluemix:public:pm-20:eu-de:a/b9331efaedac4670a69900b9b86e4341:150d8bd2-b3df-4636-848a-d80f4b26fcd1::',
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'name': 'Watson Machine Learning-kn',
'type': 'machine_learning'}],
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'guid': '920ea9cd-9efd-4270-a82b-87e13faac607',
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'url': '/v2/spaces/cff76553-4fb2-400c-9341-d2e9ac10faee'}]}
Activate Windows
Go to Settings to activate Windows.
[ ] space_uid="cff76553-4fb2-400c-9341-d2e9ac10faee"
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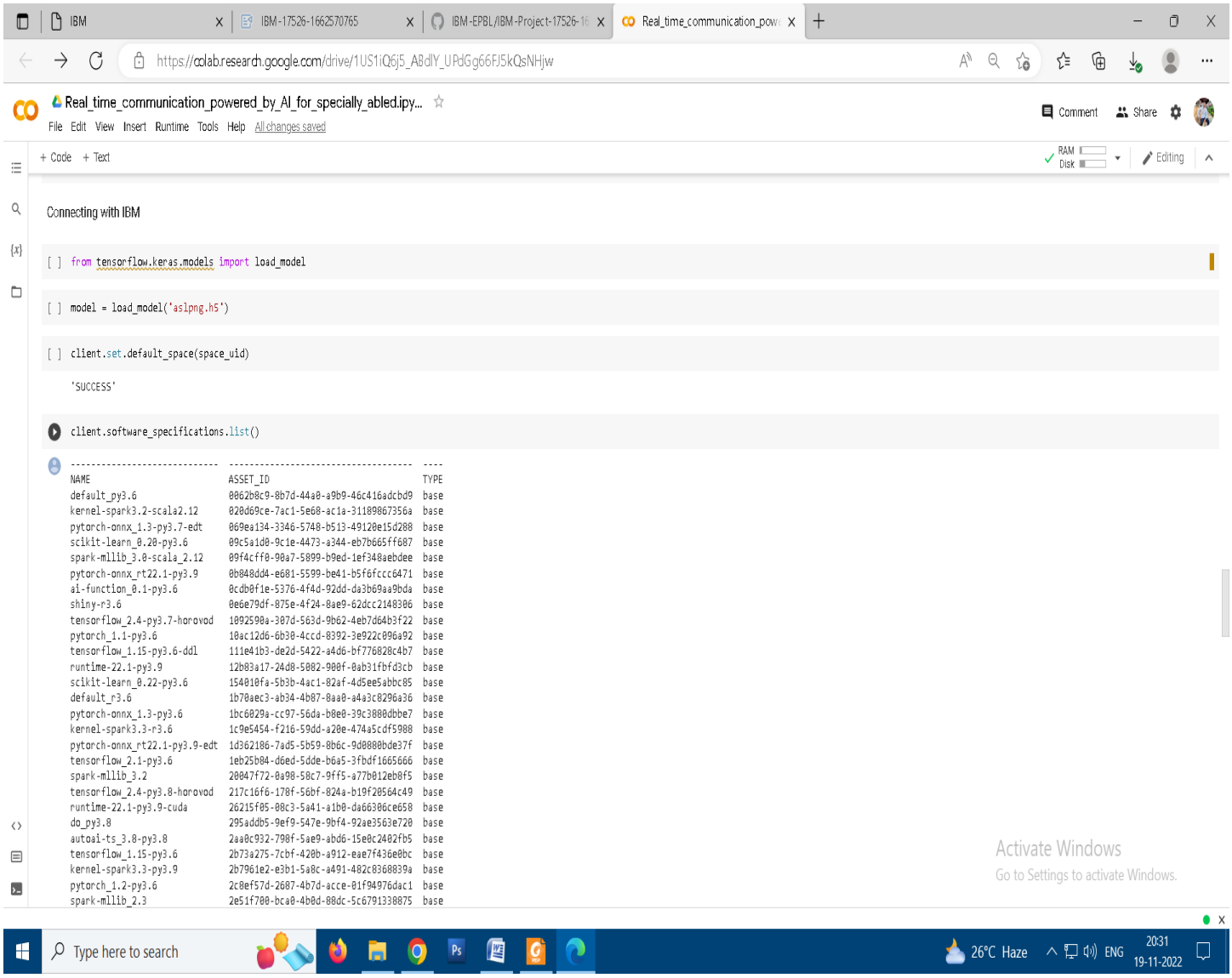
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IBM-EPBL/IBM-Project-17526-16
Real_time_communication_pow
https://colab.research.google.com/drive/1US1iQ6j5_ABdlY_UPdGg66FJ5kQsNHjw
Real_time_communication_powered_by_AI_for_specially_abled.ipy...
File Edit View Insert Runtime Tools Help All changes saved
Comment
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RAM
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Editing
Connecting with IBM
[ ] from tensorflow.keras.models import load_model
[ ] model = load_model('aslpng.h5')
[ ] client.set.default_space(space_uid)
'SUCCESS'
client.software_specifications.list()
NAME ASSET_ID TYPE
default_py3.6 0062b8c9-8b7d-44a0-a9b9-46c416adcbd9 base
kernel-spark3.2-scala2.12 020d69ce-7ac1-5e68-ac1a-31189867356a base
pytorch-onnx_1.3-py3.7-edt 069ea134-3346-5748-b513-49120e15d288 base
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spark-mllib_3.0-scala_2.12 09f4cff0-90a7-5899-b9ed-1ef348aebdee base
pytorch-onnx_rt22.1-py3.9 0b848dd4-e681-5599-be41-b5f6fccc6471 base
ai-function_0.1-py3.6 0cdb0f1e-5376-4f4d-92dd-da3b69aa9bda base
shiny-r3.6 0e6e79df-875e-4f24-8ae9-62dcc2148306 base
tensorflow_2.4-py3.7-horovod 1092590a-307d-563d-9b62-4eb7d64b3f22 base
pytorch_1.1-py3.6 10ac12d6-6b30-4ccd-8392-3e922c096a92 base
tensorflow_1.15-py3.6-ddl 111e41b3-de2d-5422-a4d6-bf776828c4b7 base
runtime-22.1-py3.9 12b83a17-24d8-5082-900f-0ab31fbfd3cb base
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default_r3.6 1b70aec3-ab34-4b87-8aa0-a4a3c8296a36 base
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kernel-spark3.3-r3.6 1c9e5454-f216-59dd-a20e-474a5cdf5988 base
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tensorflow_2.4-py3.8-horovod 217c16f6-178f-56bf-824a-b19f20564c49 base
runtime-22.1-py3.9-cuda 26215f05-08c3-5a41-a1b0-da66306ce658 base
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spark-mllib_2.3 2e51f700-bca0-4b0d-88dc-5c6791338875 base
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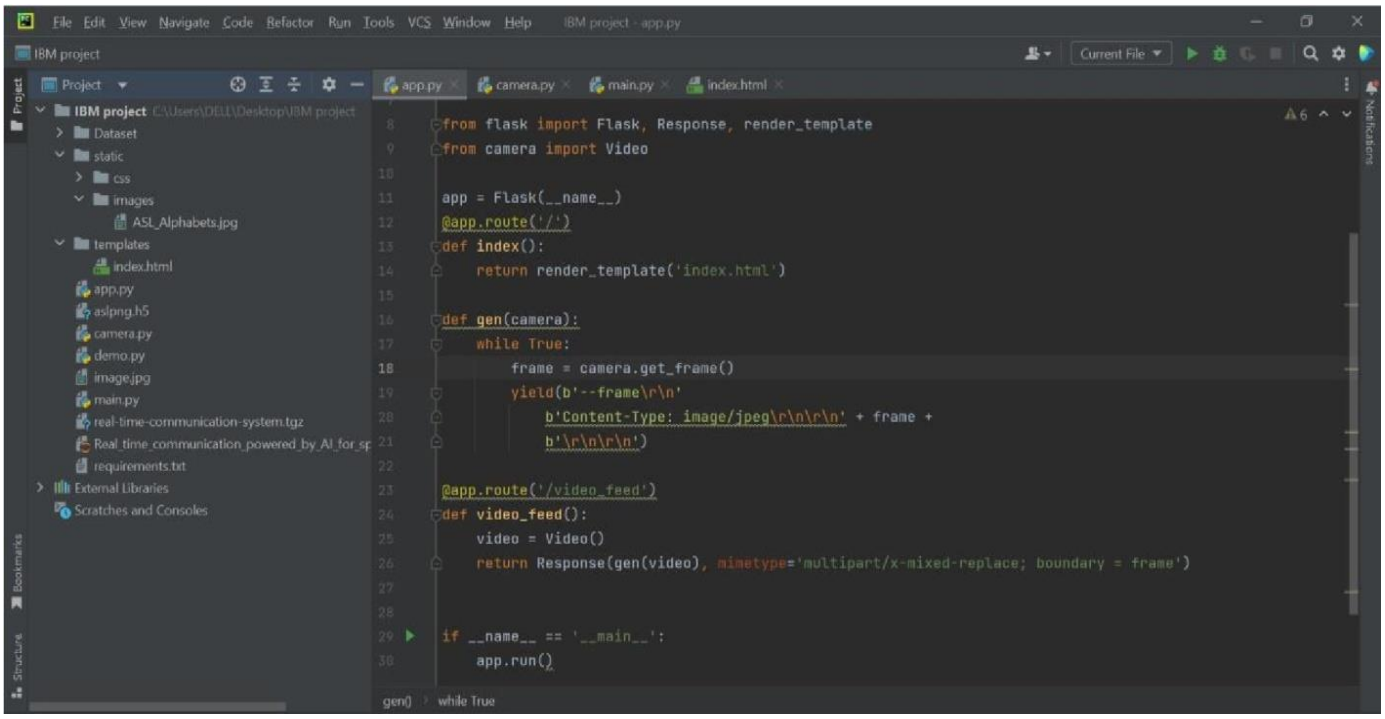
File Edit View Navigate Code Refactor Run Tools VCS Window Help
IBM project - app.py
IBM project
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app.py
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main.py
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images
ASL_Alphabets.jpg
templates
index.html
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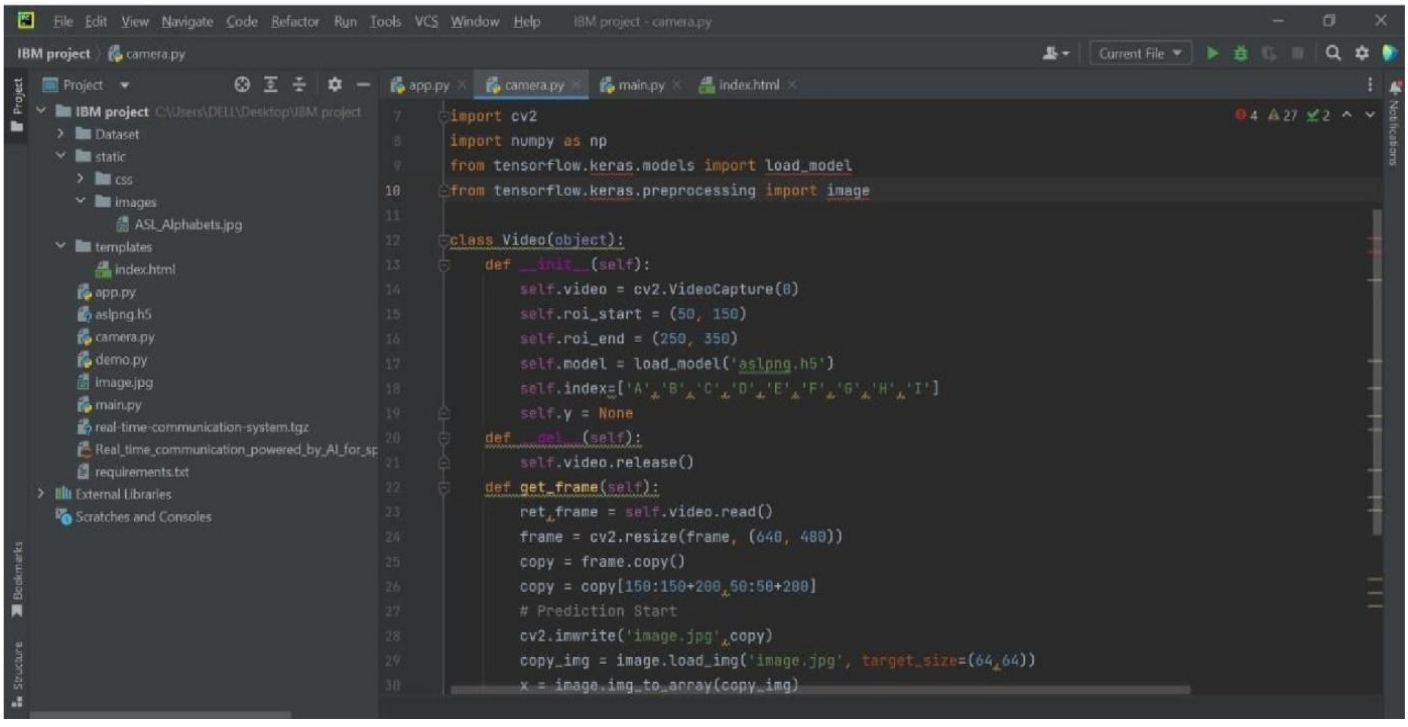
aslpng.h5
camera.py
demo.py
image.jpg
main.py
real-time-communication-system.tgz
Real_time_communication_powered_by_AI_for_sp
requirements.txt
External Libraries
Scratches and Consoles
from flask import Flask, Response, render_template
from camera import Video
app = Flask(__name__)
@app.route('/')
def index():
return render_template('index.html')
def gen(camera):
while True:
frame = camera.get_frame()
yield(b'--frame\r\n'
b'Content-Type: image/jpeg\r\n\r\n' + frame +
b'\r\n\r\n')
@app.route('/video_feed')
def video_feed():
video = Video()
return Response(gen(video), mimetype='multipart/x-mixed-replace; boundary = frame')
if __name__ == '__main__':
app.run()
gen() › while True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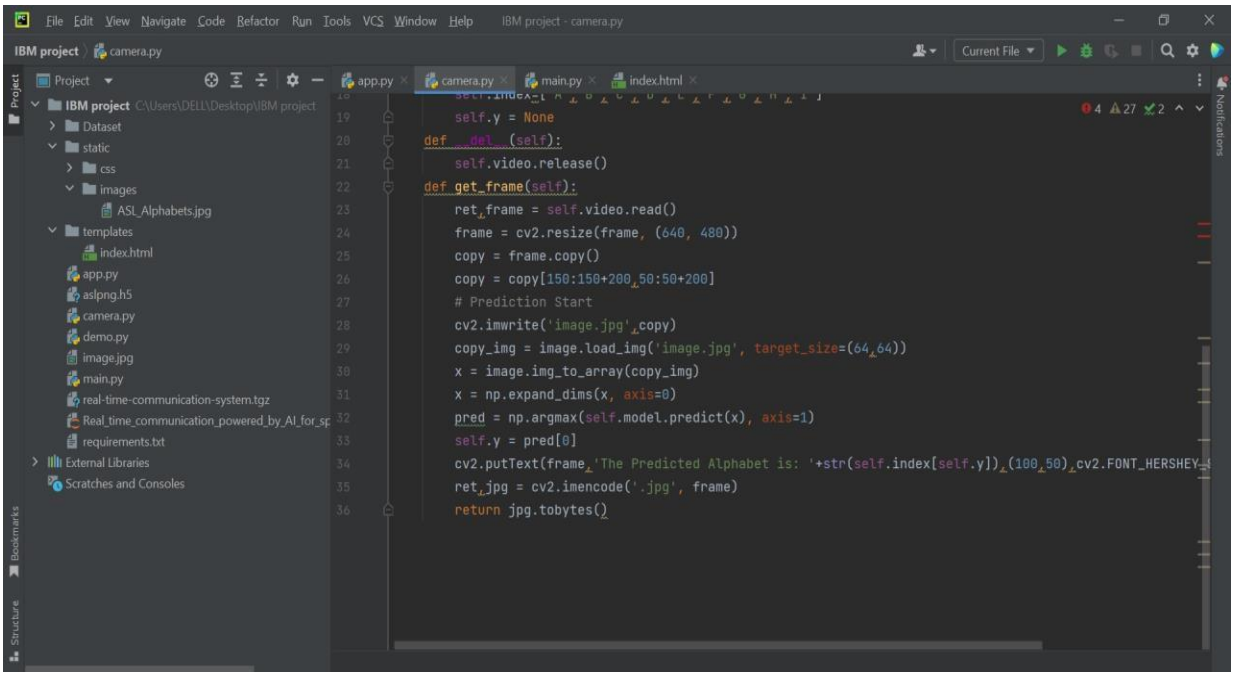
demo.py
image.jpg
main.py
real-time-communication-system.tgz
Real_time_communication_powered_by_AI_for_sp
requirements.txt
External Libraries
Scratches and Consoles
import cv2
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
class Video(object):
def __init__(self):
self.video = cv2.VideoCapture(0)
self.roi_start = (50, 150)
self.roi_end = (250, 350)
self.model = load_model('aslpng.h5')
self.index=['A','B','C','D','E','F','G','H','I']
self.y = None
def __del__(self):
self.video.release()
def get_frame(self):
ret,frame = self.video.read()
frame = cv2.resize(frame, (640, 480))
copy = frame.copy()
copy = copy[150:150+200,50:50+200]
# Prediction Start
cv2.imwrite('image.jpg',copy)
copy_img = image.load_img('image.jpg', target_size=(64,64))
x = image.img_to_array(copy_img)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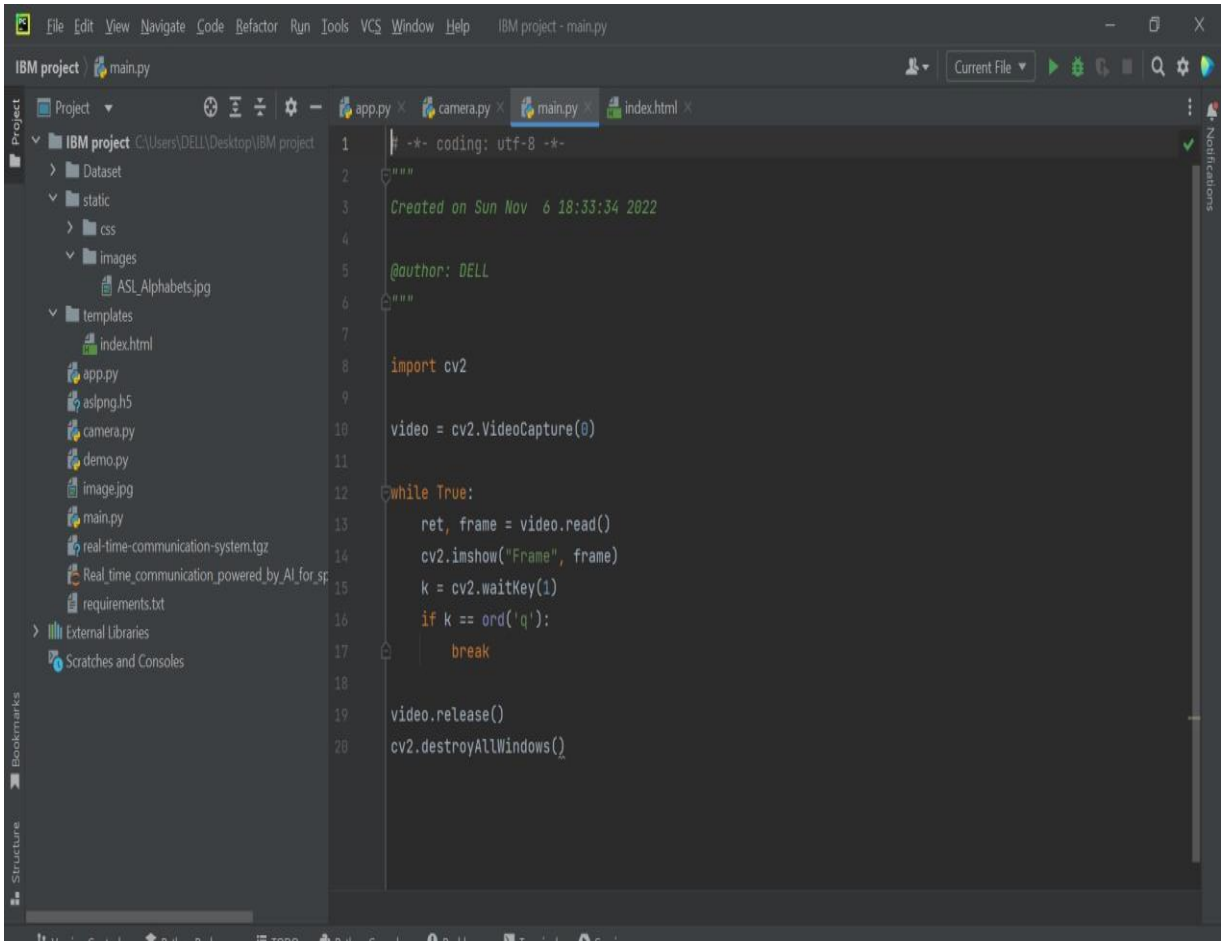
real-time-communication-system.tgz
Real_time_communication_powered_by_AI_for_sp
requirements.txt
External Libraries
Scratches and Consoles
Bookmarks
Structure
Notifications
4 27 2
self.y = None
def __del__(self):
self.video.release()
def get_frame(self):
ret, frame = self.video.read()
frame = cv2.resize(frame, (640, 480))
copy = frame.copy()
copy = copy[150:150+200, 50:50+200]
# Prediction Start
cv2.imwrite('image.jpg', copy)
copy_img = image.load_img('image.jpg', target_size=(64, 64))
x = image.img_to_array(copy_img)
x = np.expand_dims(x, axis=0)
pred = np.argmax(self.model.predict(x), axis=1)
self.y = pred[0]
cv2.putText(frame, 'The Predicted Alphabet is: '+str(self.index[self.y]), (100, 50), cv2.FONT_HERSHEY
ret, jpg = cv2.imencode('.jpg', frame)
return jpg.tobytes()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IBM project - main.py
IBM project
main.py
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IBM project C:\Users\DELL\Desktop\IBM project
Dataset
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real-time-communication-system.tgz
Real_time_communication_powered_by_AI_for_sp
requirements.txt
External Libraries
Scratches and Consoles
Bookmarks
Structure
Notifications
-*- coding: utf-8 -*-
"""
Created on Sun Nov 6 18:33:34 2022
@author: DELL
"""
import cv2
video = cv2.VideoCapture(0)
while True:
ret, frame = video.read()
cv2.imshow("Frame", frame)
k = cv2.waitKey(1)
if k == ord('q'):
break
video.release()
cv2.destroyAllWindows()