REAL - TIME COMMUNICATION SYSTEM POWERED BY AI FOR SPECIALLY ABLED

NALAIYA THIRAN PROJECT BASED LEARNING ON PROFESSIONAL READLINESS FOR INNOVATION EMPLOYMENT AND ENTERPRENEURSHIP

A PROJECT REPORT

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Project Report Format

- **INTRODUCTION**

  - Project Overview
  - Purpose
- **LITERATURE SURVEY**

  - Existing problem
  - References
  - Problem Statement Definition
- **IDEATION & PROPOSED SOLUTION**

  - Empathy Map Canvas
  - Ideation & Brainstorming
  - Proposed Solution
  - Problem Solution fit
- **REQUIREMENT ANALYSIS**

  - Functional requirement
  - Non-Functional requirements
- **PROJECT DESIGN**

  - Data Flow Diagrams
  - Solution & Technical Architecture
  - User Stories
- **PROJECT PLANNING & SCHEDULING**

  - Sprint Planning & Estimation
  - Sprint Delivery Schedule

  - Reports from JIRA

- **CODING & SOLUTIONING (Explain the features added in the project along with code)**

- Feature 1
- Feature 2
- Database Schema (if Applicable)
- **TESTING**

- Test Cases
- User Acceptance Testing

9RESULTS

9.1 Performance Metrics

- **ADVANTAGES &DISADVANTAGES**

- **CONCLUSION**
- **FUTURE SCOPE**

13APPENDIX

Source Code

GitHub &Project Demo Link

REAL TIME COMMUNICATION SYSTEM POWERED SYSTEM BY AI FOR SPECIALLYABLED

INTRODUCTION:

1.1 Project Overview:

Deaf and dump is a term means who cloud not either here or both hear speak. The number of deaf and dumb in the increasing and they are introverted closed society. The education of the deaf in the one century old. Since it is the earliest way of communication in the world when there is no appropriate language so, the sign language preferred among the

deaf-dumb people for education. As with other forms of manual communication, sign language depends on figure spelling,. The simplest visual from of figure spelling is simulating the shape of letter in the air, or actually, tracking letters on the hand. Figure spelling can use one hand such as in British sign language .Uneducated Deaf- dumb people can communicative with other people (normal or handicaps) with sign language only, so they offices…etc. Therefore, they effective tool to translate their worlds from sign language to Arabic or English language directly. This toll can facilities heir communication with normal people and English them to learn both Arabic and language. Also Deaf-Dumb kids easily solve most of their problems in one application.

Therefore, the present work aims to:

Help deaf and dumb to interact more with normal people.

- Offer a great tool for parents to teach their deaf and dumb kids
- Introduction sign language keyboard.
- Introduction quizzes and games for training deaf and dumb to identify Arabic and English world.

Hoping this application can give a hand to uneducated Deaf-Dumb people who do not read write Arabic language to communication with others, to learn entertain.

The remainder of this paper is organized as follows. Section discusses the related. Section describes our proposed application in details. Section provide the performs evaluation. Finally section concludes this paper.

Purpose:

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. 1

We are using 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.

- **LITERATURE SURVAY**
  - **Existing problem :**

    - The specifically a bled in used for RF tab fixed the classroom.

- Wi-Fi and Bluetooth in connected the system to read instructions for students.
- Convolution neural network to create a model that is trained on different hand gestures.

- **References:**

S.No	Title	Journal	Authors	1
1	**Hand Gustur eRecognition system**	Journal of the inst. OfEngineers India :series-A vol.17,No.1,pp.45-78(2017)	Dr.Sundarajan	Change of the color was happeningvery rapidly. Changing in thedifferent lightin g condition, which error or even.
2	**Hand Gestur eRecognition system using data-acquisition andpre processing**	Journal of computer science vol.4, issue-April(2017)	Dr.Dasaraju Srinivasa Rao	Does not consider gesture recognition oftemporal space. Unable to classify image with complex background.
3	**Hand Gesture Recognition using kinetic camera**	Journal of the into Engineers India :series-A oct(2020)	Dr.Partha Talukdar	Change in the illumination, rotation and orientation, scaling problem a special hardware.

- **Problem Statement Definition:**

- This problem occurs for the people the disabled who find it difficult to communication by the necessary information.

- Through technology grow by day. No means communication by the disabled once. As a result find it very difficult to convey the information. It becomes a huge problem during the emergency times.

- Considering the above situations, if system is designed to capture the hand of fixed related information. Then it would be easier if the solution is not fixed, then issue rise to in the result the unexpected.

- The issue mainly in conveying the information public areas such as railway counters and airports, by the disabled once so, we required advanced encrypted powerful AI data along with uninterrupted to conveys effectively.

- AI enables people with the disabilities to lead in depended life with this app. supporting activities daily with the living conveying the required information.

- **IDEATION & PROPOSED SOLUTION:**

  - **Empathy Map Canvas:**

    Build empathy and keep your focus on the user by outing yourself in their shoes.

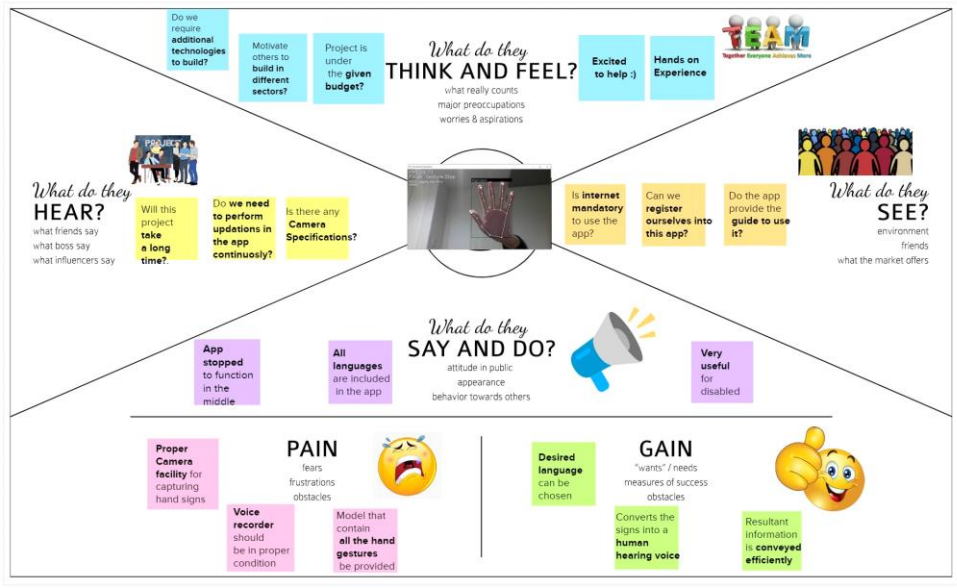
Edit this template
Right-click to unlock

Empathy Map Canvas

Gain insight and understanding on solving customer problems.

1

Build empathy and keep your focus on the user by putting yourself in their shoes.



Share your feedback

- **Ideation & Brain storming:**

Brainstorming can be used to generate possible solutions for simple problems, but it is unrealistic to expect it to accomplish most problem-solving or planning tasks.

- **Proposed Solution:**
-

Problem Statement

- **Problem**

Solution fit: Problem –

Solution Fit Template:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It

helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why

Purpose:

- Solve complex problems in a way that fits the state of your customers
- Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.
- Sharpen your communication and marketing strategy with the right triggers and messaging.q Increase touch-points with your company by finding the right problem-behavior fit and
- Building trust by solving frequent annoyances, or urgent or costly problems.
- Understand the existing situation in order to improve it for your target group.

- **REQUIREMENT ANALYSIS**

Functional requirement:

- Here, Desktop along with Camera is presented as black box.
- Deaf/Dumb is the person, who will show different signs based on the type of
- Information being conveyed. The normal person is the passive user of the desktop.

The **system requirements** that are required are specified below,

- Deaf/Dumb person should be able to perform a sign that represents digit/number
- Deaf/Dumb person should be able to perform a sign that represents a character
- Deaf/Dumb person should be able to perform a sign, where group of characters forms a word.
- Deaf/Dumb person should be able to perform a sign, where a group of words forms a sentence.

- Especially Deaf people should be able to see the translation of sign to text format.
- Dumb person should be able to understand the conversion of text into voice mode.
- Normal user should be able to understand the corresponding information conveyed by disabled through sign language. 6

Software Requirements	Hardware Requirements
Web camera –(320x260 minimum)	**Operating system platform-windows7 and greater**
Processor-400 MHz or above	**MYSQL Database**
RAM-512 MB or above	**Adam Boost Face detector**
Hard disk-at least 256 MB free	**HTML,CSS,Java Script and Angular for webpage**
Speaker with a sensitivity of 87-88 D8	**Media pipe Framework**

Default Operation:

- The user of the app faces the camera and performs the concerned hand sign to convey information.
- System/Desktop analyses the sign made by the user.
- Once analysis gets finished, then the concerned signs together are shown as a text based and also through voice.

Unexpected Operations:

Desktop indicates that user's hand sign is not within the frame or in Region of Interest(ROI).

User of the app show the hand sign towards the camera

. 2. Desktop shows that sign is not within ROI.

- Still User , make sure to present his/harbinger within frame.

- At Finally, the Desktop finally detects the hand sign.

Signs are not recognized:

- Excepts the signs that are trained and included in the dataset, the Desktop will never detect the sign rather than this.
- User Performs the sign and sees that after 50ms, the concerned letter occupies the space of text.

Speech/Voice assistant is implemented:

Speech assistant is to be implemented in order to convert the output text into voice.

Non-Functional requirements:

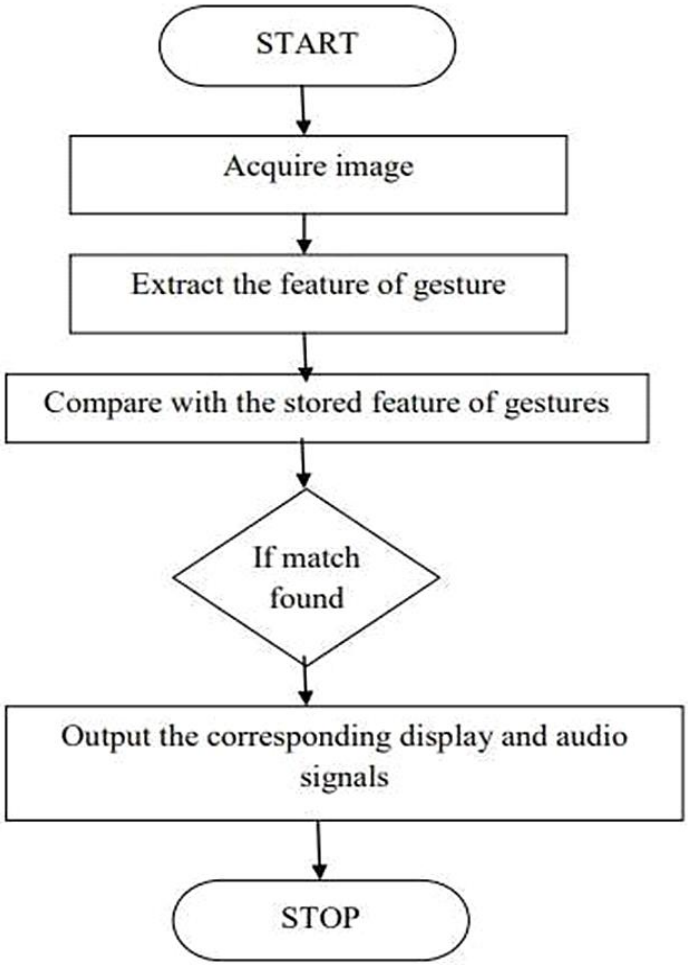
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	It is used to describe the application and easy to access the application with the guidelines.
NFR-2	**Security**	It ensures the security of the application by building a firewall and two steps verification support. Accessed only by the authorized person by given user ID and password or OTP verification
NFR-3	**Reliability**	To maintain the application conditions and update the version of the application. System update and software update are possible to increase various features and durability based on technology.
NFR-4	**Performance**	This application collects the datasets of hand gusted to provide accurate prediction. Using this method, we can communicate easily at anytime. This application is user friendly and can access by both specially abled and normal people.

NFR-5	**Availability**	Depending on the requirements of the user, alrequired functions will be offered. When the usher requests any features. Are made 8available in places where users like to know about it.

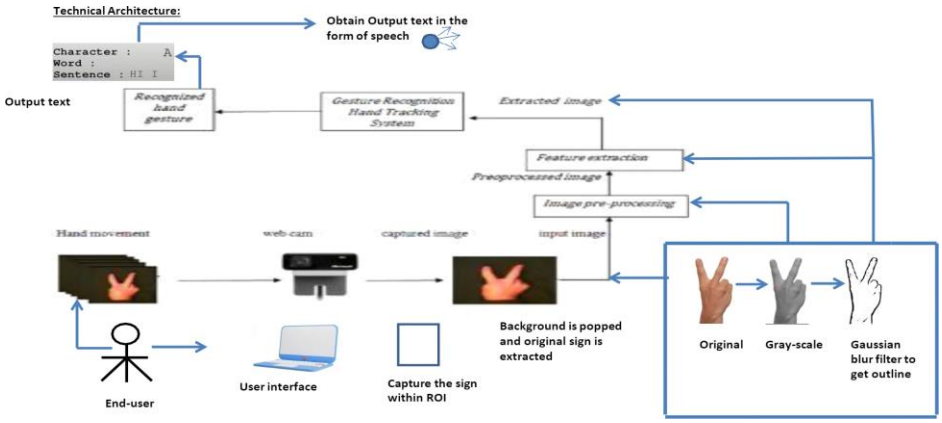
- **PROJECT DESIGN:**

5.1 Data Flow Diagrams:



A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data centers and leaves the system, what changes the information, and where data is stored.

5.2. Solution& Technical Architecture:



5.3 User Stories:

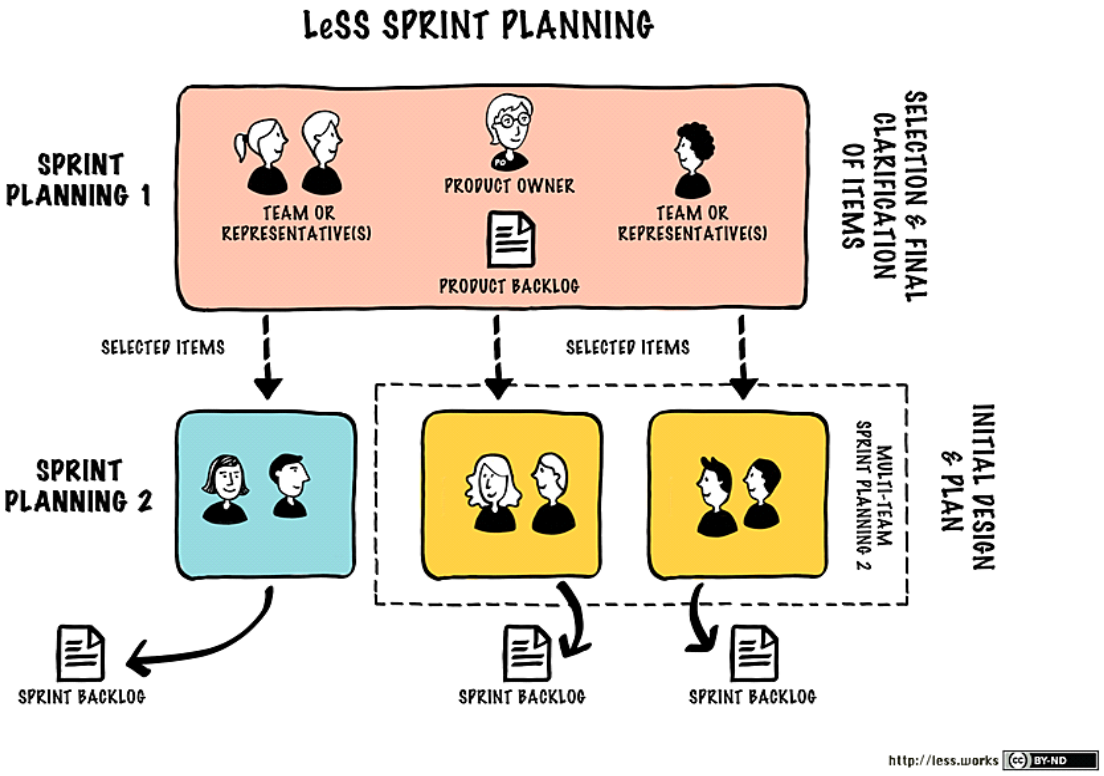
Use thebelow template to listall the user stories for the product.

Sprint	Functional Requirements(Epic)	User story Number	User story / Task	Story point
Sprint-1	Register	USN-1	As a user register for the application by entering my email, and conforming any password	2
Sprint -2	Communicate	USN-2	As user, I will receive conformation email once I have registered, for the application.	1
Sprint-1	login	USN-3	As a user I can application by entering email password	1
Sprint-2	Dash board	USN-4	As user, I can log into the account in a given Dashboard	2

Sprint-1	User interface	USN-5	Professional responsible for user requirements needs.	2
Sprint-3	Objective	USN-6	The goal is to describe all the input and output	1
Sprint-4	Privacy	USN-7	The developed application should be secure for the users	2

PROJECT PLANNING & SCHEDULING:

- **Sprint Planning & Estimation:**



- **SprintDelivery :**

Sprint	Total story points	Duration	Sprint startdate	Sprint Enddate (planned)	Story point completed (ason 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 Oct 2022
Sprint -3	20	6 days	07 Nov 2022	12 Nov 2022	20	07 Oct 2022
Sprint -4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

1
1

- **Reports from JIRA:**

- **CODING & SOLUTIONING (Explain the features addedin the project along with code)**

- **Feature 1:**

Image preprocessing

From tensorflow.keras.preprocessing.image import

ImageDataGenerator#traning Data gen

Train _data gen =
ImageDataGenerator(rescale=1/255,zoom_range=0.2,horizontal_flip=True,vertical_flip=False)

#traning Data gen

Test_datagen =

imageDataGenerator(rescale=1/255)Import

TensorFlow as tf

From tensorflow.keras.models import sequential

From tensorflow.keras.layers import Dense,Conv2D,Flatten,Dropout,

Maxpoling2DFrom tensorflow.keras.preprocessing.image import

ImagedataGenerator

Import numpy as np

Import matpotlib.pyplot as

plot Import Ipython.display

as display

From PIL import as display import path lib

From tensorflow.keras.preprocessing. image import ImageDataGenerator

Ptint("This dataset has been created and uploaded by IBM-TeamID-IBM-project-45753-16607032074")

model

buildin

g

#create

model

From keras.model import sequential

From keras. Layers import dense

From keras.Layers import

convoltion2DFrom

keras.Layers import dropout

From keras.Layers import

Flatten

From tensorflow.keras.preprocessing.image import

imageDgatGeneratorImport numpy as np

Import matplotlib.pyplot as plt #to graph import

ImageDataGeneratorImport Ipython.display as display

From Pl t import image

Import
pathlibx_train_datagen.flow_from_directory('dataset',target_size(64,64),batch_size=300clas
s_mode x_train = test_datagen.flow_from-
directory('dataset',target_size=(64,64),batch_size=300,

Class_mod='categorical',

clour_mode="grayscale")A=len(x_train)

B=le

n(x_

test)

Print

(a)

Print

(b)

#cre

at

mod

el

Model=sequential()

Model.add(convolution2D(32,(3,3),input_shape=(64,64,1)activation='

relu')) Model.add(maxpolling2D(pool_size=(2,2))

Initialize

model

Model

sequential=

()

Convoluti

on layer

Model.add(convolution2D(32,(3,3),input_shape=(64,64,1)activation="relu)

Add the pooling layer

Model.add(maxpooling2D(pool_size=(2,2))) 13

Add the

flatten layer

Model.add(flatt

en()) **Adding**

the Dense

layer

Model.add(dense(units=512,activation="rel

u"))

Model.add(Dense(units=9,activation='softm

ax'))**Compile the model**

Model compile(loss="categorical_crassentroypy',optimizer='adam',matrices=['accurancy'])

Fit and save the model

a. model.save('aslpng1.h5)

- **Feature 2:**

Build A Flask Application

Import

numpy as

npImport

cv2

Import os

Import keras.models import load_model

Import flask import Flask,render_template,

ResponseImport tensor flow tf

From tensor flow as tf

From gt import gTTs #to convert text to

speechGlobal graph

Global writer

From skimage.transfrom

import resizeWriter= none

Model = load_model(‘aslpng1.h5’)

Vals = [‘A’,’B’,’C’,’D’,’E’,’F’,’G’,’H’,,’I’]

App=flask(__name__)

Print(“[INFO] accessing video stream…”)

Vs = cv2.VideoCparute(0)#triggers the local camera 14

Pred=

””””

@app.

route(‘

/’)Def

index(

):

Return render_template(index.html)

@app.route(‘/video_feed’)

Def video_feed():

Return response(gen(), mimetype=’multipart/x-mixed-mixed-

replace;boundary=frame) Name_==’_main_’:

pp.run(host=0.0.0.0,debug=True)

- **Database Schema (if Applicable):**

Name	Date modified	Type	Size
Dataset	30-10-2022 21:44	File folder	
static	30-10-2022 21:44	File folder	
templates	30-10-2022 21:53	File folder	
aslpng1.h5	30-10-2022 21:54	H5 File	0 KB
output	30-10-2022 21:56	AVI File	0 KB
Test.ipynb	30-10-2022 21:56	IPYNB File	0 KB
text	30-10-2022 21:57	MP3 File	0 KB
Train.ipynb	30-10-2022 21:57	IPYNB File	0 KB
webstreaming	30-10-2022 21:58	Python File	0 KB

- **TESTING:**

  - **Test Cases:**

```
from tensorflow.keras.models import
load_model from
tensorflow.keras.preprocessing import image
import cv2
```



```
model = load _model('/content/Real_time,h5')
img = image.load_img('/content/Dataset/test_set/H/107.png',target_size =
(100,100))img
```

output:

- **User Acceptance Testing**

- **RESULTS**

  - **Performance Metrics**

- **ADVANTAGES &**

DISADVANTAGESADVANTAGES:

We are using 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.

DISADVANTAGES:

convolution neural network to create a model that is trained on different hand gestures.

- **CONCLUSION:**

In this paper, we present an efficient application for uneducated deaf-dumb application. This application aims to help deaf dumb by proving them with attractive communication and learning tools. This work introduces a mobile application that communication between uneducated deaf-dumb and normal people in our society.

I

t also developed an aid for deaf people in many fields restaurant, hospital and transport. Moreover, this application introduced an easy translation from sign language to English or Arabic language and vice versa.

- **FUTURE SCOPE:**

Speech-to-Transcription

We are all different, but that does not mean not equal. all of us have unique abilities, skills and limitations. As a society, we need to make sure that all can provided us with tools to make lead independent in life tools this lives. Assistive technology provided us with tools to make this people,. that is with speech to text for disable people is so important today.

The use of speech recognition and voice-to-text dictation has become an internal part of our lives. It estimation that 20 % of people has people doesn't speak clearly enough to be understood by listener, either list either to accommodate a disability or another reason. they can still use their voice to communicate with the computer and computer and reduce in their lives.

12. APPENDIX

Sou

rce CodeImage

preprocessing

From tensorflow.keras.preprocessing.image import ImageDataGenerator
#traning

Data gen

Train

_data

gen =

ImageDataGenerator(rescale=1/255,zoom_range=0.2,horizontal_flip=True,vertical_flip=Fals

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2,2)))**Add the flatten layer**

Model.add(flatten())

Adding the Dense layer

Model.add(dense(units=512,activation=”rel

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Model.add(Dense(units=9,activation=’softm

ax’))**Compile the model**

Model compile(loss=”categorical_crassentroypy’,optimizer=’adam’,matrices=[‘accurancy’])

Fit and save the model 20

model.save(‘aslpng1.h

5) **Build A Flask**

Application Import

numpy as np

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or

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cv

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m

p

or

```
t
os
Import keras.models import load_model
Import flask import Flask,render_template,
ResponseImport tensor flow  tf
From tensor flow as tf
From gt import gTTs #to convert text to
speechGlobal graph
Global writer
From skimage.transfrom
import resizeWriter= none
Model = load_model('aslpng1.h5')
Vals = ['A','B','C','D','E','F','G','H',,'I']
App=flask(__name__)
Print("[INFO] accessing video stream…")
Vs = cv2.VideoCparute(0)#triggers the local
cameraPred=""
@app.
route('
/')Def
index(
):
Return render_template(index.html)
@app.route('/video_feed')
Def video_feed():
Return response(gen(), mimetype='multipart/x-mixed-mixed-
replace;boundary=frame) Name_=='_main_':
pp.run(host=0.0.0.0,debug=True)
```