

PROJECT REPORT

Real-Time Communication System Powered by AI for Specially Abled

submitted by

PNT2022TMID49261

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CHAPTER 1 INTRODUCTION

1.1 Pre-Requisites

Machine learning and deep learning play an important role in computer technology and artificial intelligence. With the use of deep learning and machine learning, human effort can be reduced in recognizing, learning, predictions and in many more areas. 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.

1.2 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. 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.

CHAPTER 2 LITERATURE SURVEY

2.1 EXISTING PROBLEM

Many of us think that artificial intelligence represents an abstract and futuristic notion we only see in sci-fi films with humanoid robots and holograms. However it's more and more grounded in our reality reaching various fields and categories of people including people with disabilities. Artificial intelligence truly revolutionizes accessibility and inclusion! Thanks to AI technology solutions, people with disabilities can drastically improve their everyday lives. We

had previously seen that smartphones are a powerful tool that help users with a visual impairment. Indeed, many apps enable them to remain autonomous. For example, thanks to Seeing AI, visually impaired people can easily read their mail by placing documents under the smartphone camera. AI technology can apply to any type of disability profile. For instance, people with reduced mobility can control everything at home just by using their voice with a virtual personal assistant such as Amazon Alexa. Let's take a look at AI and how it can enhance accessibility thanks to a few examples of innovative solutions! The future starts now!

2.2 EXISTING SOLUTION

Google Maps: one of the most used GPS apps around the world. Visually impaired people or wheelchair users can prepare their trip in advance and visualize their route and the best means of transportation to use according to their profile. Thanks to the "wheelchair accessible" option, wheelchair users can know where ramps and elevators are located in the city. Plus the feature "accessible places" is useful for them to have more information about the layout of many premises: entrance, parking spots, restrooms, seating arrangements... This feature is also used by people with a visual impairment to find the exact location of a building entrance.

Soundscape: an app that describes blind people their surroundings with audio 3D technology. They can easily be aware of the points of interest near them and the intersections. Quite convenient to enjoy the city.

Wheelmap: it lists and maps all accessible public venues (restaurants, shops, cafés...). Even users can add data and information concerning the accessibility level of places.

2.3 PROBLEM STATEMENT DEFINITION

- ❖ 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.
- ❖ That convert speech into understandable sign language for the deaf and dumb.

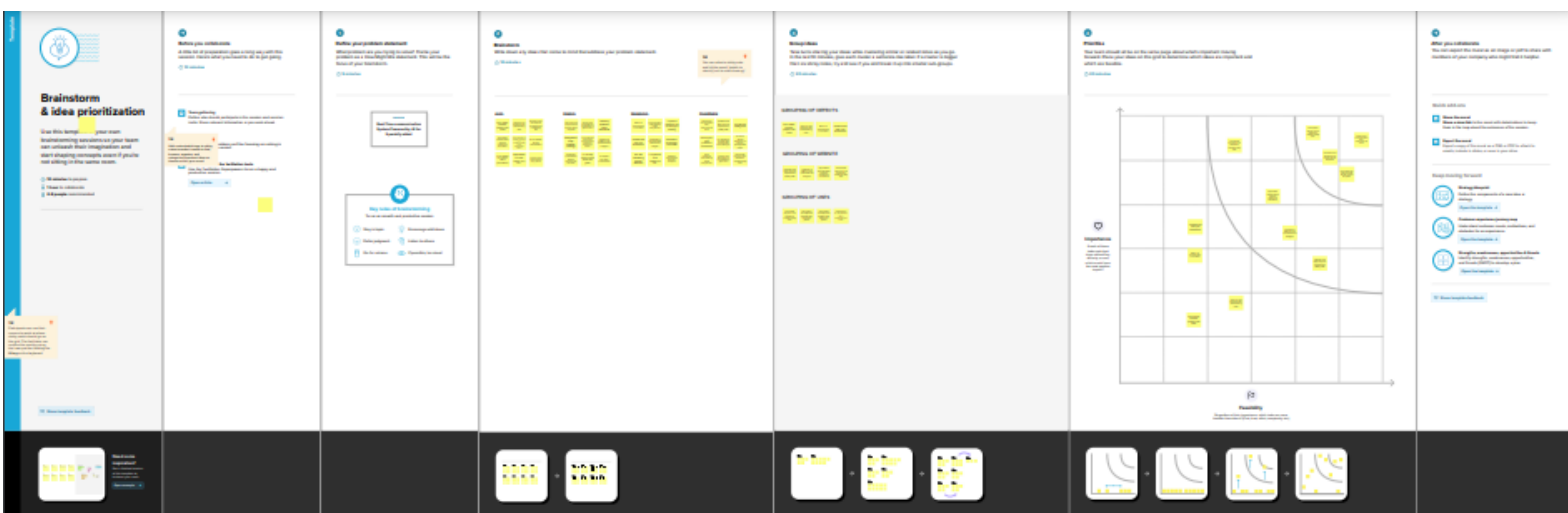
- ❖ We are making use of a convolution neural network to create a model that is trained on different hand gestures.
- ❖ This app enables deaf and dumb people to convey their information using signs which get converted to human-understandable language and speech is given as output.
- ❖ Voice Conversion 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.

CHAPTER 3

IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

3.2 IDEATION & BRAINSTORMING



3.3 PROPOSED SOLUTION

IDEA / SOLUTION DESCRIPTION :

- ❖ That converts the sign language into a human hearing voice.
- ❖ Convolution Neural Network to create a model that is trained on different hand gestures.

NOVELTY / UNIQUENESS :

- ❖ 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 by AI .

SOCIAL IMPACT / CUSTOMERS SATISFACTION :

- ❖ To overcome lack of communication between Mute and Normal People .

❖ It is easy to use in an emergency Situation .

BUSINESS MODEL (FINANCIAL BENEFIT) :

❖ Low power consumption

❖ Cost effective

❖ Easy portable

SCALABILITY OF SOLUTION :

❖ Scalable

3.4 PROBLEM SOLUTION FIT

| | | | | | |
|---|--|---|--|--|--|
| Problem-Solution fit canvas 2.0 | | Project title: Emerging Methods for Early Detection of Forest | | Team id: PNT2022TMID37567 | |
| <div>1. CUSTOMER</div> <div>CS</div> <div>1. The Department of the Interior's Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service, and National Park Service. 2.Federal agencies/forest fire management) such as National Disaster Management Authority (NDMA) USDA's Forest Service.</div> | | <div>6. CUSTOMER</div> <div>CC</div> <div>1.The triple constraint theory says that every project will include three constraints: budget/cost, time, and scope. And these constraints are tied to each other. Any change made to one of the triple constraints will have an effect on the other two.</div> | | <div>5. AVAILABLE SOLUTIONS</div> <div>AS</div> <div>From previous studies the available prototype model uses common sensors like: Pros of existing solutions: 1.The forest fire area can be detected and can be located precisely. Cons of existing solutions: 1.Complicated to manage. 2.Sensor attached to the animals and birds will affect their habitat.</div> | |
| <div>2. JOBS-TO-BE-DONE /</div> <div>L</div> <div>The process provides broad and detailed customer insights that are superior to typical market research methods and critical to developing better solutions for customers. It helped us understand a new space and identify the underserved needs so we could enter a new market in a differentiated manner.</div> | | <div>9. PROBLEM ROOT</div> <div>RC</div> <div>1. The first step when performing root cause analysis is to analyze the existing situations. This is where the team identifies the factors that impact the problematic event. The outcome of this step is a statement that comprises the specific problem A small team is tasked with the definition of the problem.This could be research staff who assesses and analyzes the situation.</div> | | <div>7. BEHAVIOUR</div> <div>BE</div> <div>Popular packages encompass processes involved in the maintenance of solar panels and solar power plants. This is critical: you must try to solve the right problem. Don't try to solve a problem the customer sees as low priority or unimportant. Identify the right problem by asking the right questions. You cannot identify the customer's problems by presenting.</div> | |
| <div>3. TRIGGERS</div> <div>TR</div> <div>Human-caused fires are the result of abandoned campfires unattended, burning debris, equipment use and malfunctions, discarded due to negligence cigarettes and arson</div> | | <div>10. YOUR</div> <div>SL</div> <div>In case of forest fire detection the burning substances are primarily identified as sceptical flame regions using a division strategy to expel the non-fire structures and results are verified by a deep learning model. The technology used to locate a forest or a bush fire is based on the concept of deep learning and YOLO algorithm. This deep learning model is deployed on a UAV</div> | | <div>8. CHANNELS of BEHAVIOUR</div> <div>CH</div> <div>§.1 ONLINE Collect the date and form a dataset in order to compare the flames regions for forest fire detection §.2 OFFLINE In case of forest fire detection the information is sent to forest authorities so that they will prevent it at ease.</div> | |
| <div>4. EMOTIONS: BEFORE / AFTER</div> <div>EM</div> <div>i BEFORE: Encroachment through loss of diversity, reduced wildlife AFTER :Forest surveillance systems can be used to monitor stress in the forest so we can prevent human and wildlife and economic</div> | | | | | |

CHAPTER 4 REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FUNCTIONAL REQUIREMENTS:

-Following are the functional requirements of the proposed solution

| Sn. No | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
|--------|-------------------------------|---|
| 1. | User Registration | Registration through G-mail. |
| 2. | User Confirmation | Confirmation through OTP. Confirmation through mail. |
| 3. | System | <ul style="list-style-type: none">• Desktop/ Mobile with good resolution camera.• Provides system access to capture images/ video and other relevant data. |
| 4. | Text conversion | Converts the Sign language into a text using Convolutional Neural Network (CNN) Model. |
| 5. | Sentence Translation | To create sentence(s) by recognizing the signs and pauses in the input video stream. |

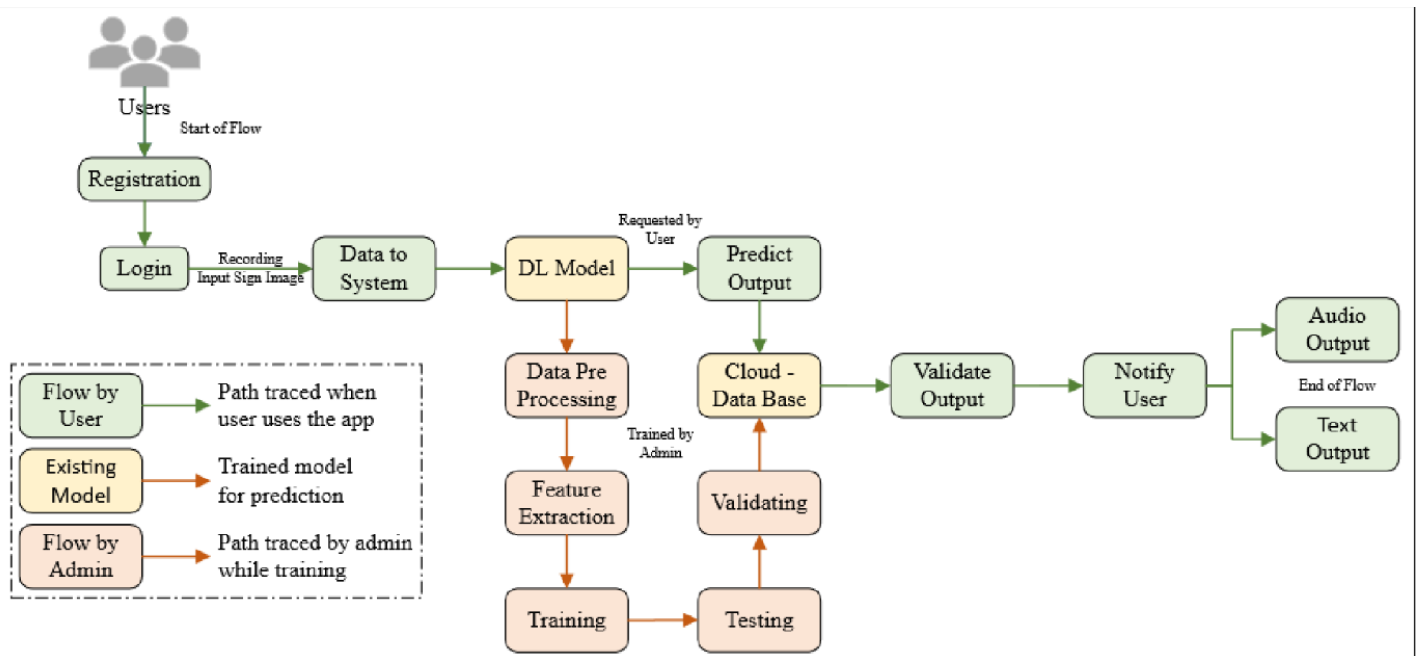
NON-FUNCTIONAL REQUIREMENTS:

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

| Sn. No. | Non-Functional Requirement | Description |
|---------|----------------------------|---|
| 1. | Usability | Deaf-mute people should be able to use the system with ease. The same applies for normal people who get the system's output. The system should have good UI. |
| 2. | Security | Even though the use-case of the system doesn't need any security feature, it must be ensured that the privacy of user data be maintained and handled appropriately. |
| 3. | Reliability | The translation of sign languages should be reliable. The accuracy of the system should be tested extensively to make sure that it is up to the mark |
| 4. | Performance | The processing should be done in considerable time so that the conversation can go on without waiting for the system's output. |
| 5. | Availability | The system should be universally accessible. Since sign language is almost same everywhere, the system can be used across the globe. |
| 6. | Scalability | The system should be scalable to accommodate new features and functionalities and to cater wider range of people in future. |

CHAPTER 5 PROJECT DESIGN

Data Flow Diagram



5.2 SOLUTION & TECHNICAL ARCHITECTURE

| Journey Steps Which step of the experience are you describing? | Discovery Why do they even start the journey? | Registration Why would they trust us? | Onboarding and First Use How can they feel successful? | Sharing Why would they invite others? |
|--|---|---|---|--|
| Actions What does the customer do? What information do they look for? What is their context? | To facilitate easier communication | For faster accessibility For robustness It operates 24/7 without interruption | Exploring all the available features Easier interface Choosing whether the value received exceeds the invested effort | To facilitate a sense of togetherness To help those who are in need similar to them |
| Needs and Pains What does the customer want to achieve or avoid? <i>Tip: Reduce ambiguity, e.g. by using the first person narrator.</i> | To avoid the barrier in communication To prevent obstacles | Clear instruction Secured data and user information | Feel optimistic Encouraged but need daily comfort and reassurance Fast detection | For accurate prediction Friendly environment |
| Touchpoint What part of the service do they interact with? | Computer Vision Neural Networks | Through simple voice command Google Face recognition | Training interface Through AI chatbot solution Via written document | Data sharing platform Social Media |
| Customer Feeling What is the customer feeling? <i>Tip: Use the emoji app to express more emotions</i> | 😊 | 😬 | 😬 | 👥 |
| Backstage | | | | |
| Opportunities What could we improve or introduce? | To increase the cyber defense accuracy | To increase the rate of prediction | Identifying new attack patterns | To increase the speed of the system |
| Process ownership Who is in the lead on this? | Developer/ Founder | User/ Customer | User/ Customer | User/ Customer |

5.3 USER STORIES

User Stories:

| User Type | Functional Requirement (Epic) | User Story Number | User Story / Task | Acceptance criteria |
|------------------------|-------------------------------|-------------------|---|---|
| Customer (Mobile user) | Registration | USN-1 | As a user, I can register for the application by entering my email, password, and confirming my password. | I can access my account dashboard |
| | Authentication | USN-2 | As a user, I will receive confirmation email once I have registered for the application. | I can receive confirmation email and click confirm |
| | Login | USN-3 | As a user, I can log into the application by entering email & password. | I am able to get into the application Dashboard |
| | Dashboard | USN-4 | One place to explore all available features. | I can access my dashboard |
| Customer (Web user) | Registration | USN-1 | As a user, I can register for the application by entering my email, password, and confirming my password. | I can access my account dashboard |
| | Authentication | USN-2 | As a user, I will receive confirmation email once I have registered for the application. | I can receive confirmation email and click confirm. |
| | Login | USN-3 | As a user, I can log into the application by entering email & password | I am able to get into the application Dashboard |
| | Dashboard | USN-4 | One place to explore all available features | I can access my dashboard |
| | Upload image | USN-5 | As a user, I can upload the sign language image for translating into text format | I can be able to see the sign language text for the sign language |
| Administrator | Manage | USN-6 | Do-it-yourself service for delivering Everything. | Set of predefined requirements must be met to mark the story complete |

CHAPTER 6 PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|----------|-------------------------------|-------------------|---|--------------|----------|----------------|
| Sprint-1 | Registration | USN-1 | As a User, I can register for the application by entering my email, password, and confirming my password. | 2 | High | AHELESWARAN E |
| Sprint-1 | User Confirmation | USN-2 | As a User, I will receive confirmation email once I have registered for the application. | 1 | Medium | PRIYADHARSAN B |
| Sprint-1 | Login | USN-3 | As a User, I can log into the application by entering email & password. | 2 | High | RAAGHUL R |

| | | | | | | |
|----------|------------------|-------|--|---|------|------------------|
| Sprint-2 | Interface Sensor | USN-1 | A sensor interface is a bridge between a device and any attached sensor. The interface takes data collected by the sensor and outputs it to the attached device. | 2 | High | RAGULP ANDIYAN K |
|----------|------------------|-------|--|---|------|------------------|

| | | | | | | |
|----------|-----------------------------|-------|--|---|--------|------------------------------------|
| Sprint-3 | Coding (Accessing datasets) | USN-1 | Coding is a set of instructions used to manipulate information so that a certain input results in a particular output. | 2 | High | AHELESWARAN E RAAGHUL R |
| Sprint-4 | Web Application | USN-1 | As a user, I will show the current Information of the Forest. | 1 | Medium | PRIYADHARSAN B RAGULP ANDIYAN K |

6.2 SPRINT DELIVERY SCHEDULE

| 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 | 27 Oct 2022 | 20 | 29 Oct 2022 |
| Sprint-2 | 20 | 5 Days | 28 Oct 2022 | 01 Nov 2022 | 20 | 04 Nov 2022 |
| Sprint-3 | 20 | 8 Days | 02 Nov 2022 | 09 Nov 2022 | 20 | 11 Nov 2022 |

| | | | | | | |
|----------|----|--------|-------------|-------------|----|-------------|
| Sprint-4 | 20 | 9 Days | 10 Nov 2022 | 18 Nov 2022 | 20 | 19 Nov 2022 |
|----------|----|--------|-------------|-------------|----|-------------|

CHAPTER 7 CODING & SOLUTIONING

```

from flask import Flask, Response, render_template
import cv2

app = Flask(__name__)
cap = cv2.VideoCapture(0)
@app.route('/')
def index():
    return render_template('index.html')

def generate_frames():
    while True:
        success, frame = cap.read()
        imgOutput=frame.copy()
        yield (b'--frame\r\n'
               b'Content-Type: image/jpeg\r\n\r\n' + imgOutput + b'\r\n')

@app.route('/predict',methods=['POST','GET'])
def predictions():
    #The prediction model code goes here
    #Once the start Button is pressed the prediction model starts
    pass

@app.route('/stop',methods=['POST','GET'])
def stopping():
    #The text to speech code goes here
    #Once the stop button is pressed the text is converted into speech
    pass

@app.route('/video')
def video():
    return Response(generate_frames(),mimetype='multipart/x-mixed-replace; boundary=frame')

if __name__ == '__main__':
    app.run(debug=True)

```

```

import cv2

import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import os

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('asl_model.h5') # Execute Local Trained Model
        self.model = load_model('realtime.h5') # Execute IBM Trained Model
        self.index=['A','B','C','D','E','F','G','H','I']
        self.y = None

    def __del__(self):
        k = cv2.waitKey(1)

        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 starts
        cv2.imwrite('image.jpg',copy)
        copy_img = image.load_img('image.jpg', target_size=(64,64,3))
        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_SIMPLEX,1,(0,0,0),3)
        ret,jpg = cv2.imencode('.jpg', frame)
        return jpg.tobytes()

```


CHAPTER 8

TESTING

CHAPTER 8 RESULTS

Final output

```
Import datagenerator to train and test
from tensorflow.keras.preprocessing.image import ImageDataGenerator

train_datagen = ImageDataGenerator(rescale = 1./255,shear_range=0.2,zoom_range=
0.2,horizontal_flip=True,vertical_flip=False)
test_datagen = ImageDataGenerator(rescale = 1./255)

import tensorflow as tf
import os
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Conv2D, Flatten, Dropout, MaxPooling2D
from tensorflow.keras.preprocessing.image import ImageDataGenerator
import numpy as np
import matplotlib.pyplot as plt
```

```
import IPython.display as display
from PIL import Image
import pathlib
from keras.preprocessing import image
# and use
# image.ImageDataGenerator()
# image.load_img()
Apply ImageDataGenerator Functionality To Train And Test set
from google.colab import drive
from tensorflow.keras.preprocessing.image import ImageDataGenerator

x_train= train_datagen.flow_from_directory(r"/content/drive/MyDrive/IBM PROJECT/DATA
COLLECTION/training_set",target_size=(64,64),class_mode="categorical",batch_size=48)
x_test = test_datagen.flow_from_directory(r"/content/drive/MyDrive/IBM PROJECT/DATA
COLLECTION/test_set",target_size= (64,64),class_mode= "categorical",batch_size=48)
x_train.class_indices
x_test.class_indices
```

MODEL BUILDING

```
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from tensorflow.keras.layers import Conv2D, MaxPooling2D
from keras.layers import Dropout
from keras.layers import Flatten
model=Sequential()

model.add(Convolution2D(32,(3,3), input_shape=(64,64,1), activation = 'relu'))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())
model.add(Dense( units=512, activation='relu'))
model.add(Dense(units=9, activation='softmax'))
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])
model.save('Realtime.h5')
```

```
a=len(x_train)
```

```
b=len(x_test)
```

Length of training and testing data

```
print(a)
```

```
print(b)
```

TEST THE MODEL

```
from tensorflow.keras.models import load_model
```

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

```
import numpy as np
```

```
import cv2
```

```
img = image.load_img('/content/drive/MyDrive/IBM PROJECT/DATA  
COLLECTION/test_set/D/101.png',target_size = (500,500))
```

```
img
```

```
from skimage.transform import resize
```

```
arr=image.img_to_array(frame)
```

```
arr = resize(arr,(64,64,1))
```

```
arr = np.expand_dims(arr,axis=0)
```

```
pred=np.argmax(model.predict(arr))
```

```
op=['A','B','C','D','E','F','G','H','I']
```

```
print("THE PREDICTED LETTER IS ",op[pred])
```

```
from skimage.transform import resize
```

```
def detect(frame):
```

```
    img=resize(frame,(64,64,1))
```

```
    img=np.expand_dims(img,axis=0)
```

```
    if(np.max(img)>1):
```

```
        prediction=model.predict(img)
```

```
        print(prediction)
```

```
        prediction=model.predict_classes(img)
```

```
        print(prediction)
```

```
arr= image.img_to_array(img)
```

```
frame=cv2.imread('/content/drive/MyDrive/IBM PROJECT/DATA COLLECTION/test_set/F/107.png')
```

```
data=detect(frame)

from google.colab.patches import cv2_imshow

cv2_imshow(frame)

cv2.waitKey(0)

cv2.destroyAllWindows()

frame=cv2.imread('/content/drive/MyDrive/IBM PROJECT/DATA
COLLECTION/test_set/A/102.png')

data=detect(frame)

from google.colab.patches import cv2_imshow

cv2_imshow(frame)

cv2.waitKey(0)

cv2.destroyAllWindows()


frame=cv2.imread('/content/drive/MyDrive/IBM PROJECT/DATA
COLLECTION/test_set/D/108.png')

data=detect(frame)

from google.colab.patches import cv2_imshow

cv2_imshow(frame)

cv2.waitKey(0)

cv2.destroyAllWindows()

print("THE PREDICTED LETTER IS ",op[pred])
```

CHAPTER 10 ADVANTAGES & DISADVANTAGES

ADVANTAGES

The system detects languages into audio that's helps the people to communicate faster and easier .Thats make the difficulties shorter

DISADVANTAGES

Its take much to complete the process

CHAPTER 11 CONCLUSION

Communication plays a significant role in making the world a better place. Communication creates bonding and relations among the people, whether persona, social, or political views. Most people communicate efficiently without any issues, but many cannot due to disability.

They cannot hear or speak, which makes Earth a problematic place to live for them. Even simple basic tasks become difficult for them. Disability is an emotive human condition. It limits the individual to a certain level of performance. Being deaf and dumb pushes the subject to oblivion, highly introverted. In a world of inequality, this society needs empowerment. Harnessing technology to improve their welfare is necessary. In a tech era, no one should be limited due to his or her inability. The application of technology should create a platform or a world of equality despite the natural state of humans. On the other hand, technology is the most innovative thing on Earth for every time the clock ticks, researchers, software engineers, programmers, and information technology specialists are always coming up with bright ideas

to provide convenience to everyone. This paper shows how artificial intelligence is being used to help people who are unable to do what most people do in their everyday lives. Aligned with communication, D-talk is a system that allows people who are unable to talk and hear be fully understood and for them to learn their language easier and also for the people that would interact and communicate with them. This system provides detailed hand gestures that show the interpretation at the bottom so that everyone can understand them. This research allows the readers to learn the system and what it can do to people who are struggling with what they are not capable of and will provide the technical terms on how the system works.

APPENDIX

SOURCE CODE

```
<html>

<head>
  <link rel="stylesheet" href={{ url_for('static', filename='css/style.css') }}>
</head>
<body>
```

```

<h2 class="header">Sign Language TO Speech</h2>
<div class="video">
    
</div>
<div class="container">
<form action='/predict' method='post'>
<button type="submit" name="start" value="start" class="button1" >Start</button>
</form>
<form action='/stop' method='post'>

    <button type="submit" name="stop" value="stop" class="button2" >Stop</button>
</form>
</div>
<div class="instruction">
    <center>
    <p> <details>
        <summary><b>Instructions to Use</b></summary>
        <p>Once the webcam is <b>ON</b> Click <strong>"START"</strong> to start the predication
model.<br>
        <br>
        >>Click <strong>"s"</strong> to save the text.<br>
        <br>
        >>Click <strong>"a"</strong> to leave a space.<br>
        <br>
        >>Click <strong>"d"</strong> to delete a character from right to left.<br>
        <br>
        >>Click <strong>"w"</strong> to delete entire text.<br>
        <br>
        >> The Saved text appears on the top left corner of the video Screen<br>
        <br>
        >> Once you are satisfied with the saved text press<b>"STOP"</b> to convert it into speech<br>
        <br>
        >><b>NOTE: The hand must be on the screen to display the text to save,delete or to leave a
space between them.</b>

    </p>
    </details></p>
    </center>
</div>
<br>
</center>
</div>
<p>Feel Free to contact us !!!!!</p>
<center>
<div class="alert info">
    <span class="closebtn">&times;</span>
    <strong>NOTE:</strong> A disturbance free background with good lighting(White-background) is
preferred.

</div>
</center>
<script>
    var close = document.getElementsByClassName("closebtn");
    var i;

```

```

for (i = 0; i < close.length; i++) {
    close[i].onclick = function(){
        var div = this.parentElement;
        div.style.opacity = "0";
        setTimeout(function(){ div.style.display = "none"; }, 600);
    }
}
</script>

<a class="social-icon"href="https://in.linkedin.com/in/sajith-m-82431721a?trk=profile-badge"
target="_blank">
    <ion-icon name="logo-linkedin"></ion-icon>
</a>
<a class="git"href="https://github.com/IBM-EPBL/IBM-Project-2475-1658472446.git" target="_blank">
    <ion-icon name="logo-github"></ion-icon>
</a>

<script src="https://platform.linkedin.com/badges/js/profile.js" async defer
type="text/javascript"></script>
<script type="module"
src="https://unpkg.com/ionicons@5.5.2/dist/ionicons/ionicons.esm.js"></script>
<script nomodule src="https://unpkg.com/ionicons@5.5.2/dist/ionicons/ionicons.js"></script>

</body>
</html>

```

```

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()
```

```
import cv2
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import os

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('asl_model.h5') # Execute Local Trained Model
        self.model = load_model('realtime.h5') # Execute IBM Trained Model
        self.index=['A','B','C','D','E','F','G','H','I']
        self.y = None
    def __del__(self):
        k = cv2.waitKey(1)

        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 starts
        cv2.imwrite('image.jpg', copy)
        copy_img = image.load_img('image.jpg', target_size=(64, 64, 3))
        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_SIMPLEX, 1, (0, 0, 0), 3)
        ret, jpg = cv2.imencode('.jpg', frame)
        return jpg.tobytes()
```

```
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()
```

```
body{
    background-color: #DED9E2;
    font-family: 'Times New Roman', Times, serif;
}
button{
    border-radius: 20%;
    size: 40px;
    text-align: center;
padding: 15px 25px;
font-size: 15px;
cursor: pointer;
text-align: center;
text-decoration: none;
outline: none;
color: #fff;
background-color: #A68CEF;
border: none;
border-radius: 15px;
box-shadow: 0 9px #999;
}
button:hover {background-color: #8410f9}

button:active {
    background-color: #8410f9;
    box-shadow: 0 5px #666;
    transform: translateY(4px);
}
form{
    display: inline;
    text-align: center;
}

.container{
    display: block;
    text-align: center;
    width:175px;
    margin:auto;
    padding-top:10px;
}
h2{
    color: #8410f9;
    font-size: 35px;
    text-decoration: underline;
    text-align: center;
    margin-block-start: 0em !important;
    margin-block-end: 0.5em !important;
}
img{
    display:block;
    margin-left: auto;
    margin-right: auto;
    width:40%;
}
```

```

border: 10px solid #C0B5DD;
border-radius: 10px;
margin-bottom: 10px;
}
.result{
  text-align: center;
  font-size: 20px;
}
details > summary {
  padding: 20px;
  width: 200px;
  background: rgb(255,218,5);
  background-color: #CF9FFF;
  border: none;
  box-shadow: 1px 1px 2px #bbbbbb;
  cursor: pointer;
}

details > p {
  background-color: white;
  width: 250px;
  padding: 2em;
  margin:0;
  box-shadow: 1px 1px 2px #bbbbbb;
  font-family:'Nunito', Arial ;
  position:relative;
}
details>summary:hover {background-color: #8410f9}
social-icon{
  color: rgb(76, 76, 194);
  transition: color 0.2s;
  font-size: 50px;
  text-decoration: none;
}
.social-icon:hover{
  color:blue
}
.git{
  color: rgb(87, 85, 85);
  transition: color 0.2s;
  font-size: 50px;
}
.git:hover{
  color:black;
}
body {
  background-image: url('https://img.freepik.com/free-vector/festive-blurred-lights_53876-89104.jpg?w=996&t=st=1668019024~exp=1668019624~hmac=938636c2be5447934cf91cc0fbb1647a77ff8d056c6e940c5fb05aaa86032700');
  background-repeat: no-repeat;
  background-attachment: fixed;
  background-size: 100% 100%;
}

```

```
.alert {
  padding: 20px;
  background-color: #f44336;
  color: white;
  opacity: 1;
  transition: opacity 0.6s;
  margin-bottom: 15px;
  width: 650px
}

.alert.info {background-color: #368faf;}

.closebtn {
  margin-left: 15px;
  color: white;
  font-weight: bold;
  float: right;
  font-size: 22px;
  line-height: 20px;
  cursor: pointer;
  transition: 0.3s;
}

.closebtn:hover {
  color: black;
}
```

Fire.py (Main file)

```
from flask import Flask, Response, render_template
import cv2
```

```

app = Flask(__name__)
cap = cv2.VideoCapture(0)
@app.route('/')
def index():
    return render_template('index.html')

def generate_frames():
    while True:
        success, frame = cap.read()
        imgOutput=frame.copy()
        yield (b'--frame\r\n'
               b'Content-Type: image/jpeg\r\n\r\n' + imgOutput + b'\r\n')

@app.route('/predict',methods=['POST','GET'])
def predictions():
    #The prediction model code goes here
    #Once the start Button is pressed the prediction model starts
    pass

@app.route('/stop',methods=['POST','GET'])
def stopping():
    #The text to speech code goes here
    #Once the stop button is pressed the text is converted into speech
    pass

@app.route('/video')
def video():
    return Response(generate_frames(),mimetype='multipart/x-mixed-replace; boundary=frame')

if __name__ == '__main__':
    app.run(debug=True)

```

GITHUB

<https://github.com/IBM-EPBL/IBM-Project-32032-1660207584>

