



Sign Language Identifier

Under Guidance of

Dr. Seema Bawa

101703476 Samiksha

101703482 Sanjana

101703488 Sargun

101703545 Simran

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BACKGROUND

1. Sign language is any means of communication that uses body movements, especially hands and arms when spoken communication is impossible or not desirable.
2. Therefore sign language is the bridge gap wherever vocal communication is not possible.
3. Only 5% of the population is hearing impaired, so most of the people don't learn sign language and the medium of its education is also less.
4. A framework needs to be built that provides a helping-hand for deaf and dumb people to communicate using sign language.
5. This would be a user-friendly environment for the user by providing text output for a sign gesture input and speech output for ISL input.

SCOPE AND UTILITY OF PROJECT

1. Eliminate the dependency on human interpreter for the conversation with deaf and dumb.
2. To incorporate the knowledge of facial expressions and body language for the complete understanding of the context and tone of the input speech.
3. A website will increase the reach to more people.
4. Integrating hand gesture recognition system using computer vision for establishing 2-way communication system.
5. It will be a scalable project which can be extended to capture the whole vocabulary of ISL through manual and non manual signs.



OBJECTIVES



1. To survey and analyze the current status of usage and effectiveness of Indian Sign Language (ISL) solutions.
2. To propose and implement an interactive solution that will convert sign language to text and speech to ISL.
3. To apply Deep Learning Model for training on collected dataset.
4. To create a website to enable Indian Sign Language to be converted into English text; and speech to Indian Sign Language.
5. To design and implement the website.
6. To test and demonstrate the usability and effectiveness of the proposed solution for targeted user groups (Deaf and dumb persons).

LITERATURE SURVEY

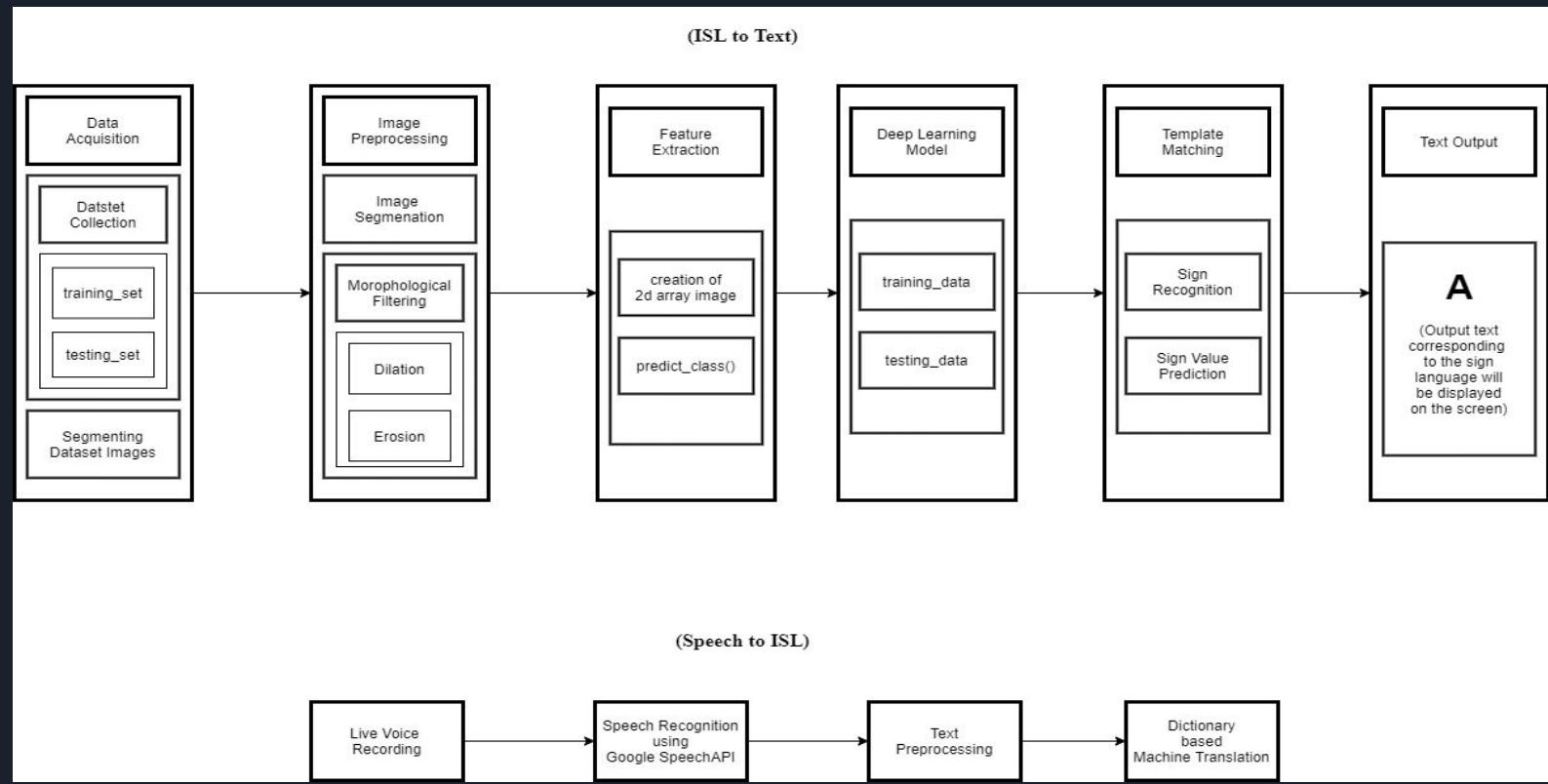
Author	Proposed Approach	Accuracy	Model/Algorithm
Thomson Zimmerman (1970)	VPL(virtual programming language) glove Gesture recognition system	83.1%	Optical fiber sensors
Cristopher Lee and Yangsheng Xu (1996)	Glove based Gesture recognition system	90.9%	Hidden Markov Model
Hyeon-Kyu Lee and Jin H. Kim (1999)	Glove Based Real time hand gesture recognition system	90.9%	Hidden Markov Model
Mohandes, Mohamed (2001)	Vision Based Gesture recognition system	87%	Support Vector Machine, Feature extraction
Reyadh (2012)	Vision Based Alphabet Sign Recognition System	naked hand-50% red hand-75% black hand-65% white hand-85%	KNN
Kishore PVV, P. Rajesh Kumar(2015)	Vision Based 4-Camera Model	92.23%	Back propagation algorithm, ANN
Etsuko Ueda and Yoshio Matsumoto (2015)	Vision Based Hand Pose recognition using voxel model	90.1%	Voxel Model
Chan Wah NG, Surinder Ranganath (2015)	Vision Based Hand Gesture Recognition	90.9%	Image Furrier descriptor, RBF network
Claudia Nolker and Helge Ritter (2015)	Vision Based Hand Gesture Recognition	80%	Neural Network
Mandeep Kaur Ahuja and Dr, AmarDeep Singh	Vision Based Hand Gesture Recognition	70%	PCA(Principal Component Analysis),

LITERATURE SURVEY

Tools	Working
VPL	Virtual Programming Language glove is a dataglove that is used to give input to the user. It has bundles of optical fibre with capture the orientation of the glove and give that a signal to the computer
Glove based Gesture Recognition	It has an electronic glove worn in one hand and all the gestures or movement made by the hand are captured based on the technology used to make that glove. It can be connected to a computer using a wire or wireless module.
Vision based Gesture Recognition	In Vision based Gesture Recognition, a camera is required to capture the movements of the person performing sign language. Then using different technology the captured video or photos are decoded to the meaning of the word performed by the sign language.

Technology	Working
Optical Fibre Sensors	Fiber optic sensors work based on the principle that light from a laser or any superluminescent source is transmitted via an optical fiber, experiences changes in its parameters either in the optical fiber or fiber Bragg gratings and reaches a detector which measures these changes
Hidden Markov Model	It is a machine learning model that requires any dataset to train its model. It is used to predict future events. It has initial and transition probability and bunch of observation on which it works
Support Vector Machine	It is a supervised machine learning algorithm used for classification, regression and to find the outliers
Feature Extraction	Feature extraction is an image processing technique which is used to get the important features of the image, either this is extracted feature is used to recognize the image or it is used to modify that feature in the image.
KNN	K Nearest Neighbour is a supervised machine learning algorithm. It can be used for both classification and regression. In case of classification the k-nearest neighbour having maximum common class is the output and in case of regression the average of all the k-neighbours.
ANN and Back Propagation Algorithm	Artificial Neural Network is also a machine learning algorithm that uses nodes to represent the data, which helps the algorithm to get a deep understanding of the data. Output and input nodes are connected through hidden nodes which are used to simplify the data using weights and an evaluation function. Back Propagation Algorithm is used to adjust the weights in order to improve the efficiency of the model.
Voxel Model	A voxel represents a single sample, or data point, on a regularly spaced, three-dimensional grid. This data point can consist of a single piece of data, such as an opacity, or multiple pieces of data, such as a color in addition to opacity.

BLOCK DIAGRAM



TECHNIQUES AND TOOLS USED

TECHNIQUES

- Convolution Neural Network (CNN)
- Speech Recognition
- Image Processing



TOOLS

- **OpenCV** : Video Capture, Creating Windows, Flipping the image captures, Convert Colors, Creating and Resizing Image
- **Keras** : CNN
- **Matplotlib** : to display accuracy plot
- **H5py** : to save CNN model
- **Speech Recognition** : tool for recognize speech
- **Google audio api**
- **Tensorflow** : numerical computation and deep learning
- **Flask**: For website

Sign Language Identifier

HOME

LOGIN

SIGNUP

ABOUT



“ AT YOUR ASSISTANCE ”

I CAN'T SAY IT IN WORDS, BUT EXPRESS IT.

SNAPSHOTS OF PROJECT

LANDING PAGE (WELCOME SCREEN)

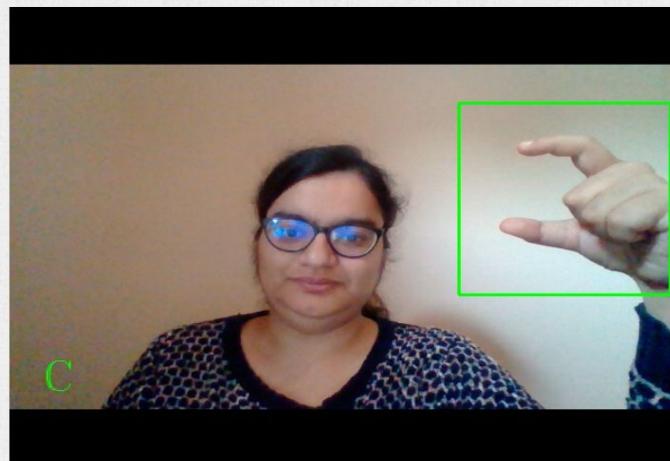
Sign Language Identifier

[HOME](#)[SERVICES](#)[LOGOUT](#)[FEEDBACK](#)[ABOUT](#)[Sign Language to Text](#)[Speech to Sign Language](#)

I CAN'T SAY IT IN WORDS, BUT EXPRESS IT.

SERVICES AVAILABLE (ISL TO TEXT OR SPEECH TO ISL)

Sign Language Identifier

[HOME](#)[SERVICES](#)[LOGOUT](#)[FEEDBACK](#)[Close Session!!](#)

ISL TO TEXT CONVERSION

Sign Language Identifier

HOME

SERVICES

LOGOUT

FEEDBACK

ABOUT

YOU SAID
FLOWER IS BEAUTIFUL



Close Session!

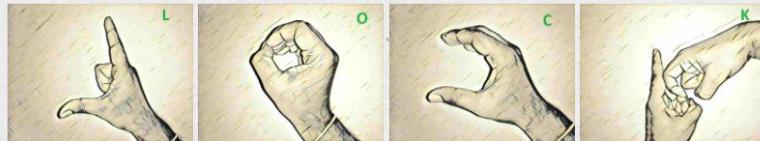
I CAN'T SAY IT IN WORDS, BUT EXPRESS IT.

SPEECH TO ISL CONVERSION (OUTPUT IN FORM OF GIF)

Sign Language Identifier

[HOME](#)[SERVICES](#)[LOGOUT](#)[FEEDBACK](#)[ABOUT](#)

YOU SAID
LOCK THE DOORS

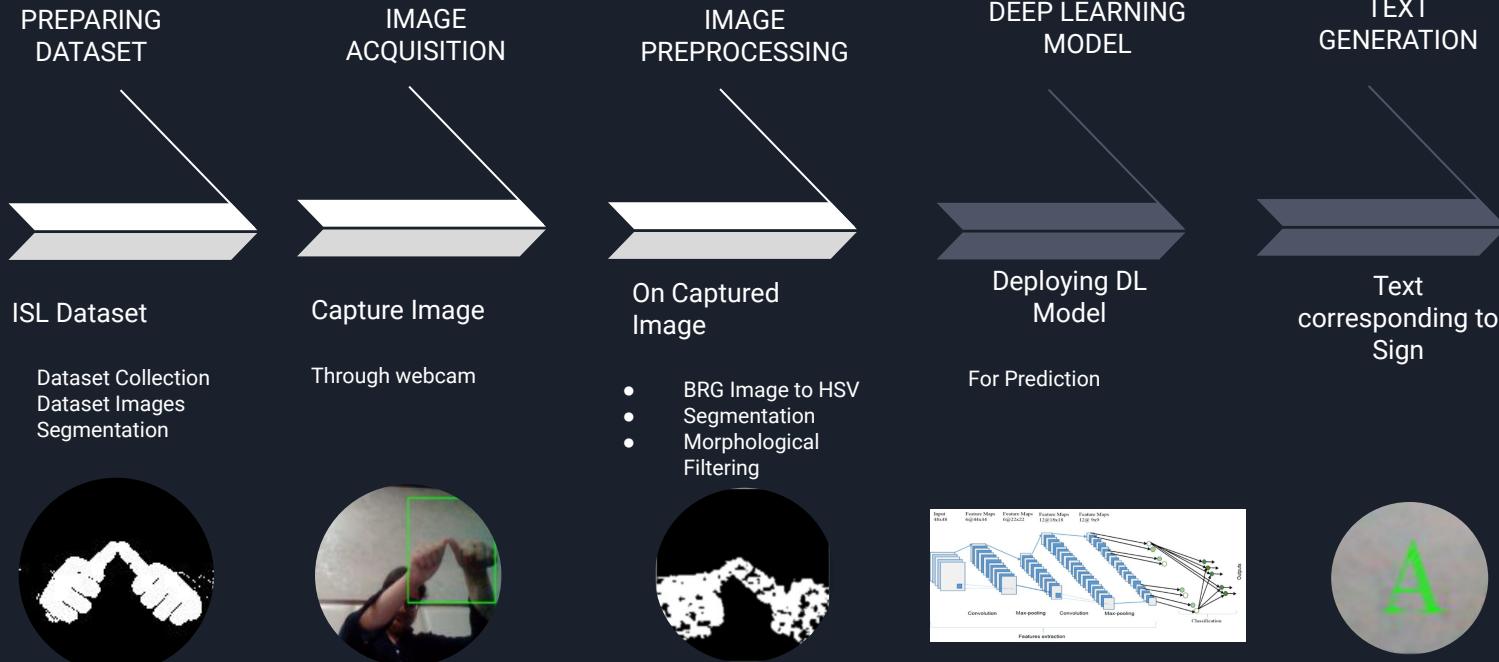


[Close Session!!](#)

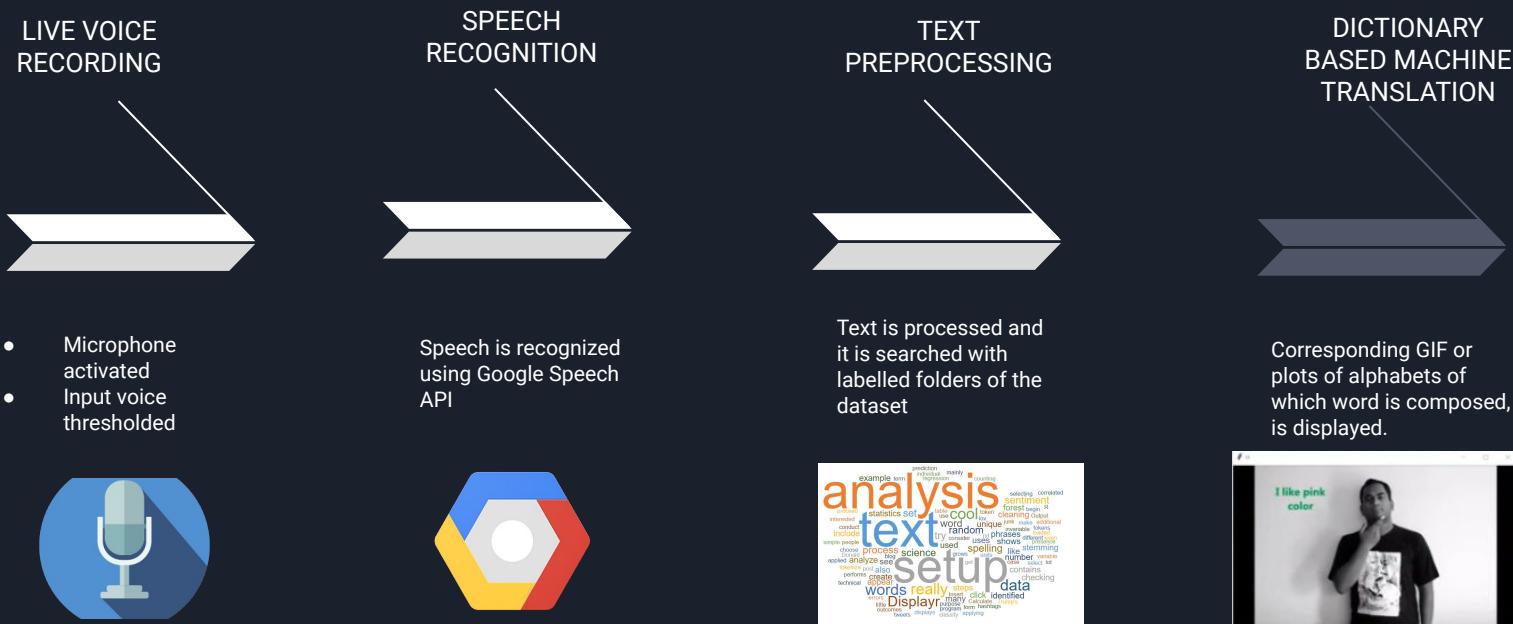
I CAN'T SAY IT IN WORDS, BUT EXPRESS IT.

SPEECH TO ISL CONVERSION

METHODOLOGY (ISL TO TEXT)

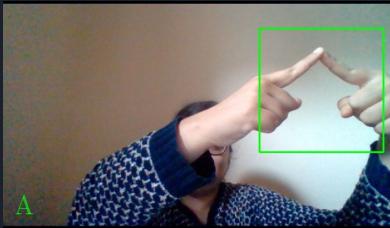


METHODOLOGY (SPEECH TO ISL)



ISL TO TEXT (HANDLING DIFFERENT CASES)

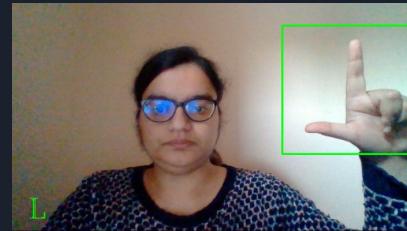
Simple Alphabets



Under all lighting conditions



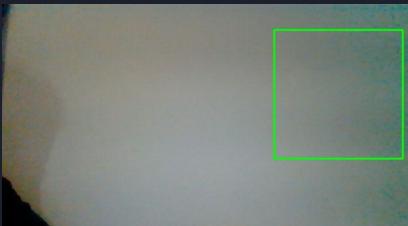
Similar Alphabets



Different Backgrounds



Blank



Bad Lighting



Letter L



Patterned Background

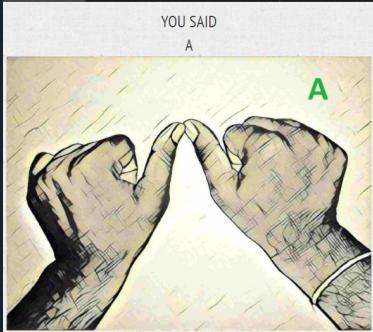


Good Lighting

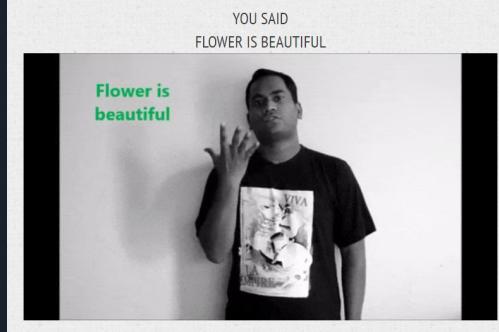
Letter I

Plain Background

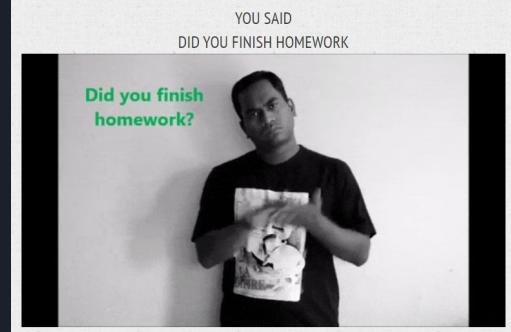
SPEECH TO ISL (HANDLING DIFFERENT CASES)



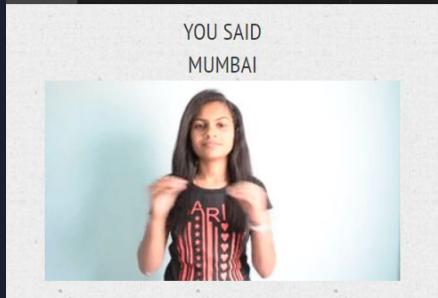
Alphabet



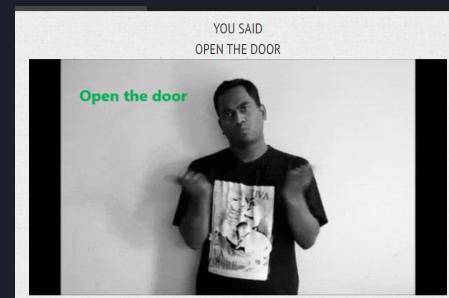
Declarative Sentences



Interrogative Sentences



Proper Noun



Imperative Sentences



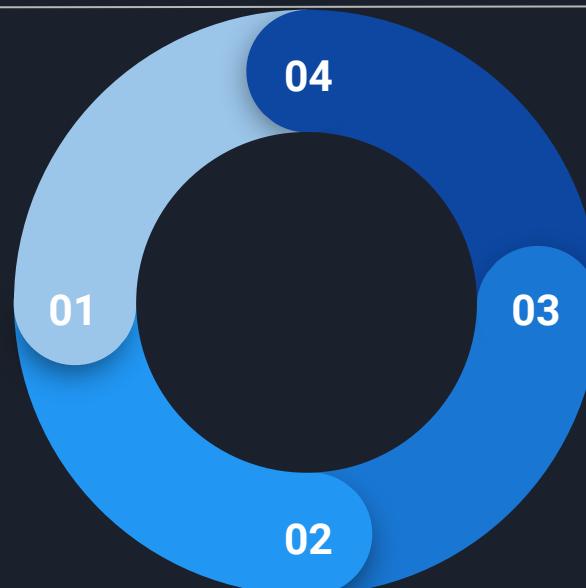
PROJECT DELIVERABLES

Website

User friendly and easy to use website

ISL to Text

Convert Indian Sign Language to text



Speech to ISL

Convert speech to Indian Sign Language

Get feedback

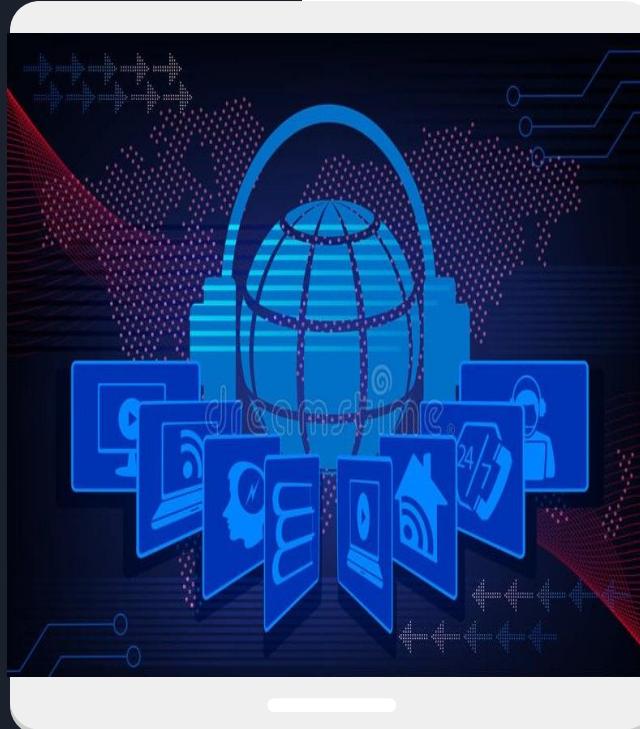
Optional feedback

Technical learning

- Technical writing
- Project Analysis
- Python, Flask, HTML, CSS
- CNN, Image recognition, speech recognition
- Tensorflow, Keras

Professional Learning

- Team Player
- Continuous Learner
- Commitment
- Adaptability
- Working before deadlines
- Planning and Working
- Remote Work





LEARNING OUTCOMES

- Analyse the working of different DL model
- Develop understanding of speech to text and speech to ISL working
- Acquire knowledge of image processing
- Acquire deep understanding of CNN
- Acquire familiarity with ISL

INDIVIDUAL ROLES

Samiksha	Studying of research paper, creating dataset, extraction of frames from video, segmentation
Sanjana	Studying of research paper, dilation and erosion, training dataset, feature extraction by specified algorithm
Sargun	Studying of research paper, text preprocessing, template matching and sign recognition using suitable algorithm, creating website
Simran	Studying of research paper, training model, template matching and sign recognition using suitable algorithm, dictionary based machine translation, creating website

Thank
you!

