
Institution Details

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Institution	National University of Computer and Emerging Sciences (FAST-NU)	Campus	Karachi
Department	Computer Science	Degree Level	BS
Degree Program	Computer Science	Telephone	
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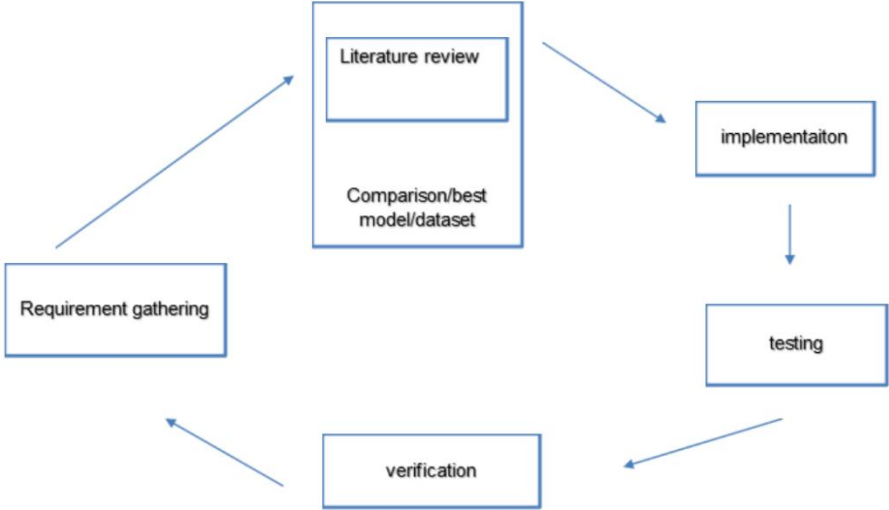
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Qualification			

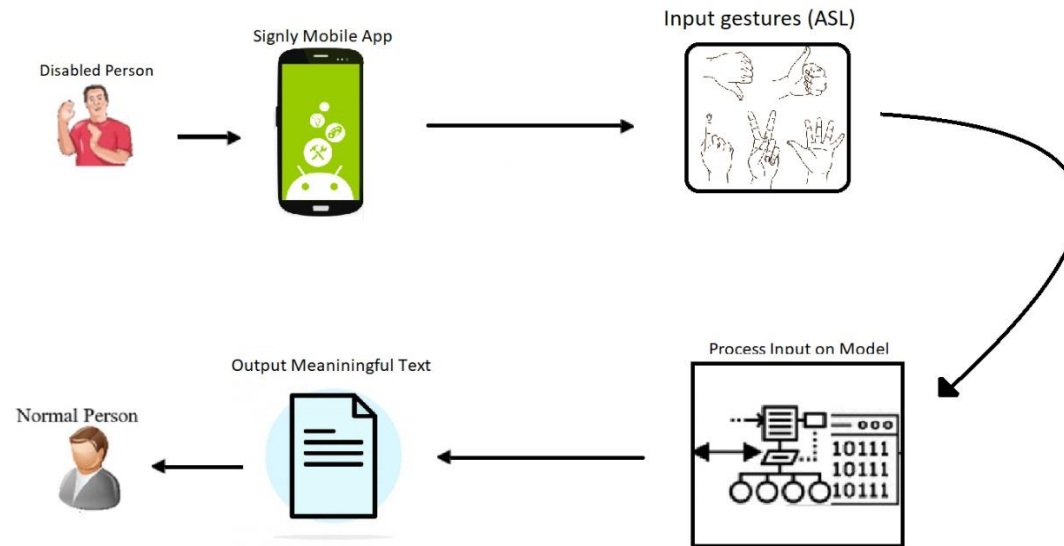
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Project Details

Project Title	Deep Learning, Neural Networking, Natural Language Processing		
Group Details	Member 1 Name: Vikash Kumar	Member 2 Name: Azmat Abedi	Member 3 Name: Aftab Ahmed
	Member 1 Roll#: 18K 0136	Member 2 Roll#: 18K 0248	Member 3 Roll#: 18K 0223
Project Area of Specialization	Deep Learning, Neural Networking Intelligence (fill out as per suggestions from your supervisor)		
Project Start Date	(As per FYP Calendar)	Project End Date	(As per FYP Calendar)
Project Summary (less than 2500 characters)	<p>A language is a mode of communication among human beings, we use written or spoken language to communicate with others, however for the people who don't have the ability to communicate with either mode sign language is the only option. So, this gap is filled by Sign language which is the basic communication method between deaf and normal people. Signly is a project to conquer any hindrance between an ordinary person and deaf individual. The main goal of this project is to develop a sign language detection system that can translate the sign language into meaningful text to ease the daily tasks for mute people so that disable person are not left behind.</p> <p>The purpose is to provide a space for effective communication method between deaf community and normal people. The project uses visual-based approach (unlike traditional Data-glove approach) to minimize the equipment necessities and cost among the deaf community. The deliverable would be an android application that can be easily used by deaf people to communicate with normal person to perform their routine activities.</p>		
Project Objectives (less than 2500 characters)	<p>The main objective of this project is to design a system that can fill up the gap between the normal person and the impaired people and to assist them to communicate with normal people in comparatively better fashion.</p> <p>This project objectives:</p> <ol style="list-style-type: none"> Developing sign/gesture recognizing system that can recognize sign gesture of deaf and mute people of American Sign Language (ASL) The sign language will then be converted into text with the functionality of translation and prediction of the correct meaningful sentence. To work on better accuracy and performance of the system. 		
Literature Review / Background Study	<p>There are many problems in the real world, which need to be identified and then need to be solved. So, if we try to solve the problems one by one in this way our life become easy. We identified the problem that is related to deaf people. Deaf people face problem to communicate with the normal people. To solve this problem. We have read the different research paper to know that how much work has been done. Then we found the several solutions in which different people try the different strategies and algorithms to find optimal solution. So, I found the models that has been implement like CNN, YOLO, and other classification model for recognizing the sign language. And then I read other research papers that how to recognize the motions like if a deaf person perform some gestures, then I how I can convert those gestures into sentence so, I found the LSTM and pose estimation algorithm that help to recognition the motion. For example, the deaf person making the posture of 'thanks' so completing this posture into the sentence we can add the NLTK 'natural language tokenizer' and RNN that make the work into sentence. So, after reading the different papers we conclude that there is not the application exit in market that helps the deaf person to communicate with normal person if exit then they are not in Pakistan. So, we decided to build and application that help the deaf person to communicate with normal person and make his life easier.</p>		

<p>Project Implementation Method (less than 2500 characters)</p>	<p>First of all, we explore the previous work that is already done in the sign language by the people so, we got the idea about that how much work and implementation has been done by the other people. And what were the loop wholes were left by the people. What type of dataset they used? Which model they used? What are the library and environment are required to implement? What are the use cases of our project? After that the previous work we found, we will try to implement that work and run the previous codes that we have found in this way we will get to know that how the actual things are working. Secondly, we will find the most generic words and sentences that deaf people use in their daily life and then we will make the dataset of that words and sentences then we do the data pre-processing, model training and data augmentation. On our dataset which model is performing well, and hyperparameter tuning will apply for getting the best model. Thirdly, we will build the small model and then we will integrate that model with mobile application simply we build the API of the model, our main focus is to build the minimal viable product so that we can involve the user, and then he will help use to make the more use cases. Along with that we will implement the basic UI of the application. Till here all the basic implementation will be done so now own words we will work to improve the model, means we will follow the iterative model. So, we build the sprints of our implementation and iteratively we update the application in this way we try to implement the project.</p>  <pre> graph TD A[Requirement gathering] --> B["Literature review
Comparison/best model/dataset"] B --> C[implementaiton] C --> D[testing] D --> E[verification] E --> A </pre>
<p>Technical Details of Final Deliverable (less than 2500 characters)</p>	<ol style="list-style-type: none"> 1. Sign Language Translation Models <ol style="list-style-type: none"> a. Static Signs <ol style="list-style-type: none"> i. Deep Learning Model For classification of different signs with no motion using MediaPipe + ML algo (to be decided) / CNN / Yolo . ii. Integrating It to app through TensorFlow lite Framework and MediaPipe's implementation or make an API using Python and deploy it. b. Action Recognition <ol style="list-style-type: none"> i. Deep Learning Model for action (signs with motion) recognition using MediaPipe + ML algo (to be decided). ii. Integrating It to app through TensorFlow lite Framework or make an API using Python and deploy it. 2. Text Processing Model <ol style="list-style-type: none"> a. Raw text generated from translation models are converted into meaningful sentence. b. Most probably we will use Recurrent Neural Network for text processing. 3. Mobile Application <ol style="list-style-type: none"> a. Login/ Sign Up for each individual using app to keep track of all translations. b. Camera Tab Provide real time translation of signs and actions c. Home Tab has all the saved signs/actions which are previously translated



Final Deliverable of the Project	Full Functional Android Mobile App with all the modules mentioned above.
Core Technology	Deep Learning, Flutter
Other Technologies (Optional)	Tensorflow/ Tensorflow lite MediaPipe
Sustainable Development Goals (Optional)	Reduce inequality within and among countries

References

1. Evaluating the Immediate Applicability of Pose Estimation for Sign Language Recognition
Amit Moryossef^{1,2}, Ioannis Tsochantaridis², Joe Dinn³, Necati Cihan Camgoz³, Richard Bowden³, Tao Jiang³, Annette Rios⁴, Mathias Muller², Sarah Ebling⁴
2. Real-Time Sign Language Detection using Human Pose Estimation
Amit Moryossef^{1,2}, Ioannis Tsochantaridis¹, Roee Aharoni¹, Sarah Ebling³, and Srinu Narayanan¹
3. Skeleton Aware Multi-modal Sign Language Recognition
Songyao Jiang[§], Bin Sun[§], Lichen Wang, Yue Bai, Kunpeng Li and Yun Fu
Northeastern University, Boston MA, USA
4. Word-level Deep Sign Language Recognition from Video: A New Large-scale Dataset and Methods Comparison
Dongxu Li, Cristian Rodriguez Opazo, Xin Yu, Hongdong Li
The Australian National University, Australian Centre for Robotic Vision (ACRV)

Project Key Milestones

Elapsed time in (days or weeks or month or quarter) since start of the project	Milestone	Deliverable
Month 1	Model Experiment Previous Work	
Month 2	Dataset Collection and Preprocessing Basic Model (Static Sign)	UML Diagram
Month 3	Design/Develop UI Basic Model Integration to App	
Month 4	Model Improvements	
Month 5	Hyperparameter Tuning Data Augmentation	MVP
Month 6	Model Verification	
Month 7	Integration of Improved Model (Action Recognition) Text Processing	
Month 8	Testing	Full Working Mobile App

