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Week 4 - Paper Review

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**A Rule Based System for Bangla Voice and Text to Bangla Sign Language Interpretation**

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**Abstract**

Sign language is the only medium of communication for the hearing impaired and the deaf and dumb community. Communication with the general mass is thus always a challenge for this minority group. Especially in Bangla sign language (BdSL), there are 38 alphabets with some having nearly identical symbol. As a result, in BdSL recognition, the posture of hand is an important factor in addition to visual features extracted from traditional Convolutional Neural Network (CNN). In this paper, voice and Bangla Text are taken as input and this input text is parsed based on Bangla linguistics.

**Introduction**

Sign language is used for those who have speech and hearing difficulties and do not connect with general people. Communication is one of the basic needs of people. Speech and hearing impaired people use sign language to communicate with others. Sign language is now recognized as minority languages that coexist with the dominant language. As far as a sign people use sign language to communicate with general people by sign language so it is very important to express their social, emotional, and linguistic growth. Like there are many spoken languages in the world. There are different sign languages in different countries, depending on the language of the countries. Therefore, sign language is not a universal language.

**Literature Review**

In this paper, voice and Bangla Text are taken as input and this input text is parsed based on Bangla linguistics. After parsing, the system links and displays the signs with the corresponding trained animated Bangla Signs. The 2D animation for the model was trained with 14 animated Bangla Numeral Signs (0-9, Hundred, Thousand, Lakh, Core). The system was evaluated using 100 different lengths of Bangla Composite Numeral. The system achieves the interpretation average accuracy of 96.03% for voice, 100% for Bangla Text as the input of Bangla Composite Numeral, and Bangla Sentences with a computation cost of 9.5ms per sign.

**Methods**

The goal of this model was to take user input and interpret it to Bangla Sign Language. The system first takes input from environment as text. The system takes Bangla Numeral as input for executing the operation. When the system takes the input it’s sent to the parsing process module.

The training process is very important for any training based system. For the training purpose, 14 Numeral Data was used. The training method works when the input data is already parsed. Every parsed individual Bangla Numeral is trained using Training (); function for future recognition and displaying the corresponding individual animated sign images. The individual trained numerals with the corresponding animated signs. The system is trained by Bangla Numeral.

The proposed system properly trains by using those datasets. The system properly trains for voice using those datasets. The system has trained by 10 people for every data of the training dataset. The proposed system has also been tested by 10 different people for every data of the training dataset. The system has also trained for as text by using those datasets. The system has trained 10 times for every data of the training dataset. The system was also tested by 10 times for every data of the training dataset

**Results**

The final comparison of accuracy, a member from the research team worked with only voice to sign language while the others worked on both text and voice to sign language interpretation. In case of text to sign language we have already trained our system with text for bangla numeral that’s why it shows 100% of accuracy. For voice to sign language we have trained our system with more data.

**Discussion**

Confusion matrix for Bangla numeral when vocal input is taken, it was tested 100 times for every individual numeral dataset. When the system recognized the voice, the system didn’t fall any confusion that’s why the system showed 100% accuracy. When the system recognize voice ১ the system confused it with with similar ৮. Because of this, the system showed 98% accuracy for ১ (এক).Confusion matrix for Bangla numeral when Inputs are taken as text. It was tested 100 times for every individual numeral dataset. When the system takes Bangla numerals as the text the system did not have any difficulty recognizing the Bangla numeral. That is why the system showed 100% accuracy for every numeral recognition.

**Conclusion**

The system that was made is intended to create an easy communication scope for speech and hear impaired people who are in need of sign language for better communication. Hopefully, through this project more space would be generated for special children to express themselves.

In this research, new methodologies are introduced to translate Bangla Text to Bangla Sign Language. Several test results prove the potency of the system. This work contributes to many levels of ongoing research in this genre of interpreting. The system is not only fast, it works dynamically and shows more accuracy than the other traditional methods. In the future, the system can be extended using more data, including Bangla Numeral and Bangla Survival word for Bangla Sentence interpretation.

**Reference**

[(PDF) A Rule Based System for Bangla Voice and Text to Bangla Sign Language Interpretation (researchgate.net)](https://www.researchgate.net/publication/350926190_A_Rule_Based_System_for_Bangla_Voice_and_Text_to_Bangla_Sign_Language_Interpretation)