SMART WEARABLE HAND DEVICE FOR SIGN LANGUAGE INTERPRETATION SYSTEM WITH SENSORS FUSION

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Abstract - Speech impaired people have difficulty in expressing their views to others for which communication is required. Application has characters feature in mobile without dialing number uses a technology that translates spoken and written words into sign language with video. Both Speech-to-sign technology and Video Relay Services enables audible language translation on smart phones with signing. Video interpreter is very much helpful for deaf or hearing impaired individuals to understand what is being said in a variety of manner or situation.

I.INTRODUCTION

Now a days Android application shows a massive amount of development in their functionality to the point where it is now possible to have cellular phone execute Java programs. Because of which the cellular users who are present throughout the world are now able to read and write email, browse web pages and play java games using their cellular phones. This development has promoted for the use of the android application for better communication. Before SMS/MMS, deaf people rarely used mobile phones. Now texting allows deaf people remotely to communicate with both deaf and hearing parties. Mobile video chat may one day replace texting, but only for conversations between hearing callers, not for those between deaf and hearing callers. Outfit-7 is an application in which an image movement will repeat everything we say in a high-pitched voice. Without dialing number, we can use this application.

II. EXISTING WORK

Many researchers have worked on this issue. Rasmussen and Williams [1] proposed Gaussian Processes for Machine Learning.

Classification of surrounding rocks in tunnel is important for design and for construction. Aiming to the fact that it is still difficult to reasonably determine the classification of surrounding rocks in tunnel, the model based on Gaussian process machine learning is proposed for classifying surrounding rocks. With the help of simple learning process, the vague mapping relationship between the classification of surrounding rocks and its influencing factors is established by Gaussian process for binary classification model. The model is applied to a real engineering. The results of case study show that Gaussian process for binary classification model is feasible and has the same results with artificial neural networks and support vector machine. Nevertheless, compared with artificial neural networks and support vector machine, it has striking pro of self-adaptive parameters determination.

B. S. Jensen, J. B. Nielsen, and J. Larsen [2] proposed Efficient Preference Learning with Pair wise Continuous Observations and Gaussian Processes. Human preferences can be effectively elicited using pair wise comparisons. This paper represents the current state-of-the-art based on binary decisions is extended by a new paradigm which allows subjects to convey their degree of preference as a continuous but bounded response. For such purpose, a novel Beta type likelihood is proposed and applied in a Bayesian regression framework using Gaussian Process priors.

Subsequent assessment and inference is performed using a Laplace approximation. The potential of the paradigm is not only demonstrated and but also discussed in terms of learning rates and robustness by evaluating the predictive performance under various noise conditions on a synthetic dataset. It demonstrates that the learning rate of the novel paradigm is not only faster under ideal conditions, where continuous responses are naturally more informative than binary decisions. It also under adverse conditions where it seemingly preserves the robustness of the binary paradigm, suggesting that the new concept is robust to human inconsistency.

J. B. Nielsen, B. S. Jensen, J. Nielsen, and J. Larsen[3] proposed Hearing Aid Personalization.
Personalization of multi-parameter hearing aids involves an initial fitting followed by a manual knowledge-based trial-and error fine-tuning from ambiguous verbal user feedback. The result is an often sub-optimal HA setting whereby the full potential of modern hearing aids is not utilized.
This article proposes an interactive hearing-aid personalization system that obtains an optimal individual setting of the hearing aids from direct perceptual user feedback. Results obtained with ten hearing-impaired subjects show that ten to twenty pair wise user assessments between different settings—equivalent to 5-10 min.—is sufficient for personalization of up to four hearing-aid parameters. A setting obtained by the system was significantly selected by the subject over the initial fitting. The obtained setting could be reproduced with some reasonable precision. The system may consist of prospective for clinical usage to assist both the hearing-care professional and the user.

E. A. Durant, G. H. Wakefield, D. J. Van Tasell, and M. E. Rickert[4] proposed Efficient perceptual tuning of hearing aids with genetic algorithms.
The system describes for integrating a genetic algorithm (GA) with perceptual feedback to perform an efficient search in a perceptual space. The system components are the most efficient method for estimating perceptual rank order and genetic operators that take advantage of the types of parameters found in certain classes of audio processing systems. Preference judgments are used, resulting in a lightweight user interface. The application subjectively fitting to a portable hearing aid based solely on binary feedback is discussed. An experiment was conducted by using the eight normal and eight hearing impaired subjects. Three parameters were varied to control cancellation of acoustic feedback. The GA performed well for fitting this system, as indicated by both objective and subjective measures. In addition to which the users had greatly differing preferences for feedback cancellation parameters and these preferences did not change much when subjects were retested.

Adriana Birlutiu, Perry Groot, and Tom Heskes [5] proposed Multi-task preference learning with Gaussian processes. Automatic age estimation using facial images has aroused research interests in recent years due to its promising potential for some computer vision applications. Among the methods proposed till date, personalized age estimation methods generally outperform the global age estimation methods by learning a separate age estimator for each person in the training data set. Moreover, since typical age databases only contain very limited training data for each person, training a separate age estimator using only training data for that person runs a high risk of over fitting the data and hence the prediction performance is limited. In this, we propose a novel approach to the age estimation by formulating the problem as a multi-task learning problem. Based on the variance of the Gaussian process (GP) called warped Gaussian process (WGP), we propose a multi-task extension called multi-task warped Gaussian process (MTWGP).Age estimation is formulated by using a multi-task regression problem, in which each learning task refers to the estimation of the age function for each person. While MTWGP models that consist of common features which is shared by different tasks (persons), it also allows task-specific (person-specific) features to be learned automatically. Moreover, unlike the previous age estimation methods which need to specify the form of the regression functions or determine any of the parameters in the functions using inefficient methods like cross validation, the form of the regression functions in MTWGP is implicitly defined by the kernel function and all its model parameters can be learned from data automatically. We have conducted lots of experiments on two publicly available age databases, FG-NET and MORPH. The experimental results shows that the MTWGP compares favorably with state-of the-art age estimation methods.

III.PROPOSED WORK

1. It is an application for the mobile phone which converts everything we say in a high pitched voice and gets the required video from the server.
2. The main part of this system which is communication between deaf is implemented using ASL video from server.
3. The proposed system will set way for the deaf people to interact with normal person from anywhere in an easy manner. This system also supports automatic translation, automatic speech recognition, and speech-to-sign and sign-to-speech transmission.
4. The various technologies used in this system are hardware and software. In hardware phone and speaker is used. In software outfit-7 and Video Relay Service (VRS) is used. They are brought together and integrated as a system.
5. It can be used without dialing, since the number of the receiver has been registered by the user.

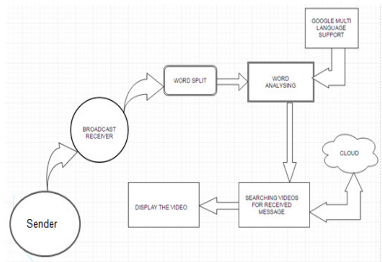


Figure1: Shows the Architecture of the project

IV.TECHNOLOGY & ALGORITHM

The technologies involved in this project are
1.Speech to Sign technology :
Sign language is a visual language which is used by the deaf and dumb people as their mother tongue. Unlike acoustically conveyed sound patterns, sign language uses body language and manual communication to fluidly convey the thoughts of a person. It can be used by a person who has difficulties in speaking or by a person who can hear but could not speak and by normal people to communicate with hearing disabled people. The Sign Language used in USA is American Sign Language (ASL); in Britain is British Sign Language (BSL);and in India is Indian Sign Language (ISL) for expressing thoughts and communicating with each other. The "Indian Sign Language (ISL)" uses manual communication and body language (non-manual communication) to convey thoughts, ideas or feelings. ISL signs can be generally classified into three classes: One handed, two handed, and non-manual signs.

2. Handshake Mechanism:
Handshaking mechanism usually takes place in order to establish the rules for communication when a computer sets about to communicate with a foreign device. When a computer communicates with another devices such as a modem, printer, or network server, it needs to handshake with it so that it establishes a connection.

3. Voice Response System:
A voice response system (VRS) is a computer interface that is used to respond to the voice commands, instead of responding to the inputs from a mouse or a keyboard. It is a type of speech synthesis in which the sentences are organized by concatenating pre-recorded words saved in the database.

V. MECHANISMS

Several mechanism are involved and they are as followed
1. Login:
Login module is used to help the user to install the application in their mobile phones. Once the user installs the application it asks the user to enter their user name, password and confirm password. If both the password matches the user registration gets successful now the user is taken to the page where the ASL keyboard is displayed. The user can view their details using SQLite browser database. The result is the creation of virtual application environment on the user's machine with the bare minimum of application components streamed into it. This application is a self - contained application. In effect, the interface to the users' application becomes completely mobile where ever suitable network connectivity exists, the user can access their own personal application, and the state of this application is preserved between accesses from different locations.

SQLite Browser

Database

2. Sign to text (or) sign recognition:
Second module comprises the Sign Language input, which is displayed as the keyboard on the mobile screen. American Sign Language is the most predominant sign language of Deaf communities in the United States and almost in Canada. ASL signs have a number of characteristic components, including movement of the face and torso as well as the hands. ASL is not a form of gestures and body movements without words, but iconicity does play a larger role in ASL than in spoken languages. English loan words are often borrowed with the help of finger spelling, although ASL grammar is not related to that of English. ASL consist of verbal agreement, aspectual marking, and has a productive system of forming agglutinative classifiers. Many philologists believe ASL to be a subject-verb-object (SVO) language, but there are several alternative proposals to account for ASL word order. This keyboard is represented using Signed English (SE). The pattern of the keyboard is represented in such a way that exhibits each letter of English Alphabet in its Hand Signs. These alphabets are used by the user to communicate with the normal people as a message passing service. When the deaf user sends the message to the hearing user, it is received as text message on the other side.

3.Access ASL Dictionary:
ASL is a system of manual communication that aims to be an exact representation of English vocabulary and grammar. It is one among the number of such systems used in English-speaking countries. It is based on Seeing Essential English (SEE-I), a manual sign system created in 1971, based on the morphemes of English words. Signing Exact English-II models much of its sign vocabulary from American Sign Language (ASL). The four components of signs are hand shape (static or dynamic), orientation (the direction of the palm), location (where the sign is performed relative to the body), and movement (trajectory shape and size, direction of motion, and planar orientation). ASL is completely a unique language means that it not only has its own vocabulary but also has its own grammar that differs from spoken English. Signing Exact English-II is not a separate language but rather a system to communicate in English through signs and finger spelling. The vocabulary of Signing Exact English-II is a combination of ASL signs, modified ASL signs, or unique English signs. The reason Signing Exact English-II signs vary from ASL is to add clarity so that the exact English word meant for the conversation is understood. For example- the sign for "car" in ASL is two a hands gesturing as if they are holding onto and moving a steering wheel. This is the same as the sign used for any automobile controlled by a steering wheel. In Signing Exact English-II, "car" is signed by two C hands, one on top of the other, moving away from each other. To specify another vehicle, the hand shape is modified to include the first initial of the type of vehicle (e.g., V for "van", B for "bus", J for "jeep", etc.). This is called as an initialized sign- the meaning of the sign is clarified by initializing the sign with the first letter of the intended English word. This is helpful for the signer to specify exactly what they want to communicate in English.

4. Sign Recognition:
Last module of our project comprises of the main Sign Language Video. This video is displayed on the deaf party side. Sign Language video is obtained from the JSON and the Hand Speak websites, which includes most of the words from the ASL Dictionary. The sign language recognition can be implemented through our project by giving a link to the particular web server. Objective is to get the video as the output in the users mobile phone. The request is given to the server and is hit to the server with get/post method, where the output is received as the String and converted to the video. This completes the module and provides a way to communicate between deaf and the hearing people.

VII. ADVANTAGES

1. Majority of people can afford the smart phone since its cost it goes on decreasing due to availability of many brands with less cost.
2. It helps other people to understand the deaf and dumb people with ease.
3. It reduces the communication gap between the deaf and dumb people with the world (other people).
4. For ASL users, VRS conversations flow so much more smoothly, naturally, and faster than communicating by typing.

VIII. EXPERIMENTAL OUTPUT

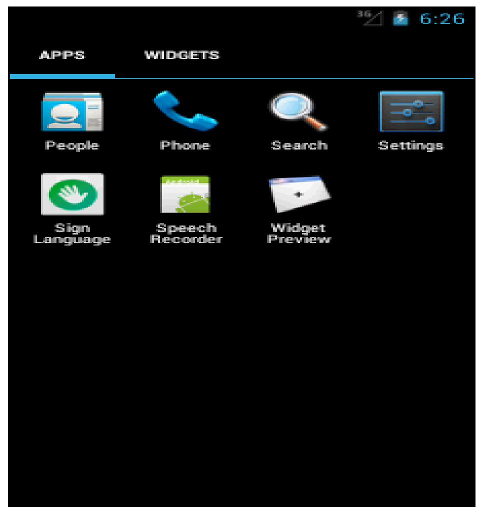


Figure 2: Shows the Logo of the application.

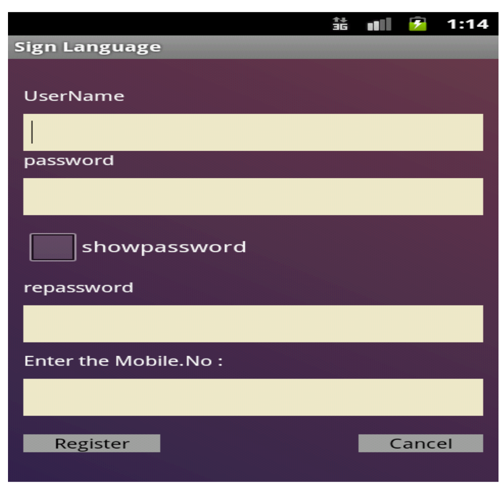


Figure 3: Shows the Registration form where the Details are to be filled by user.

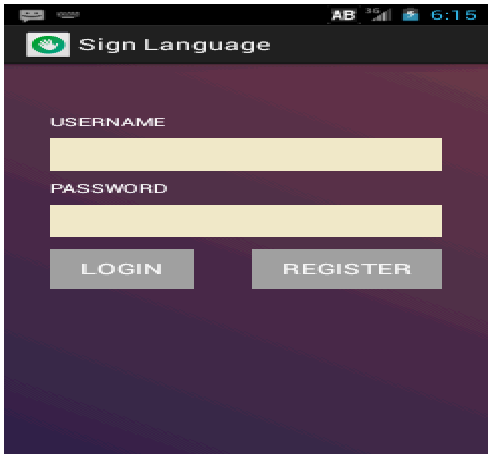


Figure 4: Shows the Login page.

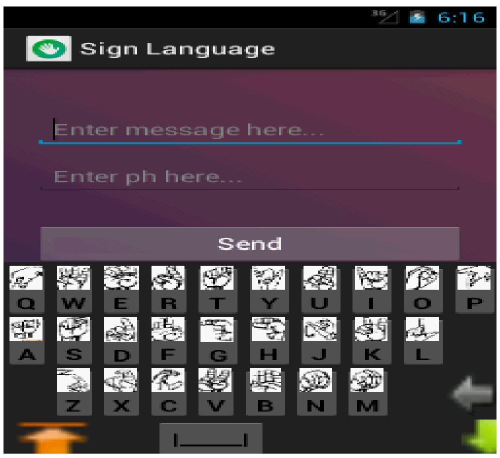


Figure 5: Shows the message to be sent to the particular phone number.

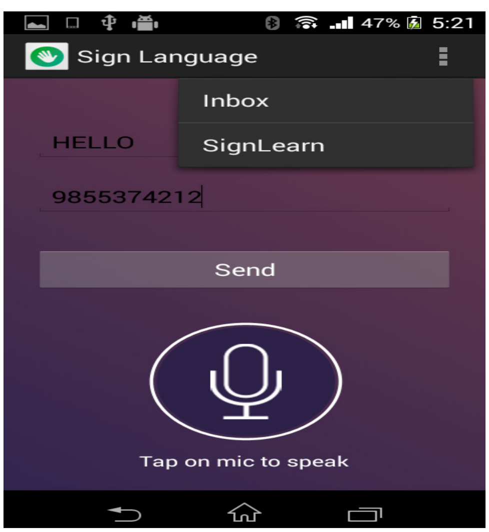


Figure 6: Shows the entered details.

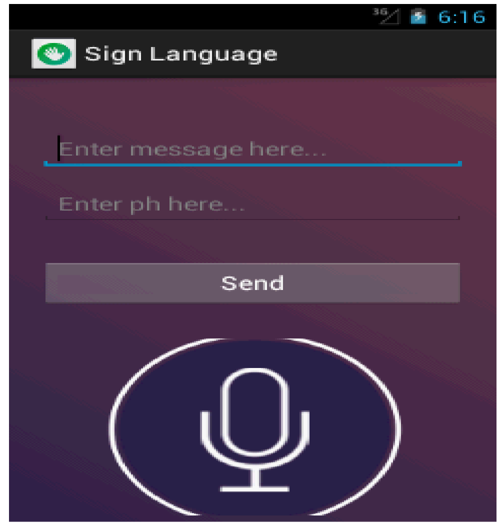


Figure 7:Shows the Voice based message transfer.

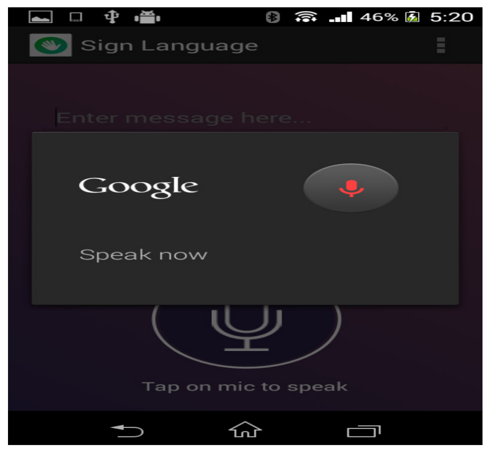
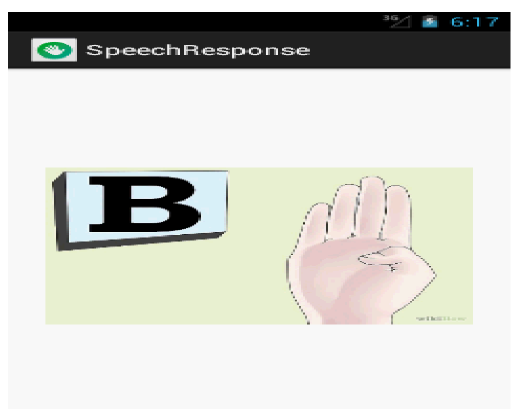


Figure 8: Shows the Google voice search.



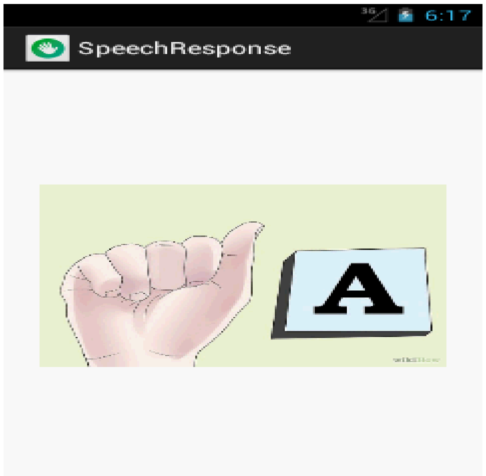


Figure 9: Shows the response generated to the voice search.

Figure 10:Shows the buffering sign.

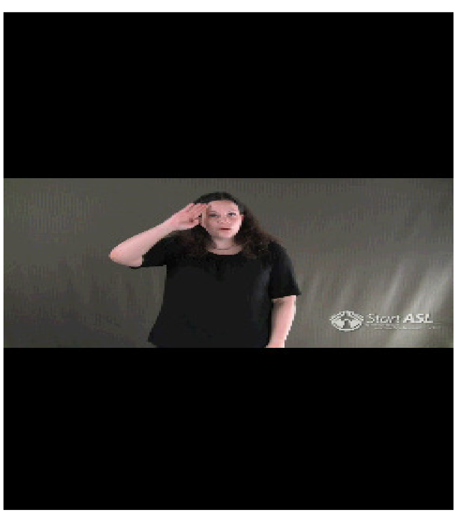


Figure 11: Shows the video that is generated.

IX. GRAPH

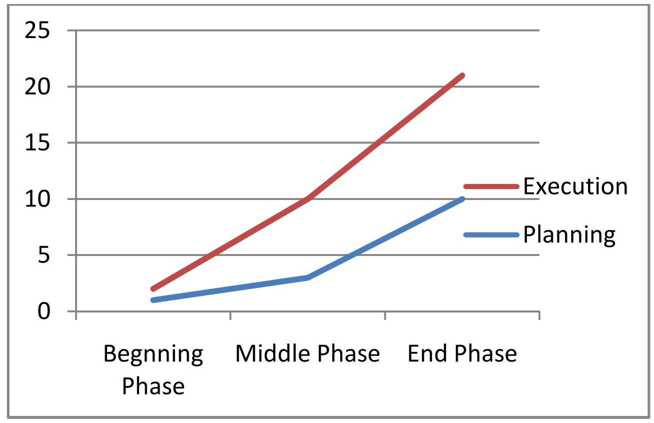


Figure12: Project Growth Graph

X. CONCLUSION

By using this application deaf person can easily interact with normal person anywhere, and he can also use this application for mobile sign translation using VSR and by using UTF-7 he can communicate in daily activates without dialling number. We can use this application for mobile sign translation using VRS, and with UTF-7 communication can be made without dialling number.

XI. REFERENCE

[1] C. E. Rasmussen and C. K. I. Williams, Gaussian Processes for Machine Learning, MIT Press.
[2] B. S. Jensen, J. B. Nielsen, and J. Larsen, “Efficient Preference Learning with Pairwise Continuous Observations and Gaussian Processes,” IEEE Workshop MLSP, Beijing.
[3] J. B. Nielsen, B. S. Jensen, J. Nielsen, and J. Larsen, “Hearing Aid Personalization,” in NIPS 2013 Workshop on Personalization, Lake Tahoe, USA,2013, pp. 2–5.
[4] E. A. Durant, G. H. Wakefield, D. J. Van Tasell, and M. E. Rickert, “Efficient perceptual tuning of hearing aids with genetic algorithms,” Speech and Audio Processing, IEEE Transactions on, vol. 12, no. 2, pp. 144–155.
[5] Adriana Birlutiu, Perry Groot, and Tom Heskes, “Multi-task preference learning with Gaussian processes,” in Proceedings of the 17th European Symposium on Artificial Neural Networks (ESANN), 2009, pp. 123–128.