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Improved Learning for Special Ones using Image Mapping

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Abstract: Hearing Impaired students have always have had issues when it comes to quality education. Same education is not provided to normal students and hearing impaired students. Due to this, they do not have equal opportunities as compared to normal students and they are always having an inferiority complex. This is because there is a vast gap between hearing impaired students and normal students. We designed a system that enables the same education curriculum to be used for both normal and special students. With some elementary techniques such as text mining and image mapping, we designed a system that will translate text entered in that system to images so that a visual representation can be obtained for better understanding.

Keywords: Image mapping, Text mapping.

I. INTRODUCTION

The population suffering from hearing disorders is differing. There is a large range of hearing loss. Many are born with a hearing impairment; others acquire it over 0-3 years of age. About 45 percentile of such individuals use speech and residual hearing as their main mode of communicating with others. Another 49 percentile use speech and gestures and 6 percentile of them use only gestures. While hearing loss have always been a part of human condition, people who can hear have demonstrated divergent reactions to deafness. Many considered curing deafness others just look at hearing impaired people as inferior. With the help of visual representations of almost everything we can easily make the hearing impaired understand whatever they can't understand with just sign language or gestures. Visual representation of any word plays an important role as we actually know what the word expresses. If the hearing impaired are taught their stories and poems in a visual form, they can grasp it more efficiently and remember everything that is being taught with all minor details. With the right visuals the teachers can explain the meaning of the poems and stories to the special students with meaning beyond literal understanding. Teachers can create their own stories retrieving sensible images from the database. With the described methodology students can practice their skills and the teachers can observe and give feedback. This gives the students to discuss what they learn in school time with each other as well as others in the world.

II. MOTIVATION

- Make the hearing impaired students listen through their eyes.
- Gestures and sign language are not as efficient as visuals.
- Enable the students with special need to stand toe to toe with normal students.
- Give a chance to have equal opportunities to the special ones.

III. GOALS AND OBJECTIVES

- To translate textual material to visuals.
- Map images to newly inserted words in the database and extend the database with a larger dataset.
- Update existing words with new images to provide flexibility.

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IV. LITERATURE SURVEY

4.1. American Sign Language Interpreter System For Deaf And Dumb Individuals [1]

American Sign Language is a widely used and accepted standard for communication by people with hearing and speaking impairments. The proposed system recognizes and translates static hand gesture of alphabets in ASL into textual output. This text can further be converted into speech. The user of the system is free from data acquisition devices. The concepts of Principal Component Analysis (PCA) are used on the static gesture images of the ASL alphabet. The PCA features extracted from the image are used to classify the image into one of the ASL alphabet. The recognition of ASL gestures results in a textual output and is then can be converted into speech. Thus, the scheme helps the hearing and speech impaired to talk using computers.

4.2. Image Retrieval: Current Techniques, Promising Direction and Open Issues [2]

Content Based Image Retrieval (CBIR) an area so active and prosperous in the past few years. This paper also contains aspect of image feature representation and extraction, multi-dimension, indexing and system design, three of fundamentals based CBIR.

4.3. Two Way Communicator between Deaf and Dumb People and Normal People [3]

Every normal human being sees, listens and then reacts to the situations by speaking himself out. But there are some who are deprived of this valuable gift. This creates a gap between the normal human beings and the deprived ones. The system is mainly consists of Indian Sign Language (ISL) gestures from real-time video and mapping it with human-understandable speech. Natural language is mapped with equivalent Indian Sign Language gestures by conversion of speech to text using Google Speech-to-Text (STT) API, further mapping the text to relevant animated gestures from the database.

4.4. Gesture Recognition for American Sign Language with Polygon Approximation [4]

In this paper, a novel method to recognize symbols of the American Sign Language alphabet (A-Z) that have static gestures. Many of the existing systems require the use of special data acquisition devices like data gloves which are expensive and difficult to handle. Some of the methods like fingertip detection do not recognize the alphabets which have closed fingers. We propose a method where the boundary of the gesture image is approximated into a polygon with Douglas - Peucker algorithm. Each edge of the polygon is assigned the difference Freeman Chain Code Direction. We use finger tips count along with difference chain code sequence as a feature vector. The matching is done by looking for either perfect match and in case there is no perfect match, substring matching is done. The method efficiently recognizes the open and closed finger gestures.

4.5. Computer Aided Interpreter for Hearing and Speech Impaired [5]

The difficulties faced by hearing and speech impaired people in communicating with others and among themselves can be easily overcome by building an assistive communication system. This real time communication system enables differently impaired people to communicate among themselves without an intermediate human translator. The proposed system is a potential human-computer and computer human interaction for hearing and speech impaired people with normal people. This is achieved using Natural Voice processing and Digital Image Processing algorithms [6].

V. PROPOSED SYSTEM AND IMPLEMENTATION

- We proposed a system for the teachers who teach the students with special needs.
- Our system consists of a database with images stored in it which are mapped to the words.
- If at all the some words with their respective images are missing, then it can be retrieve using Google API.
- Person has to give input text, system will map the given text to images which are then retrieved and displayed [7].
- A stream of images will be displayed as the text is being read by the system one word by word.
- Each distinctive word will have an image assigned, if not user can add it by accessing the admin module that lets you update, delete words and images [8] (Figure 1).

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VI. SYSTEM ARCHITECHTURE

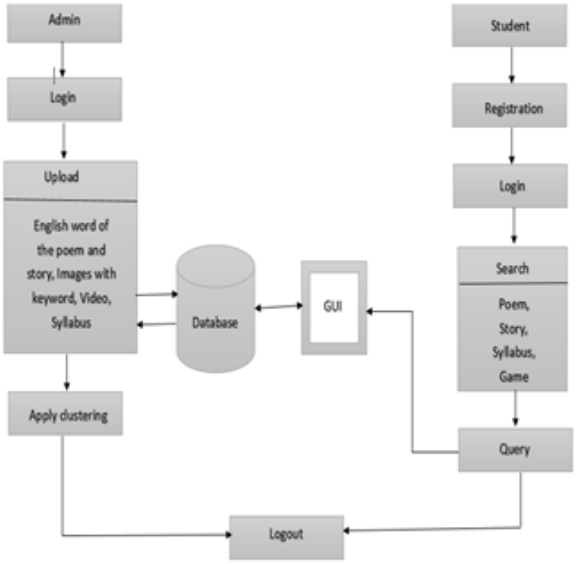

Figure 1: System architecture.

VII. MATHEMATICAL MODEL AND ANALYSIS

- Let S is the Whole System Consist of
  - S= {I, P, O}
- I = Input.
  - I = { U, Q, D, F}
  - U = User
  - U = {u1, u2}
  - Q = Query Entered by user
  - Q = {q1, q2, q3}
  - D = Dataset
  - F = {f1, f2, f3, f4}
    - f1=Poem Search
    - f2=Story Search
    - f3=Game
    - f4=Syllabus
- P=Process:
  - Step1: User will enter the query.
  - Step2: After entering query the following operations will be performed.
  - Step3: Data mining can be applied and system will display images applying following algorithm.
    1. LDA algorithm
  - Step4: User will complete following operation.
- O = Output:
  - Output: Display appropriate images related to poem, story, and syllabus.

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VIII. SYSTEM ALGORITHM

8.1 User

Step 1: Start: - Student Registers
Step 2: Student Registration: input= credentials
Step 3: Student Login
Step 4: If Login= invalid credential, go to step 3.
Step 5: Else, Search
Step 6: Search Dataset: poems, stories, etc.
Step 7: Apply LDA algorithm.
LDA (Latent Dirichlet allocation) steps:

- Steaming

E.g.: run==runnable==running

- Stopping

E.g.: Stop word removal like … what, when, is, was…
Step 7: Search Query fired to database
Step 8: Stop (logout).

8.2 Admin

Step 1: Admin Login
Step 2: If invalid login id return to step 1.
Step 3: If verified, Upload/Update data (poem, stories).
Step 4: Repeat step 3.
Step 5: Dataset stored (includes Address link of image)
Step 6: Stop.

IX. CONCLUSION AND FUTURE SCOPE

After significant research on the algorithms and also the study of sign language, we were able to develop a simulation environment where the system gives out visuals according to what the teachers of the hearing impaired students want to teach [9]. These visuals are very effective and help the hearing impaired understand and grasp knowledge effectively and efficiently. Further this application can be developed to provide higher education to the hearing impaired. With additional algorithm and changes done to the system, it can serve as a communication device between normal people and the hearing impaired. This application can also be used for kindergarten students effectively [10].

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