

# A Comparative Study for Hand Sign Language

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**Abstract**—Sign Language is mainly used by deaf and dumb people to exchange information between their own community and with other people. Sign Language Recognition is a breakthrough for helping deaf-mute people and has been researched for many years. Some of the researches have known to be successful for recognizing sign language, but require an expensive cost to be commercialized. The study aims to apply the strategy to help deaf students and dumb in academic achievement by using mobile learning technology application. The Deaf and Dumb students and the production of educational content suitable for individual differences in education between them and meets their needs mental and their interests that are different from ordinary students in Education. The paper focuses on the educational content of the component images, graphs, and illustrates appropriate signs to the Deaf and Dumb students because it is not easy to understand by a normal listener. The main objective of this project is to contribute to the field of sign language recognition. In our project, we focus on sign language hand gestures. This work focused on teaching the hand gestures which includes 26 English alphabets (A-Z) and 10 digits (0-9). To improve cognitive skills of young children with disabilities like deaf and dumb.

**Index Terms**—Sign Language, Deaf and Dumb, mobile learning technology, Education, cognitive skills

## I. INTRODUCTION

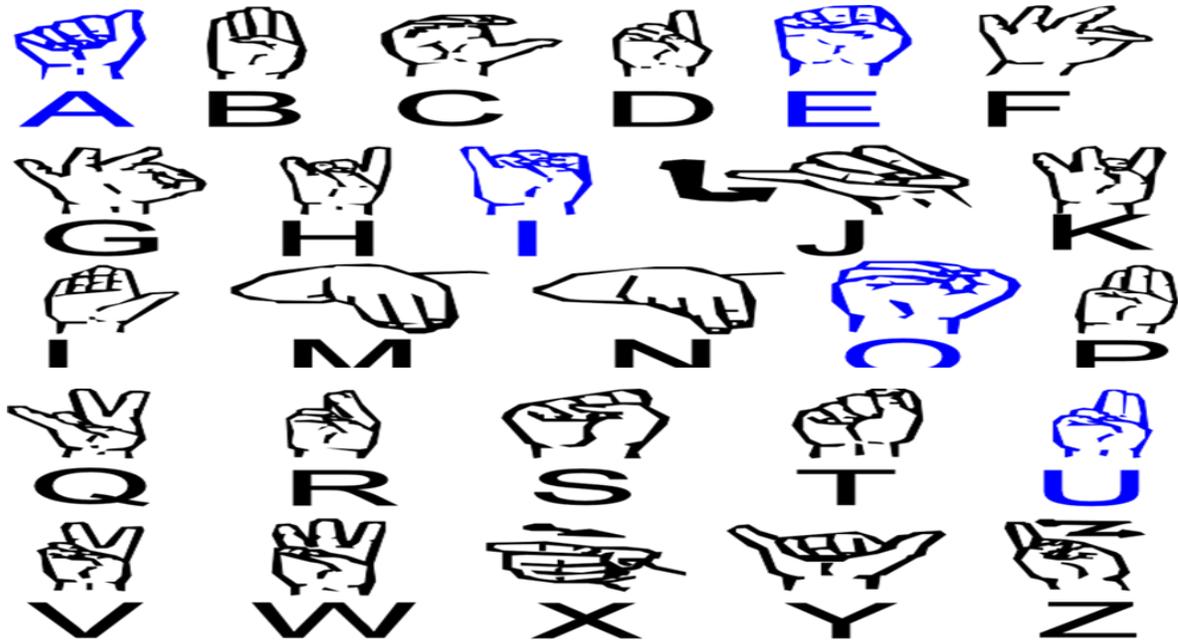
Deaf and dumb people use Sign Language as their primary means to express their ideas and thoughts with their own community and with other people with hand and body gestures. It has its own vocabulary, meaning, and syntax which is different from the spoken language or written language. Sign language uses visual hand and body gestures to convey meaningful messages. Deaf and dumb often communicate via sign

language, a kind of representation of words through hand and finger positions. But it has got serious limitations because it is not easy to understand by a normal listener and not many in the world know sign language at all. The number of Deaf and Dumb in third world countries continuously increasing and they are introverted closed society. The education of the deaf is only about a century old. Since sign is the earliest way of communication in the world when there is no appropriate language, so the sign language is preferred among the deaf-dumb people for education. Uneducated Deaf-Dumb people can communicate with other people (normal or handicaps) with sign language only, so they face serious problems in their daily life. Advantage of building a Sign Language includes:

Sign Language hand gestures to text/speech translation systems or dialog systems which are used in specific public domains such as airports, post offices, or hospitals.

Some notes about Sign Language that are:

- a.) Sign languages have an equally vibrant vocabulary as spoken languages and exhibit all fundamental structures that exist in all spoken languages.
- b.) Just like in spoken languages words do not have any parallel relation with the referent they are describing, sign languages do not have any visual relevance with what they convey.
- c.) Just like spoken languages use grammar to turn words into meaningful sentences, Sign languages have semantics that organize elementary meaningless units into meaningful units/phrases.
- d.) Unlike spoken languages, sign languages convey meaning by simultaneous meanings by the main articulators i.e. the head and the hands.



## II. LITERATURE REVIEW

Touch screen gesture method eliminates the use of complex hand gestures. Hence removes the need for hand movement sensing systems which are quite large, complex, expensive and slower. Support for uneducated people with Image translation feature. Language learning mode helps uneducated people to learn English words through it. More advanced user can use word transition.

In 2014, Dalia Nashat, Abeer Shoker, Fowzyah Al-Swatand Reem Al-Ebailan, in their paper, they present an efficient application for uneducated Deaf-Dumb application. This application aims to help deaf and dumb by providing them with an attractive communication and learning tool. This work introduces a Mobile application that enable communication between uneducated Deaf-Dumb and normal people in our society. It also develop an aid tool for deaf and dumb in many fields like restaurants, Hospitals and transportation. Moreover, this application introduces an easy translator from sign language to English or Arabic language and vice-versa.

In 2016, Kimberly A. Weaver, Kimberly A. (2012). In this paper we have explored what it means to create a mobile informal learning tool for hearing parents of deaf children attempting to learn sign language. We

described the application and outlined a study which will investigate how using this application will impact parents' ability to learn vocabulary. The final contribution of this paper is a reflection on the how device platform decisions may impact the developmental cycle and the evaluation of mobile applications. In the case of SMART Sign we strive first for experimental validity and will then expand development

M. Qutaish et al developed a system for automatically translating the static gestures in the American Sign language(ASL). To facilitate natural interaction with the system, they performed recognition on hand images by using neural networks and Hough transform. The vector representation of the image was compared with the training set. Transformations such as shearing, rotation, scaling, etc. helped by adding small noise to the model and made it robust for the variations inherent in real-life input and also fostered flexibility. The system was implemented and tested against 300 samples of hand gestures with 15 images for each sign and an accuracy of 92.33% was achieved.

Sarbjeeet Kaur et al provided a solution to interpret the Indian Sign Language(ISL) which involves alphabet recognition. An image of hand gestures is captured, processed and converted to an Eigenvector. These Eigenvectors are then compared with those of the training set of signs. MATLAB coding is used for

feature extraction in the form of Eigenvectors. A dataset of 650.

### III. METHODOLOGY

This project aims to teach sign language through images it includes both alphabets and numbers.

- Text-to-Speech Announcement
- Gesture Detection
- Random selector used of image and text
- Timer method to record the time
- Game Reset and Restart Mechanism

0:00



Start Game

0:05



Game Over.

Restart Game

Basic Sign Language App Overview:

The Cognitive Retraining Learning App is an Android application designed to aid children with disabilities, specifically focusing on deaf and mute individuals.

This app primarily emphasizes cognitive development, memory enhancement, and learning sign language through engaging modules and games. The app's main components include learning modules for sign language (from alphabets to numerics) and interactive games such as quizzes and puzzles to sustain children's interest.

#### Target Audience

The primary audience for this app comprises children with disabilities, particularly those who are deaf and mute. It aims to support their cognitive development and foster learning within a supportive and interactive environment.

### IV. FEATURES

#### 1. Login Page

Upon opening the app, users are presented with a simple username entry field to access learning and gaming modules without requiring elaborate login details.

#### 2. Learning Modules

Sign Language Learning: Structured modules covering sign language fundamentals, including alphabets and numerics.

Memory Development: Exercises and activities designed to enhance memory and cognitive skills are integrated into the learning modules.

#### 3. Games

Quiz Games: Engaging quizzes related to sign language and memory-based questions to reinforce learning.

Puzzle Games: Interactive puzzles designed for entertainment while subtly educating users on sign language and memory skills.

#### 4. User Progress Tracking

The app tracks user progress within the learning modules and games, providing feedback and insights into performance.

#### 5. Audio/Voice Assistance

To improve the learning experience, the app includes audio/voice assistance. This feature offers spoken guidance and explanations throughout the learning modules and games, aiding better understanding and efficient learning.

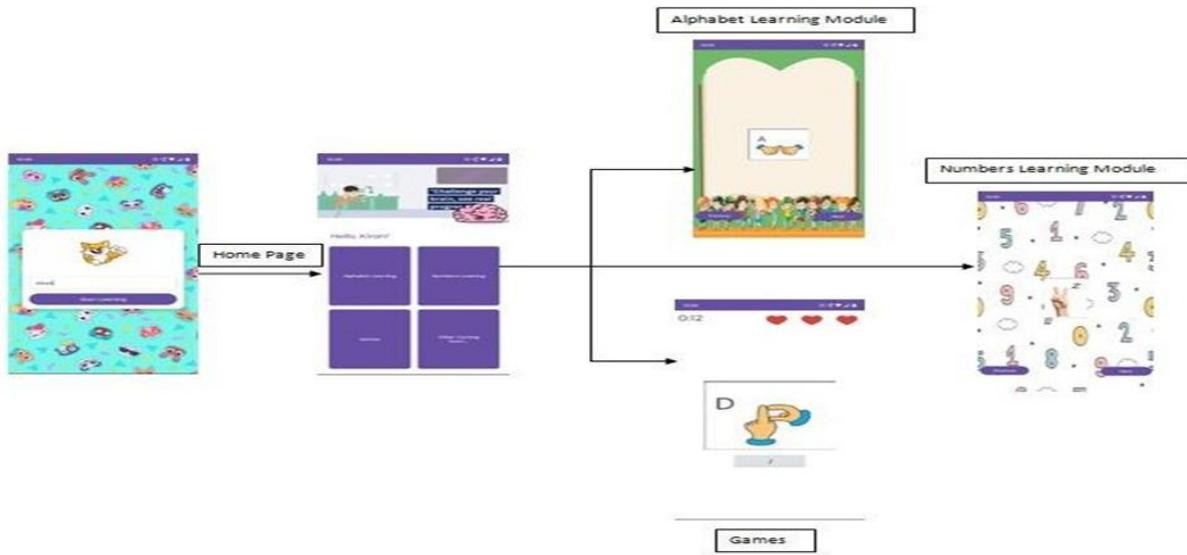
#### App Navigation

1. Login/Register Page: Users can enter their name to

- begin the learning process.
- 2. Dashboard: Upon successful login, users are directed to the dashboard, displaying available learning modules and games.
- 3. Learning Modules:  
Alphabets Numerics

- Basic Sign Language
- Memory Development Exercises
- 4. Games Section  
Quiz Games  
Puzzle Games

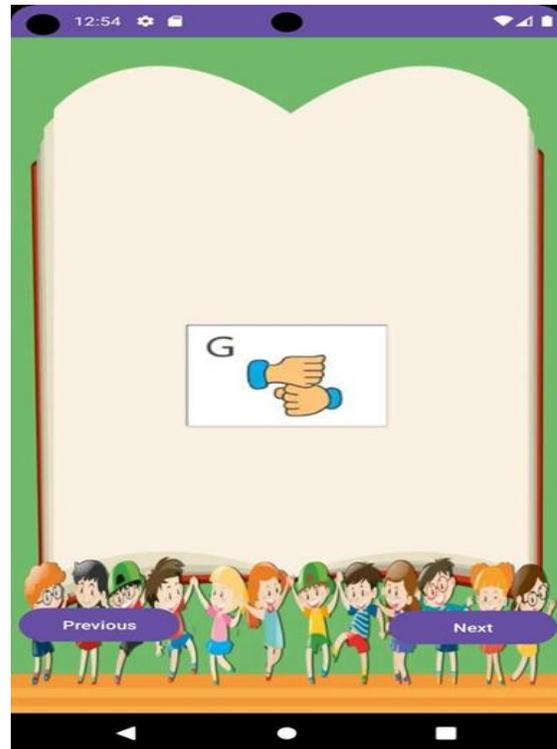
App Navigation Flowchart



V. RESULT



Options provided for learning alphabets, numbers and playing games



Sign Language Alphabet learning with audio.

#### How to Use the App

**Login/Register:** Open the app and continue with entering the user name.

**Navigation:** Upon login, navigate through the dashboard to access learning modules and games. Users can start with any module at their convenience, though starting with simpler or easier modules is recommended

**Learning Modules:** Choose a specific module (e.g., Alphabets, Numerics, Basic Sign Language) to begin learning.

**Games:** The games are meant to reinforce your learning and provide you with enjoyable and engaging activities related to sign language. They will also help you improve your memory, attention, and recognition skills.

**User Profile:** Access your profile to track progress, view achievements, and update personal information.

### VI. TECHNICAL SPECIFICATIONS

**Platform:** Android Programming Language: Java

**UI/UX Design:** The app is developed using Android XML, which is a markup language that defines the layout and appearance of the user interface. The app follows the Material Design Guidelines, which are a set of principles and best practices for creating beautiful and user-friendly Android apps. The app's user interface is designed to be intuitive, responsive, and accessible, with clear and consistent navigation, icons, colors, fonts, and animations.

### VII. CONCLUSION

To put it briefly, the Cognitive Retraining Learning App is a testament to the revolutionary power of technology in creating inclusive learning environments, in addition to meeting the educational needs of children with disabilities. The software leads the way in special education innovation by skillfully fusing cognitive development, memory improvement, and sign language learning into its intuitive design. Its focus on entertaining and engaging activities not only enhances learning effectiveness but also gives kids who are facing particular problems a sense of self-worth and achievement. By doing this, the app not only lowers obstacles to education for the deaf and mute but also serves as an example of how technology

can be used to empower and elevate all students, regardless of ability.

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