Language to Language Translator Using Speech Recognition

D. Adithya[1], A. Durga Bhavani[1], M. Dhanya[1], D. Vasavi[1] , B. Rama Jyothi[2]

[1]UG Student, [2]Assistant Professor, [1,2]Department of Computer Science and Engineering

[1,2]kallam Haranadh Reddy Institute of Technology, Chodawaram, Guntur, Andhra Pradesh, India

ABSTRACT

India is a multilingual country; different states have different territorial languages but not all Indians are polyglots. There are 18 constitutional languages and ten prominent scripts. The majority of the Indians, especially the remote villagers, do not understand, read or write English; therefore, implementing an efficient language translator is needed. The translation is required to eliminate communication problem that occurs in medical industry. The translation is completed with human translators, wants to be paid heavily, and is time overwhelming method. This project aims at providing solution by developing an android application which translates the language from one language to another language (Voice to voice translation).

Keywords: Speak Translator, Android, Language Translator.

1. INTRODUCTION

People's languages are vital to them. Through language, people communicate, share meaning and experience their sense of individual and community identity. In 2012, the United Nations held a forum on "The Study on the role of languages and culture in the promotion and protection of the rights and identity of indigenous peoples". The importance of language is summed up in the following quote: "Language is an essential part of, and intrinsically linked to, indigenous peoples' ways of life, culture and identities. Languages embody many indigenous values and concepts and contain indigenous peoples' histories and development. They are fundamental markers of indigenous peoples' distinctiveness and cohesiveness as peoples". India is a multi-lingual country is faced with challenges such as local language revitalization, language preservation and sharing knowledge and information in pursuit of development goals in rural areas. The cost of human interpretation and translation is high. However, the improvement in computer-aided software engineering tools coupled with availability of cheap technologies such as mobile phones and personal computers has reduced the cost for

machine translation. Computer technology can be a powerful tool for providing materials in local languages to foster participation and inclusion of minorities in national development. Technologies that offer speech-to-speech or text-to-text communication from one language to another are one of the many ways that residents in multi-lingual societies can bridge communication gaps. To achieve these goals, there needs to be effective communication among the diverse people, whilst different local languages and cultures are preserved. This project reports the development of an automated English-to-local-language translator, with the aim of providing solutions to language barriers and improving the understanding of how technology can be used to bridge the communication gap among the peoples.

2. LITERATURE SURVEY

Paper [1]: The Author aims to create a mobile application for Indonesian and Madurese translators using RESTful API

with JSON data format. In order to build a translator system that can be used by all platforms, including Android, a web service must be created. Web service is a standard and a programming method for sharing data between several applications.

Paper [2]: This paper talks about language translator where most of the population don't understand language and area unit unable to speak effectively with the deaf. Therefore, the deaf realize it tough to converse with folks on daily to day basis, this issue are often solved through a smartphone application.

Paper [3]: This research work proposes a portable and 24x7 available system with support for bidirectional translation i.e. from sign language to speech and speech to sign language. The mobile application will give normal speech output as audio and text and sign language output as a 3D animated video sequence, with the help of Unity3D.

Paper [4]: According to the research results, there are some recommendation on this system to fulfil the needs and requirements of the end-users. In future, new improvements can be implemented on this application where the upgraded versions can provide the user to access more languages for translation. Moreover, online functions can be added to provide more updated information.

Paper [5]: This device basically can be used by people who do not know English and want it to be translated to their native language. e. It involves extraction of text from the image and converting the text to translated speech in the user desired language.

Paper [6]: In this paper, authors developed and introduced an Android- based framework that translates the American Sign Language to a text that can be used anywhere. The mobile camera shots the picture, and skin segmentation is achieved using YCbCr systems. Features are extracted from the image using HOG and list to recognise the symbol. Using the Support Vector Machine (SVM), the classification was completed.

Paper [7]: In this paper, author developed an English to Igbo Language Translation Natural Language Processing System in Android. The Design Word, Reference System, and Decoder were performed in Microsoft Hub.

Paper [8]: In this paper, authors developed an Android-based program that could precisely translate the sign language transmitted in written language by deaf voice. The conversion process starts with the OpenCV hand recognition and the conversion of the K-NN classification hand signals. In this program, the demonstration functions were introduced to teach users intensively the use of sign language.

Paper [9]: The new English Text to Multilingual Speech Translator using Android (T2MSTA) is designed to help people who lack the power to talk or non-native speakers and individuals who do not share a common dialectal.

Paper [10]: In this paper the author talks about Android Platform for Machine Translation -A Focus on Yorùbá Language. Which was developed on a mobile platform for easier accessibility, convenience, and portability? RST (Rough Set Theory) is the mathematical tool used in decision support and data analysis of words or phrases to be translated.

3. PROPOSED SYSTEM

We will develop an android application where users can speak their own language and our application translate the user's language into required language and make them to listen the translation. Our android application helps in building rapport between the users.

3.1 Software Installation for android projects
Software Installation of JDK kit

This Java Development Kit (JDK) allows you to code and run Java programs. It's possible that you install multiple JDK versions on the same PC. But Its recommended that you install only latest version.

How to install Java for Windows

Following are the steps for JDK 8 free download for 32 bit or JDK 8 download 64 bit and installation

Step 1) Go to link Click on JDK Download for Java

Step 2) Next,

1. Accept License Agreement
2. Download Java 8 JDK for your version 32 bit or JDK 8 download for windows 10 64 bit.

Step 3) when you click on the Installation link the popup will be open. Click on I reviewed

and accept the Oracle Technology Network License Agreement for Oracle Java SE and you will be redirected to the login page. If you don't have an oracle account you can easily sign up by adding basics details of yours.

Step 4) Once the Java JDK 8 download is complete, run the exe for install JDK. Click Next

3.2 Android Studio IDE and SDK Installation

Installing Android software is probably the most challenging part of this project. It takes times - from 30 minutes to *n* hours to forever - depending on your luck, your programming knowledge, and your PC. You probably need a fairly decent PC (with 8GB RAM) and 10GB of free disk space to run the Android emulator!!! Running on "actual" Android phone/tablet requires much lesser resources.

Step 0: Pre-Installation Check List

- Before installing Android SDK, you need to install Java Development Kit (JDK). Read "How to install JDK". Ensure that your JDK is at or above 1.8. You can check your JDK version with command "javac -version".
- Uninstall older version(s) of "Android Studio" and "Android SDK", if any.
- The installation and many operations take a LONG time to complete. Do NOT stare at your screen or at the ceiling. Browse through the "Android Developers" @ https://developer.android.com. For developers, check out the "Developer Guides".
- We need to install two huge packages:
- Android Studio (IDE) (about 1 GB), which is an Integrated Development Environment (IDE) based on IntelliJ (a popular Java IDE); and
- Android SDK (Software Development Kit) (about 5 GB) for developing and testing Android apps.

- **Step 1: Install "Android Studio IDE"**
- Reference: "Install Android Studio" @ https://developer.android.com/studio/install.
- (For Windows)
- Check that environment variable JAVA_HOME is set to the JDK installation directory via command "set JAVA_HOME". Otherwise, Follow the steps HERE.
- Check the system requirements for Android Studio/SDK @ https://developer.android.com/studio#Requirements e.g., For Windows 10, recommended 8GB of RAM, 4GB of disk space, and 1280x800 minimum screen resolution.

- Goto "Android Studio" @ https://developer.android.com/studio ⇒ Clic"Download Android Studio 3.6.x for Windows 64-bit (749MB)", e.g., "android-studio-ide-192.xxxxxxx-windows.exe".
- Run the downloaded installer ⇒ You may watch a short video @ https://developer.android.com/studio/install.
- In "Choose Components", select "Android Studio" and "Android Virtual Device".
- In "Configuration Settings Install Location", accept the default "C:\Program Files\Android\Android Studio".
- In "Choose Start Menu Folder", accept the default ⇒ Install.
- Launch Android Studio. Continue to the next Step.
- by default, the "Android Studio IDE" will be installed in "C:\Program Files\Android\Android Studio", and the "Android SDK" in "c:\Users\username\AppData\Local\Android\Sdk".
- Notes: You can also use the ZIP version: Download the Windows 64-bit ZIP version (about 1.5GB) ⇒ UNZIP into a folder of your choice ⇒ Run "bin\studio64.exe" to launch the Android Studio ⇒ It will enter the "setup" for the first launch ⇒ "Do not Import Settings" ⇒ In "Welcome", click "Next" ⇒ In "Install Type", choose "Custom" (so that you can see what is going on) ⇒ In "Select Default JDK Location", use default ⇒ In "Select UI Theme", choose one that you like ⇒ In "SDK Components Setup", select "Android Virtual Device (1.05GB) ⇒ Take note of the "Android SDK Location" with default of

"C:\Users\username\AppData\Local\Android\Sdk" ⇒ In "Emulator Settings", use default ⇒ In "Verify Settings", check the settings and choose "Finish" ⇒ In "Download Components", click "Details" and check that nothing fails ⇒ Wait ⇒ Wait ⇒ Wait.

Step 2: Installing Android SDK

- This step takes a long time as you need to download about 3GB of zip data, and expand to 5 GB of disk data, even for the minimum configuration.

- Note: You can actually copy the SDK from another computer with the same OS.
- (For Windows and macOS)
- Launch Android Studio ⇒ It will run the "setup" wizard for the first launch.
- Choose "do not import previous settings".
- In "Welcome", choose "next".
- In "Install Type", choose "Standard" (default).
- In "Select UI Theme", choose one that you like (or default).
- In "SDK Components Setup", make sure that "Android VirtualDevice" is selected and take note of the SDK directory (by default @ c:\Users\username\AppData\Local\Android\Sdk for Windows, "~/Library/Android/sdk" for macOS) ⇒ Finish ⇒ Wait ⇒ Wait ⇒ Wait ⇒ Wait ⇒ Wait ⇒ Wait.
- (For Windows) Use "File Explorer" to check the SDK installed directory. Take note that the "App Data" is a hidden directory. You need to choose "View" menu ⇒ Uncheck "Hidden Items" to see this directory. (For macOS) Use "Finder" to check the SDK installed directory.
- Also use "Android Studio" to check the SDK packages installed by

selecting "Configure" (at the bottom of Android Studio) ⇒ "SDK Manager" ⇒ "Android SDK" (sidebar):
- Under "SDK Platforms" tab:
- Android 10.0 (Q) (API Level 29)
- Under "SDK Tools" tab:
- Android SDK Build Tools 30-rc1
- Android Emulator (30.0.0)
- Android SDK Platform-Tools (29.0.6)
- Intel x86 Emulator Accelerator (HAXM installer) (7.5.6)

4. RESULTS AND DISCUSSION
STEPS FOR EXECUTING THE PROJECTS

Step 1:
Open Android Studio
Step2:
Choose a virtual device or Physical device from the menu
Step3:
Click on the project Run
Step4:
View the application performance on virtual or Physical device.

Software Environment

Android is a software stack for mobile devices that includes an operating system, middleware and key applications. Google Inc. purchased the initial developer of the software, Android Inc., in 2005.

Android's mobile operating system is based on the Linux kernel. Google and other members of the Open Handset Alliance collaborated on Android's development and release.

The Android Open-Source Project (AOSP) is tasked with the maintenance and further development of Android. The Android operating system is the world's best-selling Smartphone platform.

The Android SDK provides the tools and APIs necessary to begin developing applications Android platform using the Java programming language. Android has a large community of developers writing applications ("apps") that extend the functionality of the devices. There are currently over 250,000 apps available for Android.

Features: -

- **Application framework** enabling reuse and replacement of components
- **Dalvik virtual machine** optimized for mobile devices
- **Integrated browser** based on the open source Web Kit engine
- **Optimized graphics** powered by a custom 2D graphics library; 3D graphics based on the OpenGL ES 1.0 specification (hardware acceleration optional)
- **SQLite** for structured data storage
- **Media support** for common audio, video, and still image formats (MPEG4, H.264, MP3, AAC, AMR, JPG, PNG, GIF)
- **GSM Telephony** (hardware dependent)
- **Bluetooth, EDGE, 3G, and WiFi** (hardware dependent)
- **Camera, GPS, compass, and accelerometer** (hardware dependent)
- **Rich development environment** including a device emulator, tools for debugging, memory and performance profiling, and a plugin for the Eclipse IDE

Android Architecture

Libraries

Android includes a set of C/C++ libraries used by various components of the Android system. These capabilities are exposed to developers through the Android application framework. Some of the core libraries are listed below:

- **System C library** - a BSD-derived implementation of the standard C system library (libc), tuned for embedded Linux-based devices
- **Media Libraries** - based on PacketVideo's OpenCORE; the libraries support playback and recording of many popular audio and video formats, as well as static image files, including MPEG4, H.264, MP3, AAC, AMR, JPG, and PNG
- **Surface Manager** - manages access to the display subsystem and seamlessly composites 2D and 3D graphic layers from multiple applications
- **LibWebCore** - a modern web browser engine which powers both the Android browser and an embeddable web view
- **SGL** - the underlying 2D graphics engine
- **3D libraries** - an implementation based on OpenGL ES 1.0 APIs; the libraries use either hardware 3D acceleration (where available) or the

included, highly optimized 3D software rasterizer

- **FreeType** - bitmap and vector font rendering
- **SQLite** - a powerful and lightweight relational database engine available to all applications

Android Runtime

Android includes a set of core libraries that provides most of the functionality available in the core libraries of the Java programming language.

Every Android application runs in its own process, with its own instance of the Dalvik virtual machine. Dalvik has been written so that a device can run multiple VMs efficiently. The Dalvik VM executes files in the Dalvik Executable (.dex) format which is optimized for minimal memory footprint. The VM is register-based, and runs classes compiled by a Java language compiler that have been transformed into the. dex format by the included "dx" tool.

The Dalvik VM relies on the Linux kernel for underlying functionality such as threading and low-level memory management.

Linux Kernel

Android relies on Linux version 2.6 for core system services such as security, memory management, process management, network stack, and driver model. The kernel also acts as an abstraction layer between the hardware and the rest of the software stack.

The Linux kernel is an operating system kernel used by the Linux family of Unix-like operating systems. It is one of the most prominent examples of free and open-source software.

The Linux kernel is released under the GNU General Public License version 2 (GPLv2),

(plus some firmware images with various licenses), and is developed by contributors worldwide. Day-to-day development takes place on the Linux kernel mailing list.

The Linux kernel was initially conceived and created by Finnish computer science student Linus Torvalds in 1991. Linux rapidly accumulated developers and users who adapted code from other free software projects for use with the new operating system. The Linux kernel has received contributions from thousands of programmers.[10] Many Linux distributions have been released based upon the Linux kernel.

The Linux kernel has extensive support for and runs on many virtual machine architectures both as the host operating system and as a guest operating system. The virtual machines usually emulate Intel x86 family of processors, though in a few cases PowerPC or ARM processors are also emulated.

At Google, the team led by Rubin developed a mobile device platform powered by the Linux kernel. Google marketed the platform to handset makers and carriers on the premise of providing a flexible, upgradable system. Google had lined up a series of hardware component and software partners and signaled to carriers that it was open to various degrees of cooperation on their part.[28][29][30]

Speculation about Google's intention to enter the mobile communications market continued to build through December 2006. Reports from the BBC and The Wall Street Journal noted that Google wanted its search and applications on mobile phones and it was working hard to deliver that. Print and online media outlets soon reported rumors that Google was developing a Google-branded handset. Some speculated that as Google was defining technical specifications, it was showing prototypes to cell phone manufacturers and network operators.

Hardware running Android

The main supported platform for Android is the ARM architecture.The Android OS can be used as an operating system for cellphones, netbooks and tablets, including the Dell Streak, Samsung Galaxy Tab, TV and other devices.[68][69] The first commercially available phone to run the Android operating system was the HTC Dream, released on 22 October 2008.[70] In early 2010 Google collaborated with HTC to launch its flagship[71] Android device, the Nexus One. This was followed later in 2010 with the Samsung-made Nexus S.The early feedback on developing applications for the Android platform was mixed. Issues cited include bugs, lack of documentation, inadequate QA infrastructure, and no public issue-tracking system. (Google announced an issue tracker on 18 January 2008.) In December 2007, MergeLab mobile startup founder Adam Macbeth stated, "Functionality is not there, is poorly documented or just doesn't work... It's clearly not ready for prime time." Despite this, Android-targeted applications began to appear the week after the platform was announced. The first publicly available application was the Snake game The Android Dev Phone is a SIM-unlocked and hardware-unlocked device that is designed for advanced developers. While developers can use regular consumer, devices purchased at retail to test and use their applications, some developers may choose not to use a retail device, preferring an unlocked or no-contract device. The Android software development kit (SDK) includes a comprehensive set of development tools.[80] These include a debugger, libraries, a handset emulator (based on QEMU), documentation, sample code, and tutorials. The SDK is downloadable on the android developer website. Currently supported development platforms include computers running Linux (any modern desktop Linux distribution), Mac OS X 10.4.9 or later,

Windows XP or later. The officially supported integrated development environment (IDE) is Eclipse (currently 3.5 or 3.6) using the Android Development Tools (ADT) Plugin, though developers may use any text editor to edit Java and XML files then use command line tools (Java Development Kit and Apache Ant are required) to create, build and debug Android applications as well as control attached Android devices (e.g., triggering a reboot, installing software package(s) remotely).[81]

Android applications are packaged in .apk format and stored under /data/app folder on the Android OS (the folder is accessible to root user only for security reasons). APK package contains .dex files (compiled byte code files called Dalvik executables), resource files, etc.

Android Operation System

Android is an operating system based on Linux with a Java programming interface. It provides tools, e.g., a compiler, debugger and a device emulator as well as its own Java Virtual machine (Dalvik Virtual Machine - DVM). Android is created by the Open Handset Alliance which is led by Google.

Android uses a special virtual machine, e.g., the Dalvik Virtual Machine. Dalvik uses special bytecode. Therefore, you cannot run standard Java bytecode on Android. Android provides a tool "dx" which allows to convert Java Class files into "dex" (Dalvik Executable) files. Android applications are packed into an .apk (Android Package) file by the program "adapt" (Android Asset Packaging Tool) To simplify development Google provides the Android Development Tools (ADT) for Eclipse . The ADT performs automatically the conversion from class to dex files and creates the apk during deployment.

Android supports 2-D and 3-D graphics using the OpenGL libraries and supports data storage in a SQLite database.

Every Android applications run in its own process and under its own user id which is generated automatically by the Android system during deployment. Therefore, the application is isolated from other running applications and a misbehaving application cannot easily harm other Android applications.

1. Welcome Screen

2. Home Screen: -
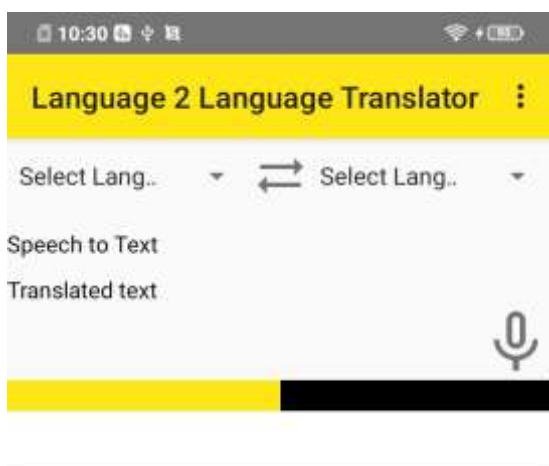
3. Translation Screen

4. Logout

5. CONCLUSION

The application was successfully developed and achieved its requirements, but it requires more testing to increase stability, especially the user's interface. The application can be used by everyone who has language barriers in their daily life.

6. REFERENCES

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