Project Title: **RECORDPAD**

Program: **Android Application Development with Kotlin**

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CONTENT

1. INTRODUCTION

1.1. **Overview**:

Speech to Text is used in most applications such as Google Search for searching any query. For using this feature user simply has to tap on the microphone icon and speak the query he wants to search. The speech of the user will be converted to text. In this article, we will take a look at How we can use speech to text feature within our android application using Jetpack Compose.

1.2. Purpose

A speech to text transcription application is very useful nowadays. The purposes for making this application are mentioned below:

- Save time: Automatic speech recognition technology saves time by delivering accurate transcripts in real-time.
- Cost-efficient: Most speech to text software has a subscription fee, and a few services are free. However, the cost of the subscription is far more cost-efficient than hiring human transcription services.
- Enhance audio and video content: Speech to text capabilities mean that audio and video data can be converted in real-time for subtitling and fast video transcription.
- Streamline the customer experience: By drawing on natural language processing, the customer experience is transformed through ease, accessibility, and seamlessness.

2. LITERATURE SURVEY

2.1. Existing Problem:

- Accuracy: The accuracy of a speech recognition system must be high to create any value. However, achieving a high level of accuracy can be challenging. According to a recent survey, 73% of respondents claimed that accuracy was the biggest hindrance in adopting speech recognition tech.

  The accuracy of a speech recognition system can be disturbed by various factors, like –

  - Background Noise
  - Field Specificity

- Language, Accent and Dialect Coverage: Another significant challenge is enabling the SRS (Speech Recognition System) to work with different languages, accents, and dialects. There are more than 7000 languages spoken in the world, with an uncountable number of accents and dialects. English alone has more than 160 dialects spoken all over the world. No SRS can cover all of them. Even aiming for the compatibility of only a few of the most spoken languages can be challenging.
  In the same study, 66% of respondents found accent or dialect-related issues a significant challenge for adopting voice recognition tech.

- Data Privacy: Another barrier that causes hindrance in the development and implementation of voice tech is the security and privacy-related issues attached to it. A voice recording of someone is used as their biometric data; therefore, many people are hesitant to use voice tech since they do not want to share their biometrics.
  For instance, the market for smart home devices is rising rapidly. According to NPR, every 1 in 6 Americans has a smart home device in their homes. Brands such as Google Home and Alexa collect voice data to

improve the “accuracy” of their devices, or so they claim. And this makes data collection necessary for improving their product’s performance. Some people are unwilling to let such devices collect their biometric data since they think this makes them vulnerable to hackers and other security threats.

- Cost and Deployment: Developing and implementing an SRS in your business can be a costly and ongoing process.
  As mentioned earlier, if the SRS needs to cover various languages, accents, and dialects, it needs a large dataset to be trained. The data collection process can be expensive, and the training model requires strong computational power.
  Deployment is also expensive and difficult since it requires IoT-enabled devices and high-quality microphones for integration into the business. Additionally, even after the SRS is developed and deployed, it still needs resources and time to improve its accuracy and performance.

2.2. **Proposed Solution**:

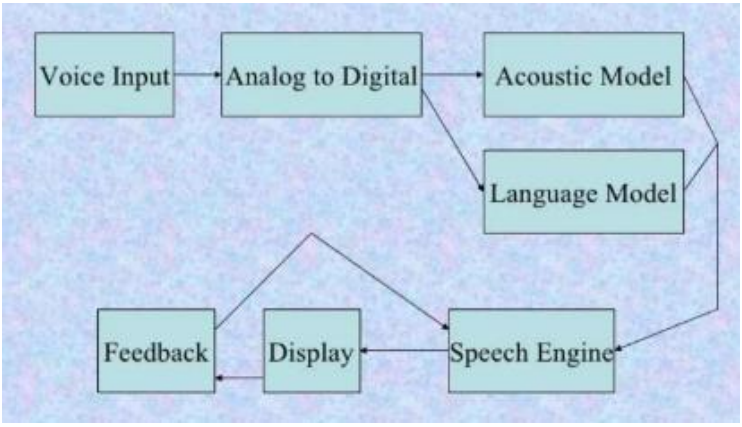
Our proposed process for the solution can be broken into these steps:

- Activate Speech Recognition
- Listen for the hot keyword
- On keyword detected, listen to the user’s voice
- On words caught, show the content

In this project, we are using jetpack compose to convert the speech into the text.

3. THEORETICAL ANALYSIS

3.1. Block Diagram:



3.2. Hardware/Software Designing:

Hardware Requirements:

- Processor must be I5 or Ryzen 5 or their higher versions
- Minimum 8 GB RAM
- High Processing Speed
- Sufficient storage space

Software Requirements:

- Android Studio with the latest version

4. EXPERIMENTAL INVESTIGATIONS

- Creating the project: Firstly, a project has been created in Android Studio. While choosing the template, Empty Compose Activity has been chosen as the activity.

- Adding Dependency: We have added a dependency in the build.gradle. We are using thus dependency for using custom icons such as the microphone icons within our application. After that, we have synced our project to install it.

- Adding colour: We have added some colour codes that are used in the application to easily access the colour code.

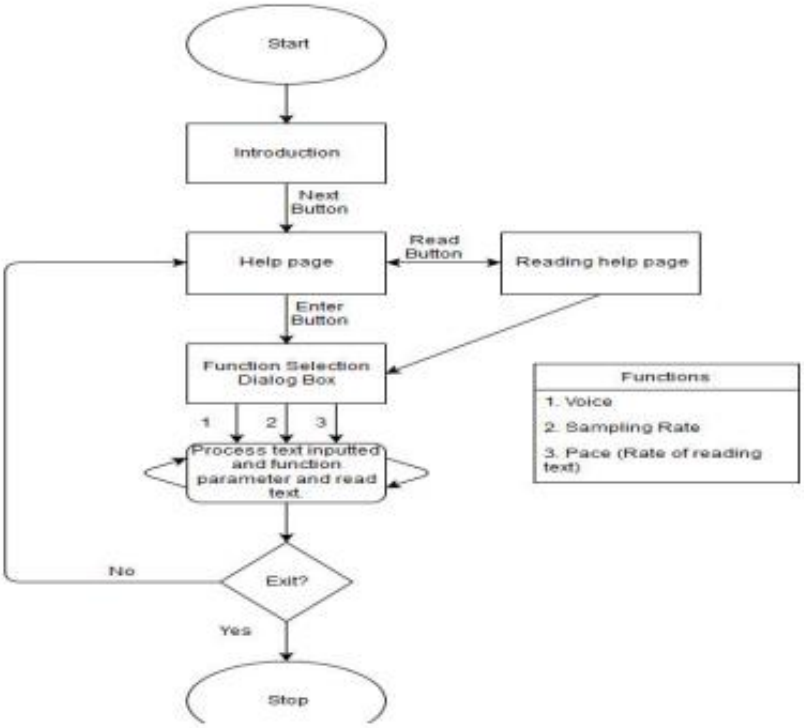
- Creating speech-to-text function

- Creating a method to get the speech input from the user

- Calling on activity result method to get the text output

- Added permission to access the microphone in XML file

5. FLOWCHART



6. RESULT

The user can speak on the mic and the recorded content will be shown on the screen as text.

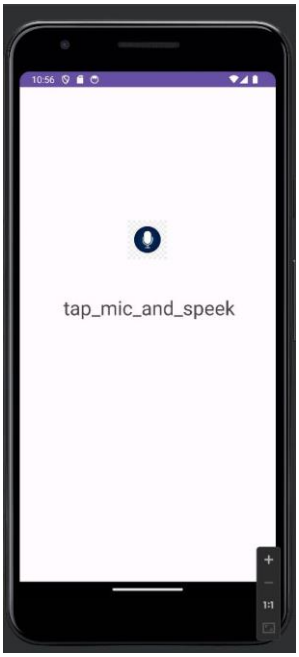


Fig: The user can speak on the mic

Fig: The content recorded on the mic

7. ADVANTAGES & DISADVANTAGES

7.1 **Advantages**:

1. Improved User Experience: Jetpack Compose simplifies the UI development process, allowing for a more intuitive and responsive user interface.

2. Flexibility and Customization: With Jetpack Compose, developers have more control over the UI components, enabling them to create highly customizable interfaces.

3. Integration with Modern Android Features: Jetpack Compose seamlessly integrates with other Android technologies, such as ViewModel and LiveData, enhancing code modularity and maintainability.

4. Enhanced Performance: Jetpack Compose leverages a declarative UI approach, resulting in improved rendering performance and reduced app complexity.

7.2 **Disadvantages**:

1. Learning Curve: As Jetpack Compose is a relatively new technology, developers may require time and effort to familiarize themselves with its concepts and APIs.

2. Limited Resources and Community Support: Compared to traditional Android development frameworks, the availability of learning resources and community support for Jetpack Compose might be relatively limited.

3. Compatibility: Jetpack Compose is compatible with Android devices running Android 5.0 (API level 21) and above, which may exclude older devices from utilizing the application.

8. APPLICATIONS

- The Speech to Text Application developed using Jetpack Compose can find applications in various domains, including:

- Note-Taking: Users can conveniently convert spoken words into written text, aiding in quick note-taking and transcription tasks.

- Accessibility: Individuals with speech impairments or disabilities can leverage the application to communicate effectively through text.

- Language Learning: The application can assist language learners by converting spoken words into written text for further analysis and understanding.

- Voice Commands: Integrating the application with other services or applications allows users to perform actions via voice commands, such as sending messages or initiating calls.

- Transcription Services: The application can be used as a transcription service for interviews, meetings, lectures, or any other spoken content that needs to be converted into written text.

- Language Translation: By integrating with language translation APIs or services, the application can convert spoken words into text and then translate them into different languages, facilitating communication in multilingual settings.

- Voice-Activated Virtual Assistants: The Speech to Text Application can serve as the foundation for building voice-activated virtual assistants similar to Siri or Google Assistant, allowing users to perform tasks or retrieve information through voice commands.

- Voice Search: Integrating the application with search functionality enables users to conduct voice searches, providing hands-free and convenient access to information or content.

9. CONCLUSIONS

In conclusion, this project successfully implemented a Speech to Text Application in Android using Jetpack Compose. The advantages of using Jetpack Compose, such as improved user experience, flexibility, and integration with modern Android features, were demonstrated. The application showcased potential applications in note-taking, accessibility, language learning, and voice commands, highlighting its versatility.

Furthermore, the development of the Speech to Text Application using Jetpack Compose provided insights into the capabilities of this emerging technology. It showcased the potential for creating dynamic and visually appealing user interfaces while maintaining code modularity and performance. The project also served as a stepping stone for further exploration and experimentation with Jetpack Compose in Android app development.

10. FUTURE SCOPE

The project's successful implementation opens up several avenues for future enhancements and expansions:

- Voice Recognition Confidence: Enhancing the application to provide confidence scores for recognized speech can help users gauge the accuracy of the transcriptions and improve the overall user experience.

- Natural Language Processing: Integrating natural language processing techniques can enable the application to analyze and extract meaningful information from the transcribed text, such as sentiment analysis or entity recognition.

- Cloud Integration: Implementing cloud integration allows for the offloading of speech recognition processing to powerful cloud services, enabling faster and more accurate results.

- Gesture and Voice Navigation: Incorporating gesture-based and voice-based navigation controls within the application can provide an alternative mode of interaction for users with limited mobility or accessibility needs.

- Real-time Collaboration: Adding real-time collaboration features would enable multiple users to collaborate on transcriptions simultaneously, making it useful for collaborative note-taking or remote meetings.

These future enhancements aim to further improve the user experience, accuracy, and functionality of the Speech to Text Application, making it a more versatile and powerful tool for various use cases.

By continuing to explore and refine the Speech to Text Application using Jetpack Compose, developers can contribute to the advancement of speech recognition technology in the Android ecosystem and cater to the evolving needs of users in an increasingly voice-enabled world.

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APPENDIX

Source Code:

// mainActivity.kt

```
package com.example.recordpad;


import androidx.annotation.Nullable;

import androidx.appcompat.app.AppCompatActivity;


import android.content.Intent;

import android.os.Bundle;

import android.speech.RecognizerIntent;

import android.view.View;

import android.widget.ImageView;

import android.widget.TextView;

import android.widget.Toast;


import java.util.ArrayList;

import java.util.Locale;

import java.util.Objects;


public class MainActivity extends AppCompatActivity {

    private TextView tv_Speech_to_text;

    private static final int REQUEST_CODE_SPEECH_INPUT = 1;
```

```
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);

    ImageView iv_mic = findViewById(R.id.iv_mic);
    tv_Speech_to_text = findViewById(R.id.tv_speech_to_text);

    iv_mic.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v)
        {
            Intent intent
                    = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
            intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
                    RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
            intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE,
                    Locale.getDefault());
            intent.putExtra(RecognizerIntent.EXTRA_PROMPT, "Speak to text");

            try {
                startActivityForResult(intent, REQUEST_CODE_SPEECH_INPUT);
            }
            catch (Exception e) {
                Toast
                        .makeText(MainActivity.this, " " + e.getMessage(),
                                Toast.LENGTH_SHORT)
```

```
                    .show();
            }
        }
    });
}
@Override
protected void onActivityResult(int requestCode, int resultCode,
                                @Nullable Intent data)
{
    super.onActivityResult(requestCode, resultCode, data);
    if (requestCode == REQUEST_CODE_SPEECH_INPUT) {
        if (resultCode == RESULT_OK && data != null) {
            ArrayList<String> result = data.getStringArrayListExtra(
                    RecognizerIntent.EXTRA_RESULTS);
            tv_Speech_to_text.setText(
                    Objects.requireNonNull(result).get(0));
        }
    }
}
}
// AndroidManifest.xml
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">
    <uses-permission android:name="android.permission.RECORD_AUDIO" />
    <uses-permission android:name="android.permission.INTERNET"/>

    <application
```

```
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.RecordPad"
        tools:targetApi="31">

        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>

// activity_main.xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
```

```
xmlns:tools="http://schemas.android.com/tools"
android:layout_width="match_parent"
android:layout_height="match_parent"
tools:context=".MainActivity">

<ImageView
    android:id="@+id/iv_mic"
    android:layout_width="60dp"
    android:layout_height="60dp"
    android:layout_alignParentTop="true"
    android:layout_alignParentEnd="true"
    android:layout_marginTop="204dp"
    android:src="@drawable/img"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.498"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<TextView
    android:id="@+id/tv_speech_to_text"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_alignParentTop="true"
    android:layout_alignParentEnd="true"
    android:layout_centerHorizontal="true"
    android:layout_marginTop="44dp"
    android:textSize="30sp"
    android:padding="10dp"
```

```
        android:text="@string/tap_mic_and_speek"
        app:layout_constraintEnd_toEndOf="@+id/iv_mic"
        app:layout_constraintHorizontal_bias="0.489"
        app:layout_constraintStart_toStartOf="@+id/iv_mic"
        app:layout_constraintTop_toBottomOf="@+id/iv_mic" />
</androidx.constraintlayout.widget.ConstraintLayout>
```