

Identification and Parsing of SQL Query Command by Implementation of JSON

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Abstract— In today's world mobile devices have become a necessity for many people. These devices have ability to keep in touch with family members and business partners. It is also used to share information in real time. But some time people don't like to input text on a small mobile device which may lead to error, compared to text input via full-sized keyboard on desktop computer system. In this paper we are going to present how SQL database query can be input using voice and technically parsed using JSON data storage. Here we use Pocketsphinx for Android and Google voice API to convert speech to text and create database query by processing text which return SQL query by processing JSON.

Keywords--- Android, Speech recognition, Google Speech API, Pocketsphinx, JSON, SQL

I. INTRODCUTION

The biggest challenge for developers today is a natural user interface and people already use gesture and speech to interact with their PCs and devices; such natural ways to interact with technologies make it easier to learn how to operate them [4].

Speech recognition based user interfaces can be effective in many environments. The only requirements are the lack of major background noise and privacy/security concerns that one might have when audibly communicating with the machine. In many domains such user interfaces provide the most efficient form of human-machine communication because alternative interfaces (e.g. keyboard, visual menu system, etc.) are not available or are cumbersome to use. For example, when driving a car, one's eyes and hands are occupied with driving while the speech facility is freely available. Recently a general application platform for speech based user interfaces has emerged in the form of mobile devices (smartphone and tablets). Such devices feature a small display and a small (and often only virtual) keyboard. Many types of otherwise simple tasks (looking up a phone number, launching an application, setting an alarm, etc.) can become time consuming and cumbersome if performed on a mobile device. Performing such tasks via speech can solve this problem, and this has already been demonstrated by applications like Apple's Siri and Google's Voice Actions, which have become quite popular among users [3].

This paper describes a how speech can be converted to text using Pocketsphinx and Google voice API for mobile environments. Here we have used JSON to store query structure which makes easy to parse result and generate output in efficient time.

II. INTRODUCTION TO JSON

JSON (JavaScript Object Notation) is a lightweight data-interchange format. It is easy for humans to read and write. It is easy for machines to parse and generate [1].

JSON is built on two structures[1]:

- A collection of name/value pairs. In various languages, this is realized as an object, record, struct, dictionary, hash table, keyed list, or associative array.
- An ordered list of values. In most languages, this is realized as an array, vector, list, or sequence.

An object is an unordered set of name/value pairs. An object begins with { (left brace) and ends with } (right brace). Each name is followed by : (colon) and the name/value pairs are separated by , (comma) as shown in figure 1 and example 1.

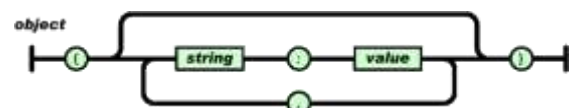


Figure 1 :JSON Object

```
{  
  "id" : "24",  
  "name" : "Pritesh",  
  "sex" : "male"  
  "bdate" : "24-jan-1984"  
}
```

Example 1 :Sample JSON Object

An array is an ordered collection of values. An array begins with [(left bracket) and ends with] (right bracket). Values are separated by , (comma) as shown in figure 2 and example 2.

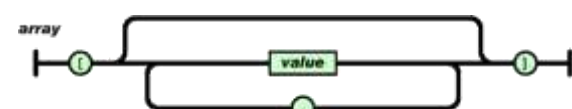


Figure 2: JSON Array

```
[  
  "id" : "1",  
  "name" : "Pritesh",  
  "sex" : "male"  
]
```

```

    },
    {
        "id" : "2",
        "name" : "Jigisha",
        "sex" : "female"
    }
}
    
```

Example 2: Sample JSON Array

A value can be a string in double quotes, or a number, or true or false or null, or an object or an array. These structures can be nested.

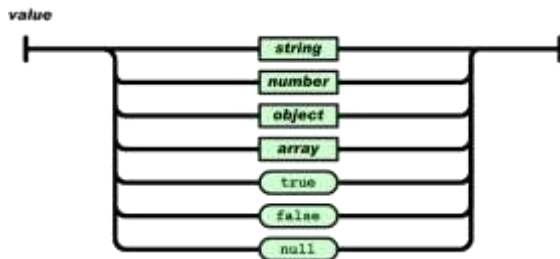


Figure 3: Data type in JSON

III. INTRODUCTION TO ANDROID

Android is a software stack for mobile devices that includes an operating system, middleware and key applications. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language.

Android powers hundreds of millions of mobile devices in more than 190 countries around the world. It's the largest installed base of any mobile platform and growing fast—every day millions of users power up their Android devices for the first time and start looking for apps, games, and other digital content [8].

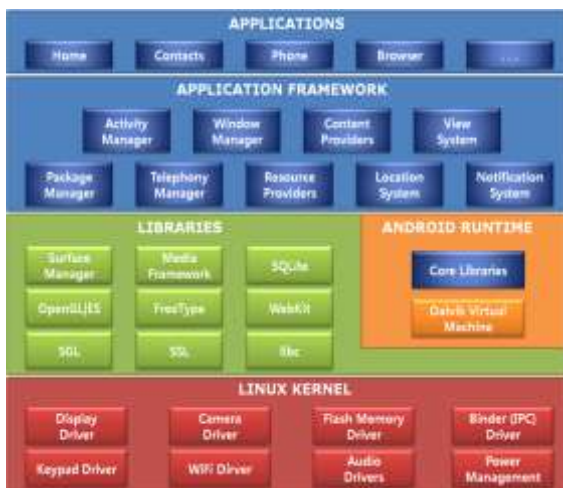


Figure 3 Android Framework

The user interface of Android is based on direct manipulation, using touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching and reverse pinching to manipulate on-screen objects [9].

Internal hardware such as accelerometers, gyroscopes and proximity sensors are used by some applications to respond to additional user actions, for example adjusting the screen from portrait to landscape depending on how the device is oriented. Android allows users to customize their home screens with shortcuts to applications and widgets, which allow users to display live content, such as emails and weather information, directly on the home screen. Applications can further send notifications to the user to inform them of relevant information, such as new emails and text messages [9].

IV. APPLICATION

In application we input data from user as a voice and convert it text and create SQL select or delete query based on predefined structure. We generate query from JSON which store all command and related words which was spoken by the users. This application can be used to fetch record and can be used to perform various database related operation. This JSON structure can also be generated based on user input and can modified based on user input.

Below given code represent JSON format for commands and its related words which may be spoken by the users. We can search and parse the query using this data stored in JSON.

```

{
    "commands": [{
        "id": "c100",
        "name": "select",
        "alias": ["display", "retrieve", "give", "list", "fetch"]
        "sort": ["order by", "sort", "arrange"]
    },
    {
        "id": "c200",
        "name": "delete",
        "alias": ["remove", "cut", "eliminate"]
    }
}
    
```

Command JSON List

Below given code represent JSON format for database tables and its related words which may be spoken by the users to represent fields and table name. We can search and parse the table name and fields name using this data stored in JSON.

```

{ "database": [{
    "id": "t100",
    "name": "student",
    "alias": ["student", "stud", "students"]
    "fields": ["sid", "student name", "marks", "birth date", "snm", "sname", "student name", "marks", "birth date", "bdate"] },
    {
        "id": "t200",
        "name": "employee",
        "alias": ["emp", "employee"]
    }
}
    
```

```
"fields":["eid",
"employeeid","enm","ename","employee name"]
}]}
```

Database JSON List

We can execute the JSON search commands to search the words to build the query using android JSON API and can create out based on the generated query. Table-1 represents the possible command that can be spoken by the user.

Command
Select all fields from table student
List roll number in student table
Display name total marks of table student
Delete from student
Remove all from stud
Purge record by student is 2

TABLE 1: LIST OF DIFFERENT COMMAND FORMATS

Below given code represent the processing of the JSON in android application.

```
JSONObject jsonObject = new JSONObject(jsonStr);
JSONArray jsonArray = new
jsonObject.getJSONArray("commands");
for(int i=0;i<jsonArray.length(); i++){
    JSONObject = command =
jsonArray.getJSONObject(i);
if(command.getString("name").equals("select")){
    //Do processing for SELECT query
}
if(command.getString("name").equals("delete")){
    //Do processing for DELETE query
}
}
```

After processing above code we get SQL query and we can convert it to any standard format and sent it to server to generate output.

The application has been tested by 25 speakers in the test environment, out of which 15 were male speakers and 10 were female speakers. We have used head mounted

microphones for the recognition. We found that the application is having an average of 90% accurate results for all the tests.

V. CONCLUSION

Here we conclude that using Google voice API can be used to create speech recognition application on smart phone to generate database queries which is speaker independent and can adapted by any mobile application development environment. The system is tested by 20 speakers in the laboratory environment and gives accuracy of 85%. The system is also able to recognize different pronunciation of some words by different speakers.

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