Developing an Android Game App implementing Audio and Text File Synchronization

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ABSTRACT

We all know how Filipinos love to sing; not only in singing competitions but especially on Karaoke Machines. Because of this, the proponents have created a Filipino fashioned karaoke game: Filipino fashioned in the sense that the proponents will use and promote OPM songs as assets in the game. To know the success rate of the game, the proponents will integrate a user acceptance test and will determine success rate from the results of the integrated testing and surveys as to the number of players who liked the Karaoke game. This study also shows the successfulness of the Karaoke Game with the use of an OpenSource Developing Tool Eclipse, Android SDK and PHP language.

Keywords:
Karaoke Machine, Filipino Fashioned, OpenSource developing tool Eclipse, Android SDK, PHP

ACM Reference Format:

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1. INTRODUCTION

1.1 Background of the Study

As of today, karaoke is one of the things that Filipinos like to do on their past time. It is also said that most Filipinos really love to sing; in fact some of Filipinos are born with a talent in singing, that's why many Filipinos win on international singing contests. Filipinos also use karaoke as a form of television entertainment. Some TV networks created reality game shows like "The singing Bee", and as time goes by, the fast technological innovation karaoke has reached the mobile entertainment. Smartphones became one of the most innovated technologies in today's era. One example of this is Google for its G1/Android OS smartphone. The Android Market features over 1,000 apps and still growing, including those enterprises which focuses on third-party applications. Smartphones or mobile technology remain as a hot area for small and big developing company. This means that Mobile technology is now today's center of innovation. Because of this reasons, the proponents developed a karaoke game that promotes Filipino songs especially OPM songs and was developed on Android developing tool eclipse.

1.2 Technology Application Context

The proponents developed a tap-the-lyrics android karaoke game which focuses on audio and text file synchronization. This game will be implemented using Audacity, Eclipse IDE and some Android libraries. The game will be different from other karaoke games for it was played not by

singing the song but by tapping the missing lyrics of the song. Since the game involves more lyrics, the proponents also applied audio and text file synchronization in the game. The proponents have also used OPM songs in order to promote the overlooked impressive Filipino songs.

1.3 Objectives of the Study

The general objective of this study is to develop an Android game app that will sync audio and text file to be used on the game.

The specific objectives are:

- Create the information Design for the game that will be implemented by the use of eclipse plugin android SDK.
- Create a Karaoke game
- Use the scoring engine on ranking of the scores.
- Implement this study on Android mobile phones.
- Create a Simple PHP project
- Connect both projects the Php and game app (Tap the Lyrics) on a domain server for holding and retrieving the files.

1.4 Significance of the Study

The significance of the study is to promote the OPM songs that has been used on the game app. Use the Audio and text file synchronization method that has been developed by the proponents. Deploying the game on an Android Operating System phone.

1.5 Scope and Limitations of the Study

The study will generally focus on developing the game app *"Tap the lyrics"* that implements audio and text file synchronization and also enables the proponents to accomplish the said objectives. This thesis game app was implemented with the use of android SDK plugin on eclipse and also uses Android SDK samples with open source programs. The proponents have also used Android libraries on implementing the text and audio synchronization. Audacity will be used on creating text files that will be used on the game. This includes the music lyrics' start-second and end-second of each word to be used in the game. The study will also promote OPM songs that will be used in the game.

1.6 Definition of Terms

Android SDK - The Android SDK (software development kit) is a set of development tools used to develop applications for Android platform. The Android SDK includes the following:

Android - The Android operating system (OS) is based on the open Linux kernel. Unlike the iPhone OS, Android is open source, meaning developers can modify and customize the OS for each phone. Therefore, different Android-based phones may have different graphical user interfaces GUIs even though they use the same OS.

Eclipse - Eclipse is a multi-language software development environment comprising a workspace and an extensible plug-in system. It is written mostly in Java. It can be used to develop applications in Java and, by means of various plug-in, other programming.

Audacity - is the name of popular open source multilingual audio editor and recorder software that is used to record and edit sounds. It is free and works on Windows, Mac OS X, GNU/Linux and other operating systems.

2. REVIEW OF RELATED LITERATURE AND WORKS

2.1 Audio-Text Synchronization inside mp3 files: A new approach and its implementation

The researchers developed a karaoke-like service system which can only play mp3 files using java and ATS language. ATS language was used for the part of the audio-text timing synchronization. The researchers used comment-field to store the textual information in a form which will be displayed when the music is playing. The mp3 files can also be played in an ordinary mp3 player but the one they have made has the function of interpreting the comment-tag fields stored in it. In order to edit and store new information inside the mp3 file, they have designed a tool to make it easier on storing lyrics on a song or mp3 file. The user must have two separate files, the one with mp3 audio and the other with song lyrics, but pressing the set-time button, the lyrics and audio-text timing synchronizations are automatically inserted inside the comment-field. The language that was been used in the implementation of the player and in the function of interpreting the comment-tag field was java (Furini M., Alboresi L., 2004).

(Furini M., Alboresi L. Audio-Text Synchronization inside mp3 files: A new approach and its implementation. Computer Science Department. University of Piemonte Orientale, Italy. Italy. 2004)

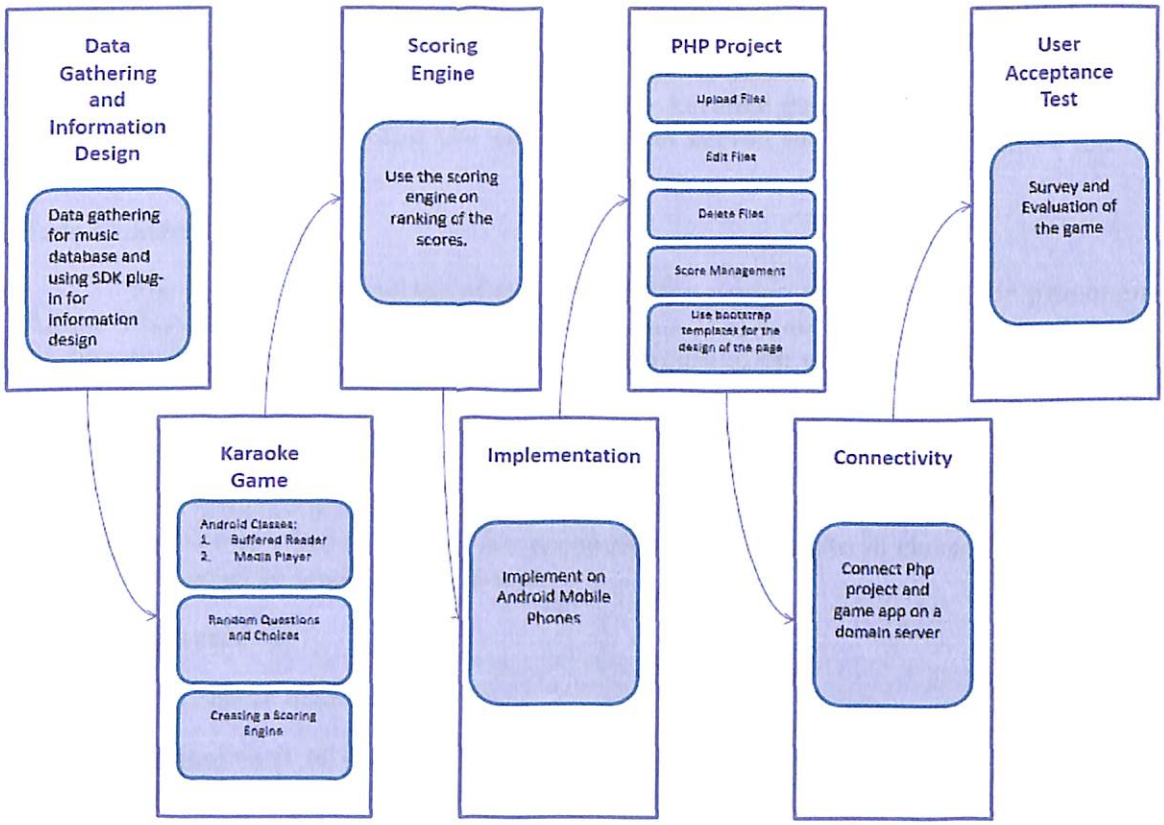
2.2 HTML5 Audio Karaoke – a JavaScript Audio Text Aligner

This research focused on audio and text file syncing that is implemented with the use of HTML5 and a generated timing file using CMU Sphinx. The developer implement audio and text file syncing with the use of correct timing from audio to text; it can jump to corresponding parts of the audio that is used on navigating audio and allows user to highlight areas of the text and having just a part of the text played back which give him an interesting exercise. The implementation was done by creating an array which was stored with words and its start and end time, the array was used which made it easier for the developer to do the program. He used "Image Overlay Mode", which is a text overlayed on image mode, to achieve overlay mode he used canvas (Dyer, 2012).

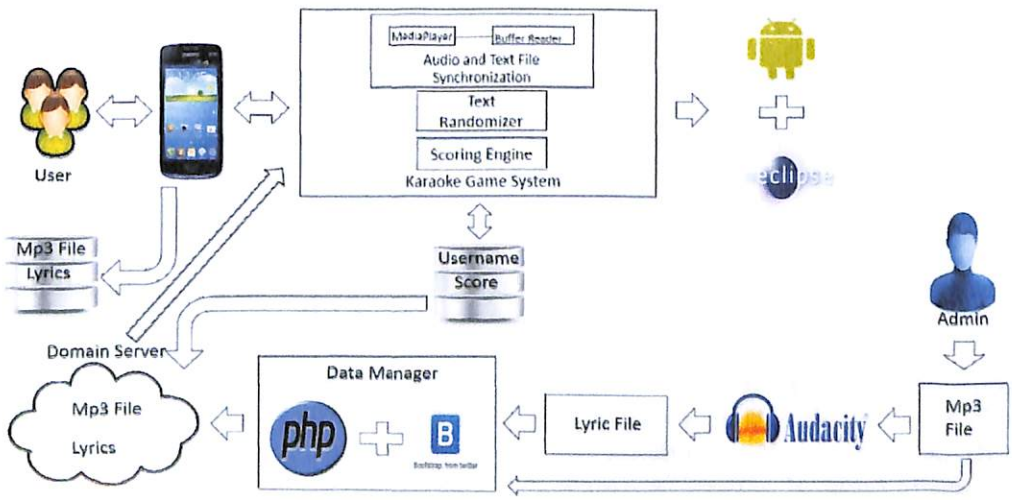
(Dyer J. HTML5 Audio Karaoke- a JavaScript Audio Text Aligner. Communications and Educational Technology, Dallas Theological Seminary, Texas, USA. USA. 2012)

3. RESEARCH DESIGN AND METHODOLOGY

3.1 Research Design



3.2 Implementation Diagram



3.3 Methodology

3.3.1 Data Gathering

In the gathering of data, the proponents did not have a hard timeselecting the songs to be used for the game. The application used OPM (Original Pilipino Music) songs for this because it was one of the main goals of the study: to preserve the heritage of OPM. Also, the proponents have done research as to how other karaoke games have been implemented and other relevant ways of doing the project, which served as the resources and guides while doing the application.

3.3.2 Information Design

For the implementation of the information design of the game, the proponents used Adobe Photoshop for the creation of the images that were used in the game such as the background images and buttons. As for the manipulation of the images and layouts, it was done using the xml in eclipse IDE.

3.3.3 Creation of Karaoke Game

The proponents have divided the synchronization function of the game into 3 subparts which are the following: file management of the android classes, the randomization of texts and scoring engine of the game.

3.3.3.1 File Management

A. Buffer Reader and Audacity

In the management of the text file, the proponents used Audacity software. Audacity was used to get the timeframe of each word or lyrics of the song. As the media file was imported into Audacity, the frequency and wavelength of the song is shown to determine the duration of the whole song. The process of getting the duration was done by selecting the frequency of each word and adding a new label to the song which served as a copy of the lyrics but this time, with its individual timeframe. After the label has been done, the label will be exported into a text file which consists of the following; each word and its timeframe (start time and end time of each word). The text file will be imported and loaded in the game using the Buffered Reader class of Android, a built-in class which will only be used to read the text file. The same process will be done to other songs as well.

B. Media Player

In this part, the media player will only get and play the song that will be used for the game. The PlayMusic function is found under Play Activity Class.

3.3.3.2 Random Questions and Choices

For the implementation of the random questions and choices, the proponents have made a number of functions which are under two classes: the "Lyrics" class and the "Play Activity" class. One of the functions is the ReadLyrics function under Lyrics class which does the part of converting the inputs that the text file contains into objects which are used for displaying of lyrics while the song is playing, and also the lyrics for the random questions andfor the random choices as well. Another function that the Lyrics class has is the CreateTenQuestions function; this is the part wherein it will produce 10 different options of which words will be the random question for a specific line of a song. As for the Play Activity class, it is composed of four major functions: InitSong, UpdateLyrics, SetSelection and CheckAnswer. In the InitSong function, this operates the displaying of the lyrics or words while the song is playing and checks at the same time if the word is a question

or not. If the word that is loaded or read by the function is a question, it will now call the UpdateLyrics function which does the replacement of the question into blanks. Also in this function, it is where the lyrics are updated if the player has already tapped the answer; updated in a way where the blanks will be filled in with the correct word. The SetSelection method, is where the randomization of choice had been done. The method gets the current question or word and combines it with two random variables to be used as the random choices. As the random choices had been iterated, the choices are set and sent to the buttons to be displayed. Lastly, the CheckAnswer method checks whether the player had tapped for the correct answer or not.

3.3.3.3 Scoring Engine

The Scoring Engine of the game is also under the Play Activity Class. The function CheckAnswer also does the scoring of the game but only on the part of incrementing the scoreVal variable every time the player gets the correct answer. After the player has finished the game or after the InitSong has done the displaying of all the lists of lyrics then, it will be the time that the scores will be evaluated. The delayShowingEndGame will be called but only for delaying the time so that the game will properly end. If the delayShowingEndGame is done, it will call the EndGame method which gets the scoreVal variable's value and checks whether it is greater than the previous high score or not. If it is a new high score, the game will prompt the user to input their name then the data will be automatically sync the scores on the created server by the use of the ScoreActivity.

3.3.4 Scoring Engine used for Ranking of the Scores

As mentioned above, the data has been sent to the domain server. In the ranking of the scores, the proponents created two classes: HighScoreSongActivity and HighScoreActivity. The HighScoreActivity gets and displays the song title and description from the server while the HighScoreSongActivity gets and displays the best 5 scores of each song from the server.

3.3.5 Implement on Android Mobile Phones

On this part, the proponents will implement the game on android phones via its USB port.

3.3.6 PHP Project

The proponents have made an additional objective for the application's scope. The proponents have been advised to make an easier way to manage the files of the game and to also make the game more interesting. Before, the game used to have all the files stored and processed in its folders which causes for game to lag. The proponents have decided to create a simple PHP project which will store and manage the files in the database, which is more efficient than before and will serve as the administrator page of the game. Only the proponents can open, update and delete files from the administrator page. The PHP project is divided into 4 subparts; Uploading of Files, Editing of Files, Deleting of Files and Using bootstrap templates for the implementation of the design.

3.3.6.1 Uploading Files

Just like other PHP projects, the proponents have created a simple function for the uploading of the files to the site and for storing it to its database. The files that are uploaded in the site are the files needed for the game which are the text files and audio files. When a proponent or administrator will upload a file, it will be categorized according to its difficulty. The proponent must choose whether the song will be placed under the easy category or hard. The proponents have made these options to make it easier to identify which song is easy or hard and also, to make it easier to manipulate.

3.3.6.2 Editing of Files

This function is the part where updating of the data is done right away if the proponents want to update or edit the files or the data.

3.3.6.3 Deleting of Files

In this function, it will only delete the files that have been uploaded in the server.

3.3.6.4 Score Management

Score management displays the scores that have been sent by the ScoreActivity and will be also fetched by HighScoreActivity and HighScoreSongActivity to be used on the game.

3.3.6.5 Use Bootstrap template for the implementation of the design

The proponents searched for bootstrap templates and used bootstrap templates to make the administrator page more clean and organized.

3.3.7 Connect PHP and game to Domain Server

Since, the proponents added a new objective, other functions have been added too. The functions are the following; connection of PHP and domain server and connection of game and server. As to what server the proponents have used, the proponents only borrowed a domain server for it was too expensive to buy one and it was taking a lot of time and adjustments to install and configure one. Since the proponents used PHP and domain server, functions such as Synchronize, JSONParser and a function on Main Activity Class have been made. The Synchronize Class consists of functions which connects the game to server and fetches the data from the server as well as a function for displaying time of download. Also, it consists of the function DownloadFromURL where the game downloads the files from the server and stores it to the phone's memory card to be used for the game. The JSONParser class consists of functions for defining an arraylist to hold the data types and for converting of the URL into objects which will be used for the game. The MainActivity Class has functions which operate the first instance of the game or the starting of the game which leads to all other classes and functions. It has a method which checks for network availability before calling the other method of downloading the files from the server to the game.

4 TECHNOLOGY BACKGROUND

4.1 Audacity – is a free software, developed by a group of volunteers and distributed under the GNU General Public License (GPL). It is free, easy-to-use, multi-track audio editor and recorder for Windows, Mac OS X, GNU/Linux and other operating systems. The interface is translated into many languages. It can edit wav, aiff, flac, mp2, mp3 or ogg Vorbis sound files. It has the following functionalities; cut, copy, splice, mix sounds together and converts tapes and records into digital recordings or CDs, record live audio and more.

4.2 Eclipse IDE - is an integrated development environment. It contains a base workspace and an extensible plug-in system for customizing the environment. Written mostly in Java, Eclipse can be used to develop applications in Java. By means of various plug-ins, Eclipse may also be used to develop applications in other programming languages: Ada, C, C++, COBOL, Fortran, Haskell, JavaScript, Lasso, Perl, PHP, Python, R, Ruby (including Ruby on Rails framework), Scala, Clojure, Groovy, Scheme, and Erlang.

4.3 Android Libraries - The Android Support Library package is a set of code libraries that provide backward-compatible versions of Android framework APIs as well as features that are only available through the library APIs. Each Support Library is backward-compatible to a specific Android API level. This design means that your applications can use the libraries' features and still be compatible with devices running Android 1.6 (API level 4) and up.

5 RESULTS AND DISCUSSION

5.1 Karaoke Game

After the Game app was developed, the proponents have conducted a testing phase where the proponents let the randomly chosen 35 players to test/play the game and will be asked to answer a survey for the users' acceptance test. The proponents used random sampling in choosing the game testers because the proponents do not have a specific target market.

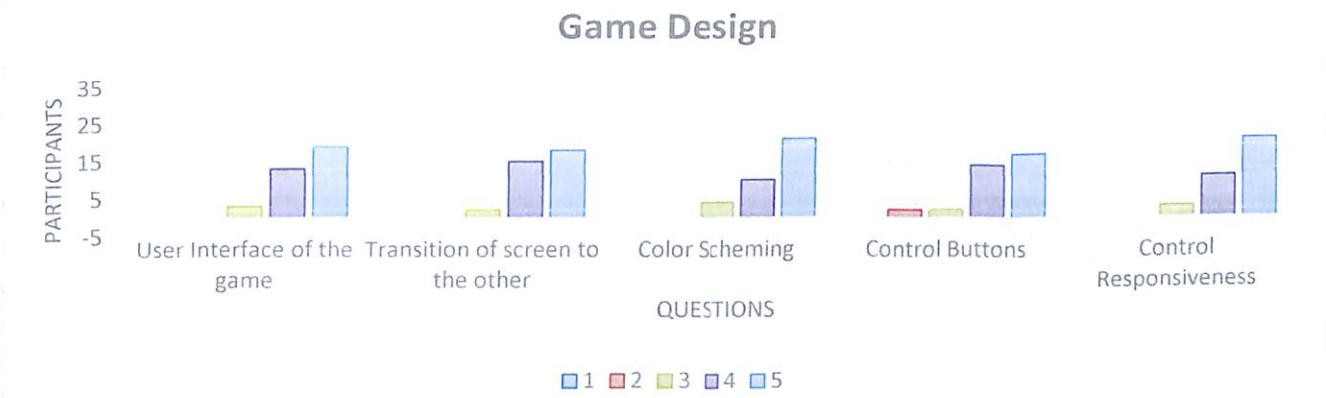


Fig. 3. Test Results for the Game Design.

This graph shows the ratings that the player gives to the game design (User Interface) of the game app. This module has 6 questions that focus on the design or user interface of the game and these questions are answered through ratings from 1 to 5 (1= Very Poor 2= Poor 3= Good 4= Very Good 5= Excellent). As it shows in the table of Game design, the User Interface is effective and acceptable for the user, with an overall mean of 4.45, as an overall Qualitative Response of the players to the Game Design (User Interface). All of the questions got Very Good ratings.

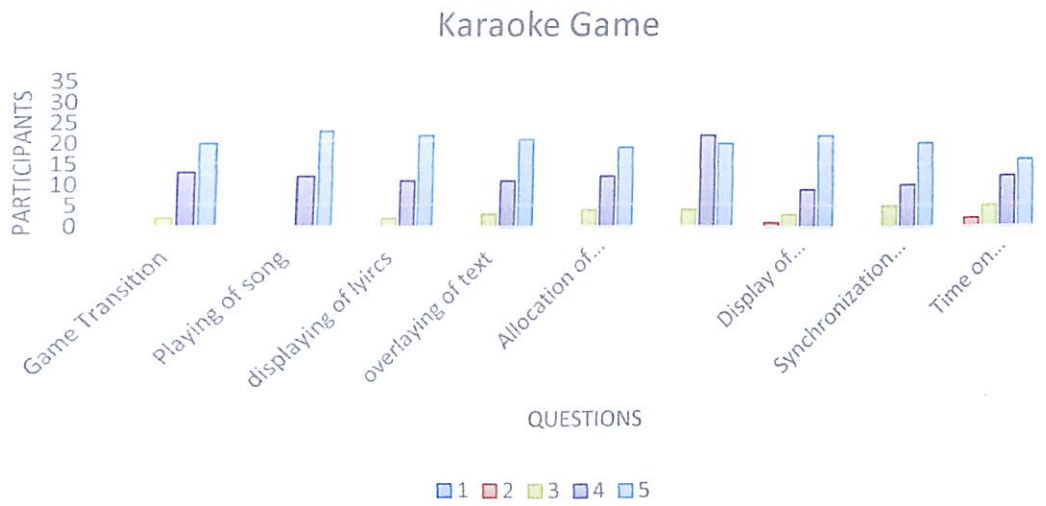


Fig. 4. Test Results for the Karaoke Game.

Both Chart and Tabular data display the result of the survey in regards to the Karaoke Game. In this part, the players rate the transitions of each activity in the karaoke game, playing of the song, the displaying of lyrics, overlaying of text, the time allocation for the user to choose the right answer, displaying of downloaded songs, synchronization of the app and the server and time on downloading the files from the server. The result of the survey is that most of the players saw that the karaoke game is effective in terms of the functionalities it has, especially on the synchronization part of two files text and audio file with an overall mean of 4.47 and a Qualitative Response of Very Good.

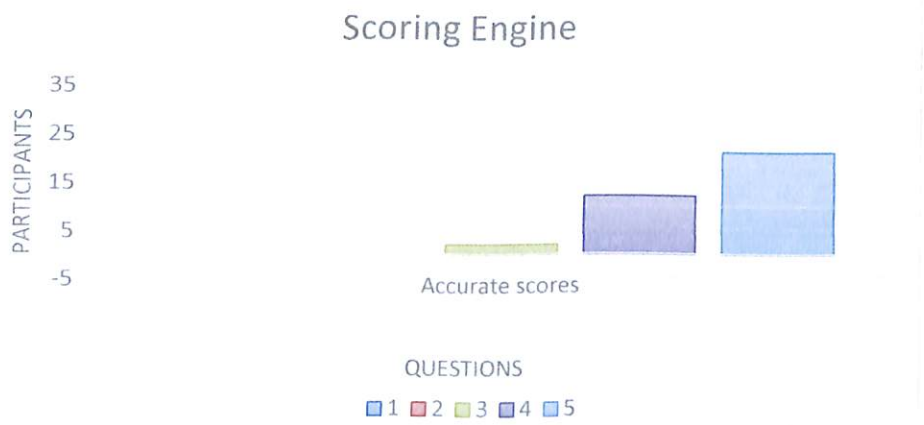


Fig. 5. Test Results for the Scoring Engine

This graph and table displays the response of the players to the scoring engine that the Game application has. The question is Does the game display accurate scores? How is it?" Most of the players accepted the scoring engine the game has and saw that it effectively displays accurate scores for the users with a mean of 4.57, and an overall Qualitative Response of Excellent.

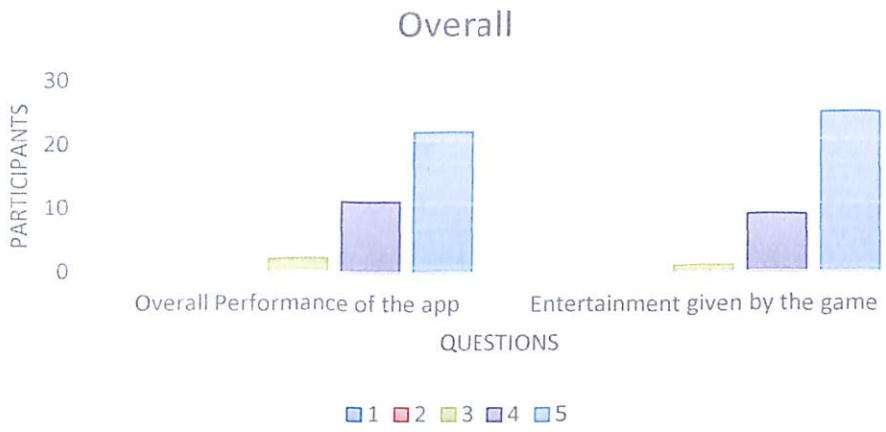


Fig. 6. Test Results for Overall Performance.

This graph refers to the overall performance of the game app itself, and the effectiveness of the game in terms of entertainment. This uses the question "Does it give entertainment to the player/user?" As you can see on the table of overall performance, it displays that most of the players like the games over all performance and the game is also entertaining with an overall mean of 4.63 and an overall Qualitative response of Excellent.

5.1 Technologies used

Audacity has been used for the generation of the text file. The proponents also used Buffered Reader and Media Player Class from Android libraries in Eclipse IDE.