ISSN 2278-9723
DOI:10.31838/ijccts/10.02.05

Research Article

A Mobile System for Highlighting the Key Legal Terms That Must Be Agreed in Terms and Conditions of the Usage of Internet Contents

ABEER ZAHER[1] , IRADA ALHAWSAWI[1] , GHINA KATTAN[1] , JOUD AL-AHMRI[1] , AREEJ AL-SHUTAYRI[1], NAHLA ALJOJO[2], EMAN ALDHAHRI[1], OMAR ABOUOLA[2]

[1]Department of Computer Science and Artificial Intelligence, College of Computer Science and Engineering, University of Jeddah, Jeddah, Saudi Arabia

[2]College of Computer Science and Engineering, Information system and Technology Department
University of Jeddah, Jeddah, Saudi Arabia

Email: aoalshutayri@uj.edu.sa, eaal-dhahery@uj.edu.sa, nmaljojo@uj.edu.sa, oaboulola@uj.edu.sa

Received: 04.01.22, Revised: 11.02.22, Accepted: 22.03.22

ABSTRACT

There is of course, a question about the use of any software, and that is whether or not people ever read the "terms and conditions". In the last few years, Saudi Arabia has become very eager to expand and modernize all of its technical and knowledge fields to achieve a high quality of life by motivating students to participate in problem solving and disseminating their ideas by using applications and sites that help the general public achieve their goals in the field of Artificial Intelligence, Security, and user experience. The goals of this study are to develop an application that simplifies reading the terms and conditions by highlighting the important terms and conditions that may cause problems and to help users to be aware of any potential problems that could occur in the system. The app's final design and look should also enhance the appeal to the user. The results of this study will further online resource use by providing more justification for subscription and usage of online resources, as many online subscriptions and usages are based on agreeing to terms and conditions, and in the current Internet era, people must have agreed to these terms and conditions at least once in their lifetime.

Keywords: terms, conditions, scanning, Dictionary

1. Introduction

Due to the community's use of applications and social networking, there have become many terms and conditions for software management and Legal follow-up in the user's device. The Terms and Conditions (TC) are useful because the developer can use them to inform the users who are the owner of the content, developer of the application or updates and other intellectual property[1]. It contains legal terms, payment policies and updates permissions.

The issue arises when people update their devices or download new application, they agree on terms and conditions without reading it. This application helps the user to read and understand the other application's terms and conditions in an easier way by highlighting what the user needs to understand from the T&C, and warn the user if there are any problems that might damage the performance of the system's device, or diminish quality of the device and display it to the user.

2. Problem Definition

We created a survey consisting of 5 questions to perceive people's awareness on the terms & conditions and its intentions and if they read it or not. 338 people participated in our survey and based on the results of their answers we deduced the following:

According to our survey in Makkah and AL-Sharqiyah region, 68% of people consent to the legal terms and service conditions without reading them, and 32% would sometimes read it but not fully comprehend it. Apparently, users are willing to accept that, the worst thing that most companies will do is sell their name and email to a third party that wants to advertise to them.

We interviewed some of the participants and asked them why they wouldn't read the T&C and their answers suggested that users don't read the detailed terms and conditions for the following reasons:

- Text size is too small
- Too many subheading
- The language is too complex, long-winded
- Unable to fully understand the legal terms
- The style is usually not user friendly

A conducted study at York University in Toronto by creating a fake social networking site called Name Drop. Johnathan Obar Created this website to observe if people would read and consent to the T&C, in this website they wrote up a terms and

services agreement for users to agree to, before signing up. In the agreement they included the disclosure that users give up their first-born child as payment, and that anything users shared would be passed along to the NSA. And it turned out that A whopping 98% of participants agreed without reading the terms and services[2].

3. Project Objectives

- To develop and application that can be used either automatically or manually
- To Scan and read the terms & conditions
- To summarize the terms & conditions
- To highlight the important terms & conditions according to the type of problem that might cause performance issues to the system
- To clarify ambiguous terms by providing a dictionary to explain the meaning of the word in English and Arabic

4. Literature review

This section presents the mechanism of text summarization and text highlighting and creating a dictionary for words that are hard to understand and how we are going to use Natural Language Processing (NLP) and AI.

4.1 Summarize Bots

There are some online websites and applications that in help in text summarization for academic articles like summarize bots [3] the app works with various file types such as: PDF, MP3, DOC, TXT, JPG, etc., to summarize any text, you should only send the message on Facebook or add the bot to Slack.

The app is an ad-free software and helps saving time, one of its extra features is that it supports almost all languages. And summary size is from 0% to 100% of the original text.

Similarly, scanning terms and conditions is using the extractive summarization approach it selects the meaningful sentences in the article or document without modification. We do not want to modify or change the text in the T&C document because the users need to understand their rights and legal obligations and what protocols they should follow like in case of excusable events. It uses the single document summarization scale since the T&C, privacy policies, and cookies are listed in a single document or a single page.

4.2 Dictionary.com

Dictionary.com is the world's leading digital dictionary that provides millions of English definitions, spellings, audio pronunciations, example sentences, and word origins. Dictionary.com also offers a translation service that will strongly help the learners in order to improve their vocabulary and understand the words meanings.[4] The site has been developed into an application to give the user several options on how to use the program to feel comfortable while using the application or the website. Part of our application "Scanning Terms and Conditions" aims to use the dictionary and learn the vocabulary and meanings of the difficult words. Because Dictionary.com is one of the top three in reference applications, we decided to choose it as one of the applications that will be compared with a part of our application.

The most important advantages of Dictionary.com are: [5]

- This free online reference software services provides reliable access to millions of word definitions, synonyms, spelling, audio pronunciations, example sentences, translation from
  Web properties and iPhone, Blackberry, Android, and iPad apps.
- Dictionary.com contains over 1 million words, and its thesaurus offers 1.5 million alternative words.
- Searches are not only fast and comprehensive, but Dictionary.com offers comprehensive synonyms to help users find just that "right" word. The contemporary and literary quotes below the definitions are very useful for a better understanding of the word's meaning.

4.3 IEEE

The world's largest technical professional organization for the advancement of technology. IEEE and its members inspire a global community through its highly cited publications, conferences, technology standards, and professional and educational activities.[6]

It is technical professional society website for advancing innovation and technological excellence, it is designed to serve the professionals Participants in all aspects of electrical, electronic and computing fields and related areas of science and technology that underlie modern civilization.

It seems like an electronic library for all scientific and academic researches, books and studies for all aspects that the user will searching for. This organization implements based on store the professional's writes on sections based on the appropriate type of written topic.

When the user search for some topic, the IEEE will search for the words and sentences that have been written and it will highlight the appropriate researches, books and studies for the user search. Since IEEE is one of the websites that uses the highlighting technique as a main feature, it has been chosen as a user experience.

IEEE is a website:

- Reliable reference for research and professional studies.
- Gives a lot of suggested resources to the user.
- Use the highlighting technique to facilitate the information to the user need.

4.4 Apache OpenNLP

The most basic and useful technique in NLP is extracting the entities in the text. It highlights the fundamental concepts and references in the text. Named entity recognition (NER) identifies entities such as people, locations, organizations, dates, etc. from the text. NER is generally based on grammar rules and supervised models. However, there are NER platforms such as open NLP that have pre-trained and built-in NER models.[7]

Apache OpenNLP is an open source Java library which is used process Natural Language text. OpenNLP provides services such as tokenization, sentence segmentation, part-of- speech tagging, named entity extraction, chunking, parsing, and co-reference resolution,etc. And producing an annotated block of text that highlights the names of entities.[8]

5. Methodology

The overall methodology for the research consisted of four stages as outlined below.

Stage 1: Review of literature and previous works on summarization, highlight and dictionary of the Applications.

Stage 2: Prior Questionnaire

To ensure a system that provides a proper user experience, we created a survey consisting of 5 questions to perceive people's awareness on the terms & conditions and its intentions and if they read it or not. 338 people participated in our survey and based on the results of their answers we deduced the following: According to our survey in Makkah and AL-Sharqiyah region, 68% of people consent to the legal terms and service conditions without reading them, and 32% would sometimes read it but not fully comprehend it. Apparently, users are willing to accept that, the worst thing that most companies will do is sell their name and email to a third party that wants to advertise to them.

Stage 3: Design and implementation of the application

The user interface is designed to scan the document terms and conditions by permitting the user to copy the URL of documents afterwards the system when summarize the document, highlight words and sentences in order to draw the user's attention, and to provide a dictionary.

Stage 4: Usability testing

Usability testing is the relation between the tools and the user they allow patrons to perform tasks or uses in the best possible way. This means that it can be used by the beneficiaries. It is the degree of success of the beneficiary in learning and using the product to achieve a specific goal.

6. Results of Prior Questionnaire

First Question: Based on the responses of the survey, none of the respondents answered yes to reading the entire document of terms and conditions whether when they download an application, or when updating their devices, or browsing websites on the internet. 32%of the respondents who answered sometimes, they did not read the entire document of the T&C or they did not read it at all. 68% of the respondents said that they never read the terms and conditions, after we interview these participants, they said they did not read the T&C because of several problems that we are going to mention later on in this chapter. As shown in Figure 1

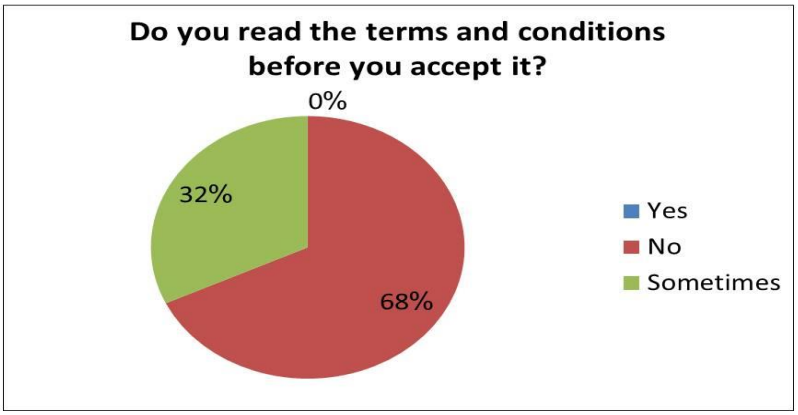


Fig.1: Distribution of question 1

Second Question: 94% of the participant said they would read the terms and conditions if they were shorter and more comprehensible. The terms and conditions are usually too long, it uses too many subheadings, text is too small, and uses complex language, and after we interviewed some of the participants, they pointed out that these problems are the main reason they are not reading the T&C. As shown in Figure 2.

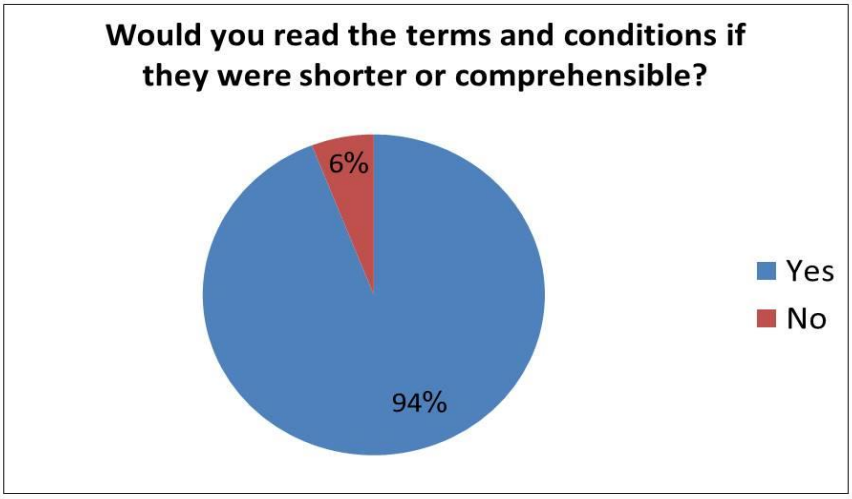


Fig.2: Distribution of question 2

Third Question: This question is very important for our application because it shows and finds good reasons to use the application. According to Figure 3.

1) 57% of the participants said they find it difficult to read terms and conditions.
2) 31% participants said it sometimes faced difficulty to read terms and conditions, because they usually read the terms and conditions in their life by downloading more apps and using a lot of the websites.
3) The other 12% said no difficulty in reading the terms and conditions, because of the technical major and the technical background they have about the applications.

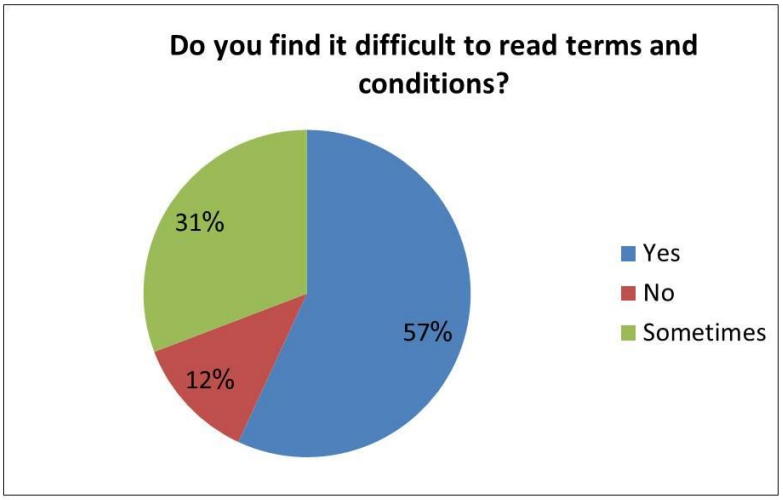


Fig.3: Distribution of question 3

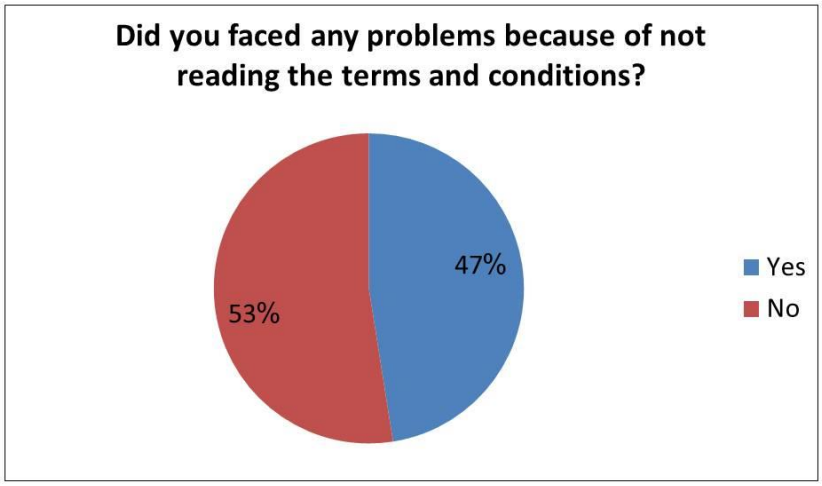


Fig.4: Distribution of question 4

Fourth Question: 53% of people have encountered problems after accepting the T&C without reading it, however we did not ask them what kind of problems they faced because, the plan in our project is facilitate reading the T&C for the user and make it easier, but not solve the problems that are caused by the application or websites. As shown in Figure 4.

Fifth Question: Based on the results of the questionnaire, we found that 83% of people want to use an application that highlights the important terms and conditions that may cause problems if they did not read it. As shown in Figure 5.

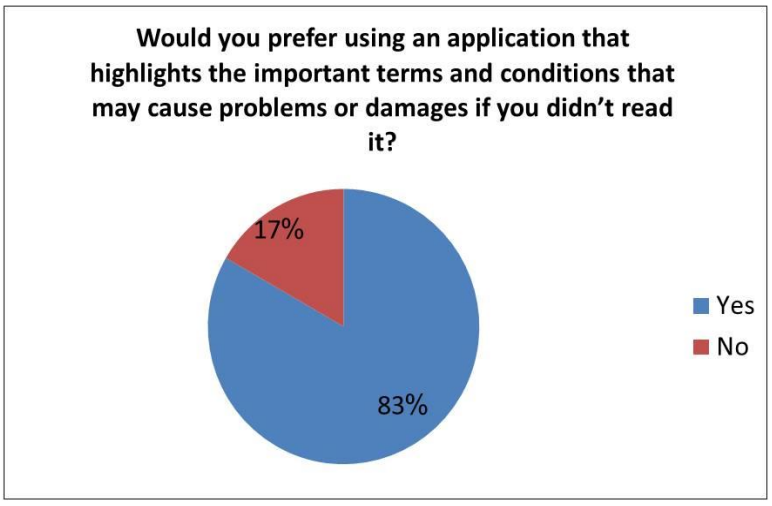


Fig.5: Distribution of question 5

7. Design and implementation of the application

7.1 Design of the application

In this section we will present the sequence diagram to exhibit how the application of scanning T&C should work. The user must first open the application, then they have to choose if they want to use the application either automatically or manually, afterward they need to copy a URL of the desired

document of TC they want to read. If the user chose to use the application automatically it will summarize, highlight and provide a dictionary for the word they want to look up, on the other hand if they chose to use the application manually a list of option will be displayed including the summarization option, highlight option, or the option of using the dictionary, separately. Sequence diagram will be represented in Figure 6.

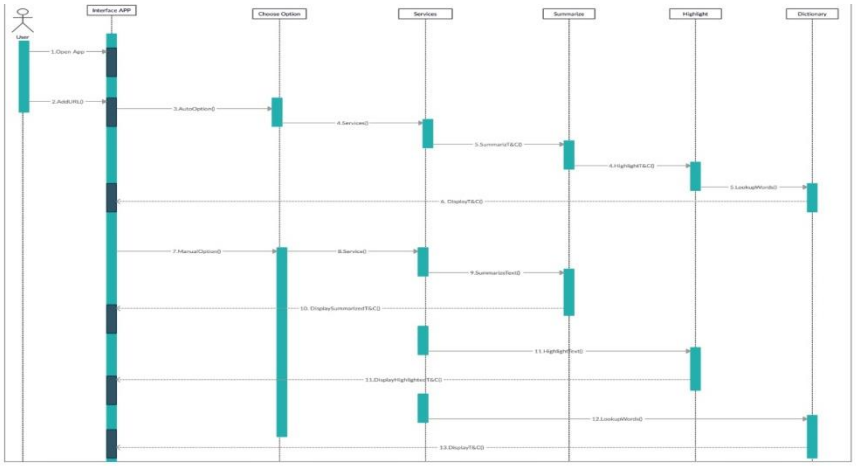


Fig.6: Sequence diagram for the whole system

7.2 Implementation of application

This section represents the processes pursued to implement a functional high-fidelity prototype. Section 7.2.1 lists the technologies, programming languages, and tools used in the implementation process. Furthermore, section 7.2.2 will present and describes the main implemented interfaces and their workflow.

7.2.1 Programming Languages and tools

The framework of the project consists of an Application Programming Interface that contains the words that will be used in the dictionary, an API for the summarization, and the application that will be connected to the APIs to access the words and extract the document for the summarization. Moreover, the users will be using the dictionary for the uncomprehend words. The following list presents the different tools and programming languages for each part of the system:

• API

We used two sources of the APIs, the first API we used for the summarization, and the second API was used for the dictionary by the Retrofit library. Retrofit is a typesafe REST client for Android, Java and Kotlin developed by Square. The library provides a powerful framework for authenticating and interacting with APIs and sending network requests with OkHttp. This library makes downloading JSON or XML data from a web API fairly straightforward. [9] [10]

• Phone Application

• JAVA and Android Studio

7.2.2 System Work Flow and Interface Description

The system mainly consists of an application, and an API. The application is made into two parts, automatic and manual which are both provided with three services of summarization, highlight, and a dictionary. The first part which is the auto is where the application should execute all three service without the user's instructing. The second the manual is when the user has the option of which service they want to be executed or provided.

The API was established using URL in android studio. Our API consists of two parts the summarization and the dictionary. The codes are represented in figure 7 ,figure 8 and figure 9 respectively ,by using the Retrorfit library to add the APIs for the application as a configuration to request the HTTP over the networks for the Client to fit the goals ofthe application needs.

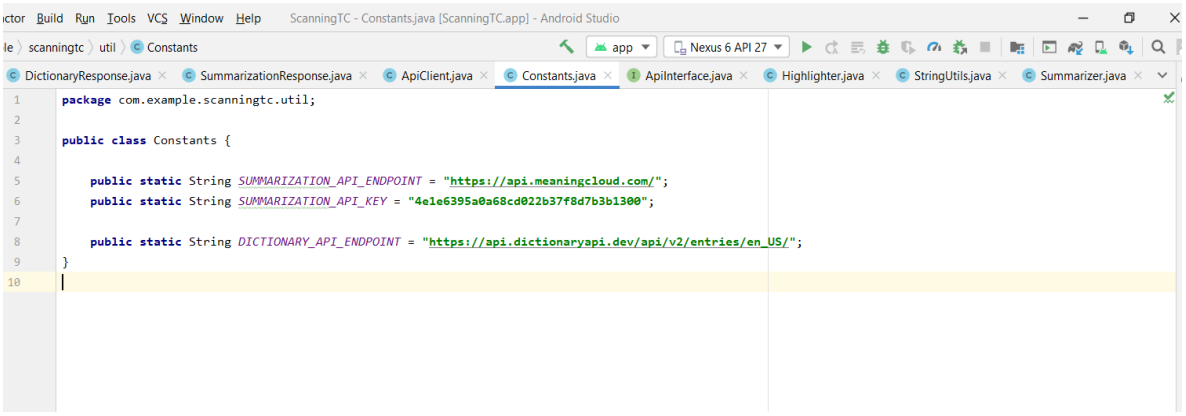


Fig.7: API service request

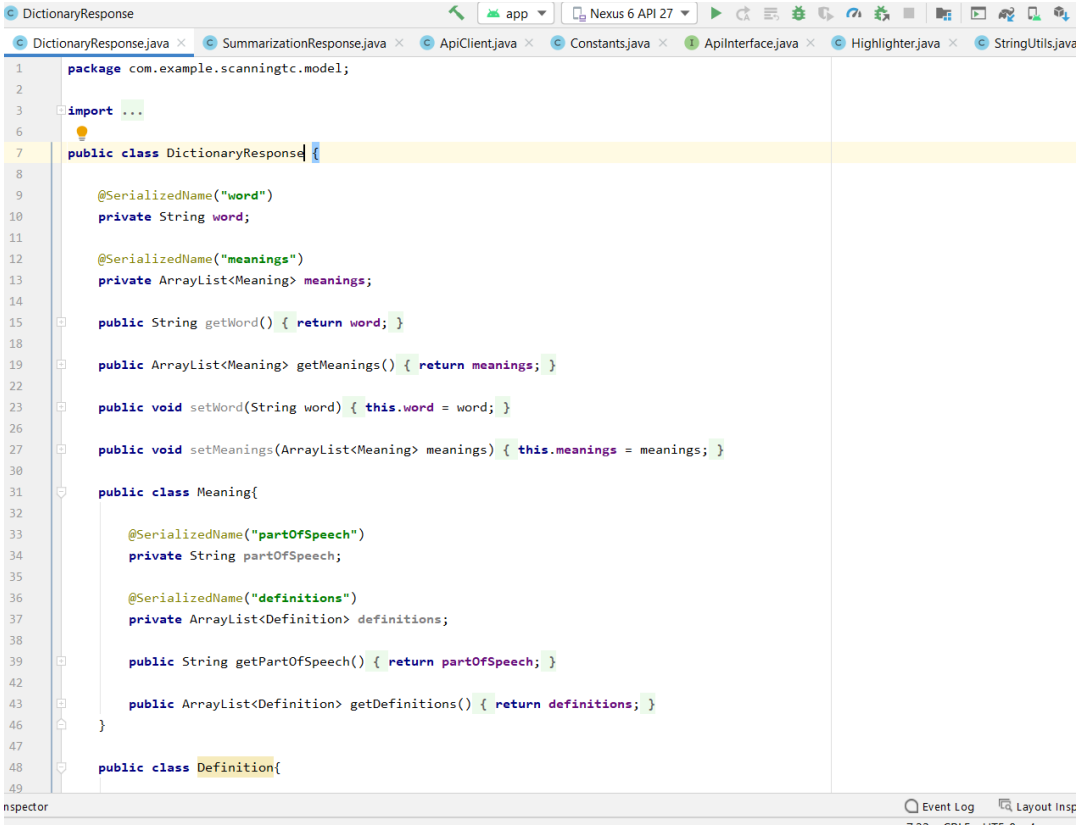
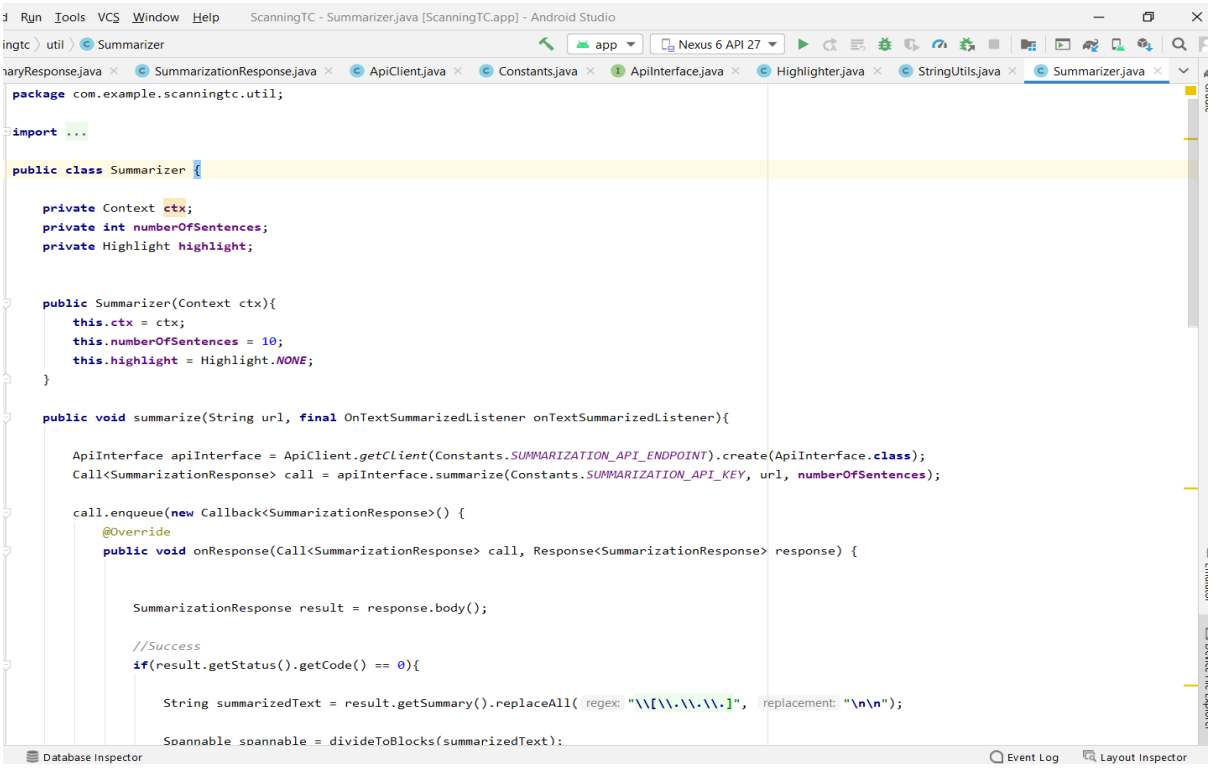


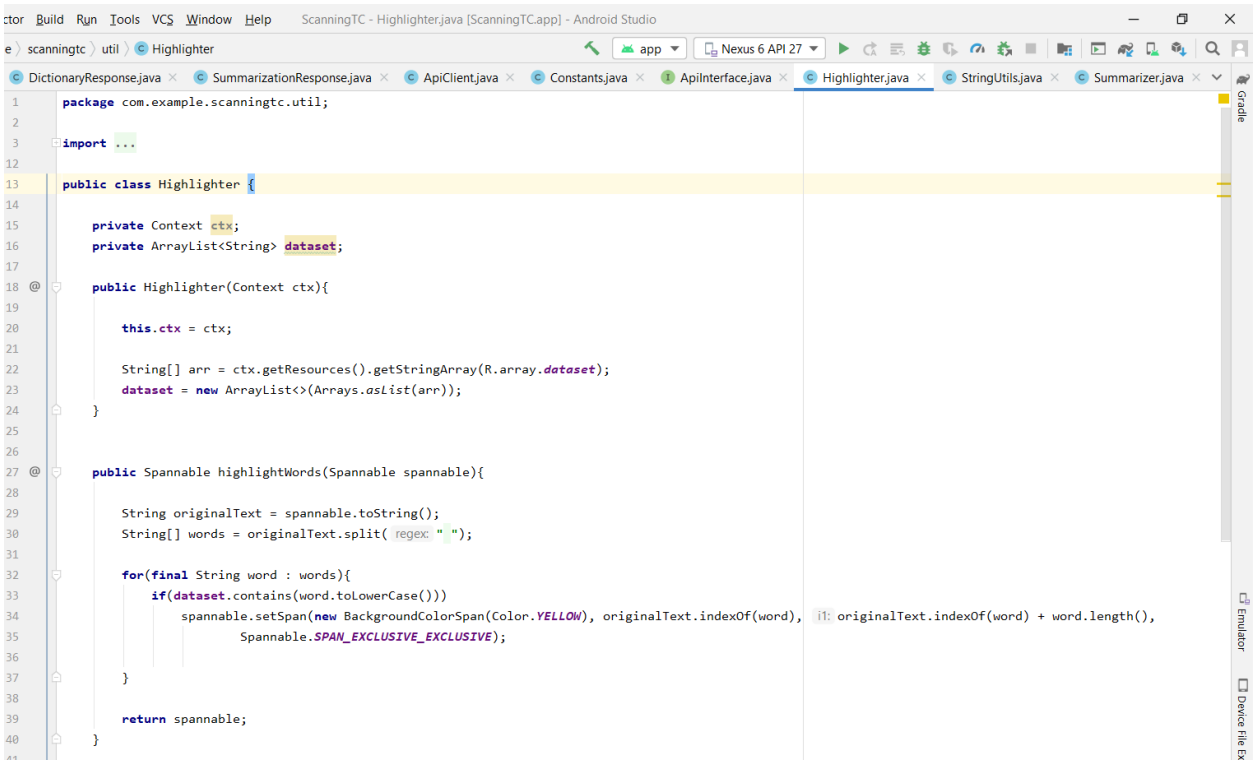
Fig.8: Result returned from API request for dictionary



```
package com.example.scanningtc.util;

import ...

public class Summarizer {

    private Context ctx;
    private int numberOfSentences;
    private Highlight highlight;


    public Summarizer(Context ctx){
        this.ctx = ctx;
        this.numberOfSentences = 10;
        this.highlight = Highlight.NONE;
    }

    public void summarize(String url, final OnTextSummarizedListener onTextSummarizedListener){

        ApiInterface apiInterface = ApiClient.getClient(Constants.SUMMARIZATION_API_ENDPOINT).create(ApiInterface.class);
        Call<SummarizationResponse> call = apiInterface.summarize(Constants.SUMMARIZATION_API_KEY, url, numberOfSentences);

        call.enqueue(new Callback<SummarizationResponse>() {
            @Override
            public void onResponse(Call<SummarizationResponse> call, Response<SummarizationResponse> response) {


                SummarizationResponse result = response.body();

                //Success
                if(result.getStatus().getCode() == 0){

                    String summarizedText = result.getSummary().replaceAll( regex: "\\[\\.\\.\\.]",  replacement: "\n\n");

                    Spannable spannable = divideToBlocks(summarizedText);
```

Fig.9: Result returned from API request for summarization

Highlight code:



```
package com.example.scanningtc.util;

import ...

public class Highlighter {

    private Context ctx;
    private ArrayList<String> dataset;

    public Highlighter(Context ctx){

        this.ctx = ctx;

        String[] arr = ctx.getResources().getStringArray(R.array.dataset);
        dataset = new ArrayList<>(Arrays.asList(arr));
    }


    public Spannable highlightWords(Spannable spannable){

        String originalText = spannable.toString();
        String[] words = originalText.split( regex: " ");

        for(final String word : words){
            if(dataset.contains(word.toLowerCase()))
                spannable.setSpan(new BackgroundColorSpan(Color.YELLOW), originalText.indexOf(word),  i1: originalText.indexOf(word) + word.length(),
                        Spannable.SPAN_EXCLUSIVE_EXCLUSIVE);

        }

        return spannable;
    }
```

Fig.10: Highlighter methods

```
}

public Spannable highlightSentences(Spannable spannable){

    String originalText = spannable.toString();
    String[] sentences = originalText.split( regex: "\\.");

    for(final String sentence : sentences){
        if(StringUtils.isThereSimilarString(dataset, sentence))
            spannable.setSpan(new BackgroundColorSpan(Color.YELLOW), originalText.indexOf(sentence),  i1: originalText.indexOf(sentence) + sentence.length(),
                    Spannable.SPAN_EXCLUSIVE_EXCLUSIVE);

    }

    return spannable;
}
```

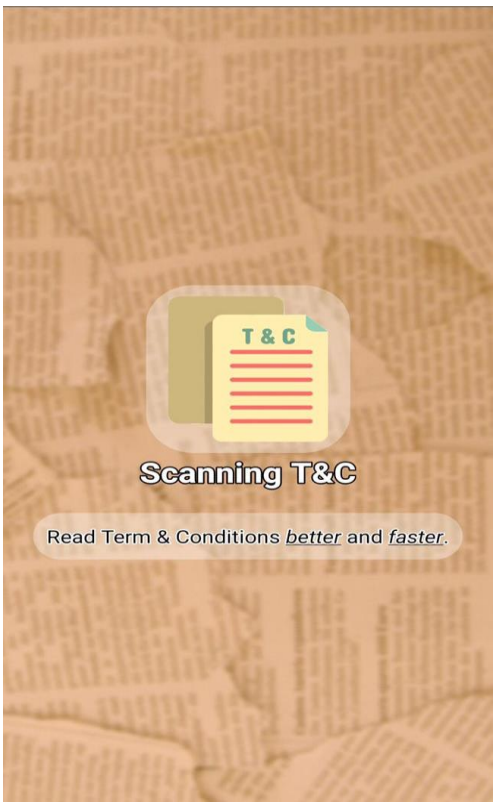
Emulator Device File Explorer

Profiler Database Inspector Event Log Layout Inspector

Fig.11: Highlight sentence method

T&C Application Interface

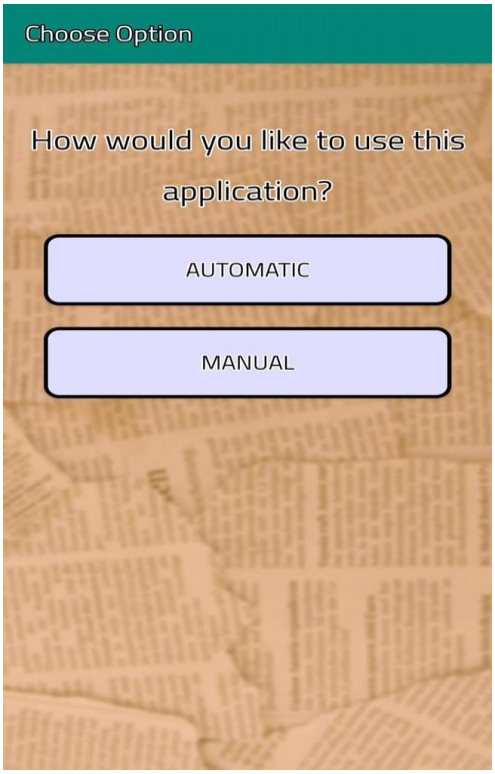
The application will be used by the user either automatically or manually .Starting up with the homepage followed by displaying the option of using the application.



activity_splash.xml | ic_launcher_background.xml | activity_use_options.xml | layout_background.xml

```
        android:src="@drawable/logo"
        android:layout_centerHorizontal="true"
        android:layout_marginTop="30dp"/>

    <TextView
        android:id="@+id/tv1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_centerHorizontal="true"
        android:layout_below="@+id/logo"
        android:text="Scanning T&C"
        android:textStyle="bold"
        android:textColor="#ffeead"
        android:textSize="25sp" />

    <TextView
        android:id="@+id/tv2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_centerHorizontal="true"
        android:layout_below="@+id/tv1"
        android:layout_marginTop="20dp"
        android:gravity="center_horizontal"
        android:padding="10dp"
        android:background="@drawable/background_white_circled_alpha"
        android:text="Read Term & Conditions better and faster."
        android:textColor="#444"
        android:textSize="16sp" />

</RelativeLayout>
```

Fig.12: starting interface with design details




```
<include layout="@layout/layout_background" />

<TextView
    android:id="@+id/tv1"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_centerHorizontal="true"
    android:layout_marginTop="50dp"
    android:layout_marginLeft="10dp"
    android:layout_marginRight="10dp"
    android:gravity="center_horizontal"
    android:text="How would you like to use this application?"
    android:textColor="@android:color/black"
    android:textSize="25sp" />

<Button
    android:id="@+id/btn_automatic"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_below="@+id/tv1"
    android:layout_marginLeft="30dp"
    android:layout_marginTop="20dp"
    android:layout_marginRight="30dp"
    android:background="@drawable/button_white_background"
    android:padding="18dp"
    android:text="Automatic"
    android:textColor="@android:color/black"
    android:textSize="18sp" />
<Button
    android:id="@+id/btn_manual"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_below="@+id/btn_automatic"
    android:layout_marginLeft="30dp"
    android:layout_marginTop="20dp"
    android:layout_marginRight="30dp"
    android:background="@drawable/button_white_background"
    android:padding="18dp"
    android:text="Manual"
    android:textColor="@android:color/black"
    android:textSize="18sp" />
</RelativeLayout>
```

Fig.13: choose option with design details


```
android:layout_below="@+id/tv1"
android:layout_marginTop="20dp"
android:background="#ddf"
android:paddingTop="40dp"
android:paddingBottom="40dp">


<TextView
    android:id="@+id/tv2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_centerHorizontal="true"
    android:text="Put Your Link Here"
    android:textSize="25sp" />

<EditText
    android:id="@+id/et_url"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_below="@+id/tv2"
    android:layout_centerHorizontal="true"
    android:layout_marginTop="20dp"
    android:layout_marginLeft="150dp"
    android:layout_marginRight="-90dp"
    android:background="@drawable/background_white_circled"
    android:hint="Type here"
    android:text="https://www.journaldev.com/14886/android-mvp"
    android:textSize="18sp"
    android:drawableLeft="@drawable/round_insert_link_white_36"
    android:drawableTint="@android:color/black"
    android:drawablePadding="5dp" />
```

Fig.14: add URL interface with design details

In case the user chooses to use the application automatically, the application will execute all services along with providing the dictionary for the user. Figure 15

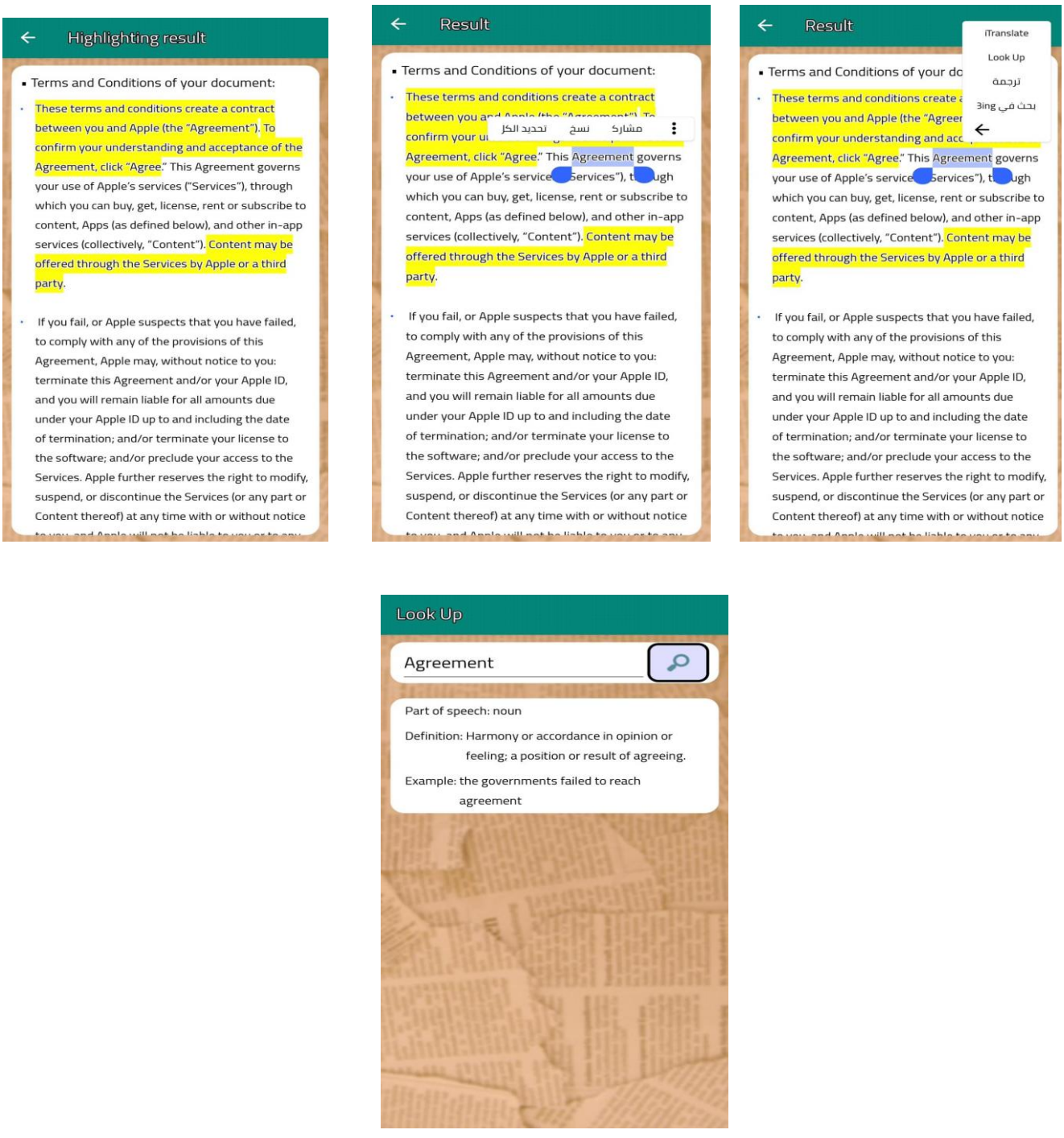


Fig.15: Automatic result

In case the user chooses to use the application manually, the application will either summarize, highlight or provide dictionary along with the other services.

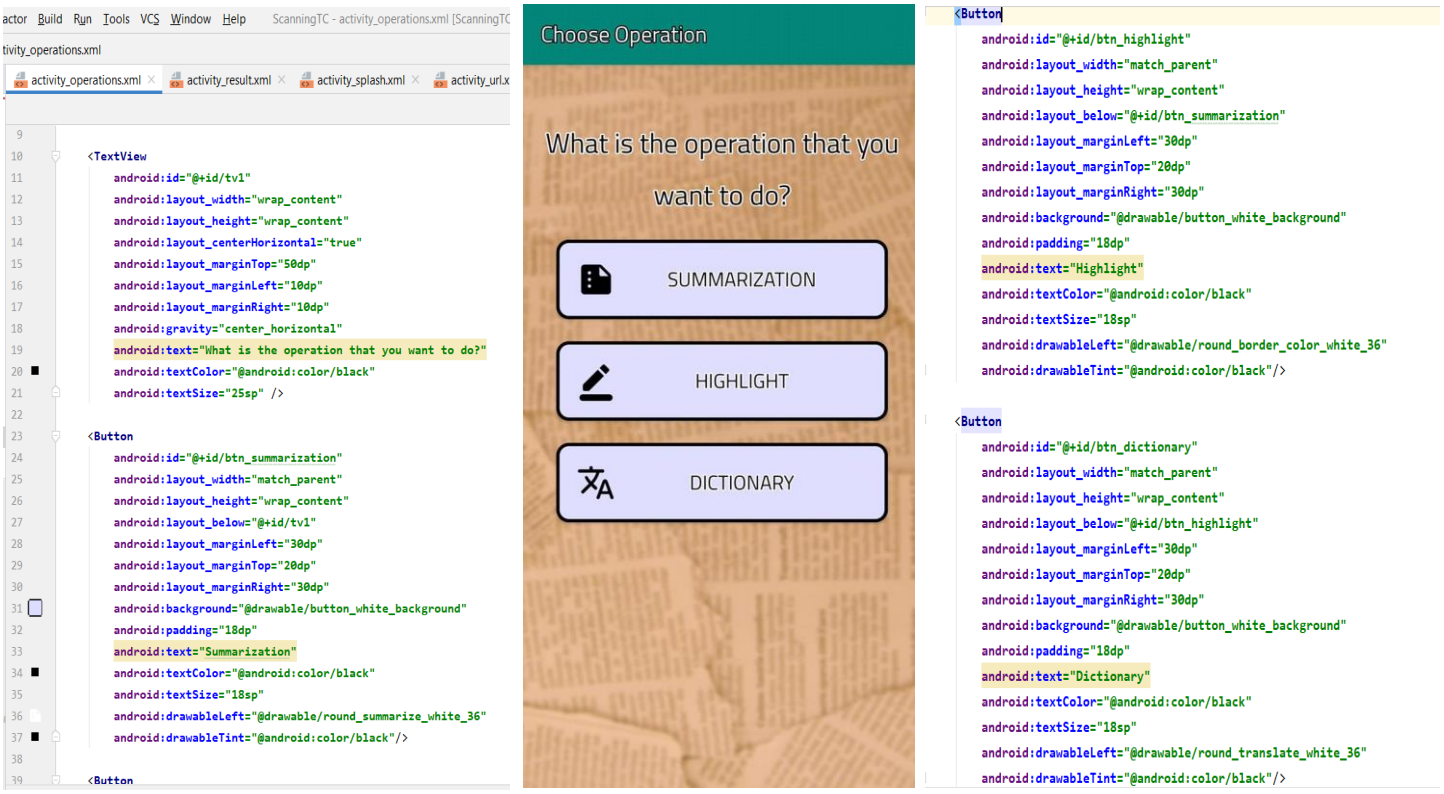


Fig.16: choose operation interface with design details

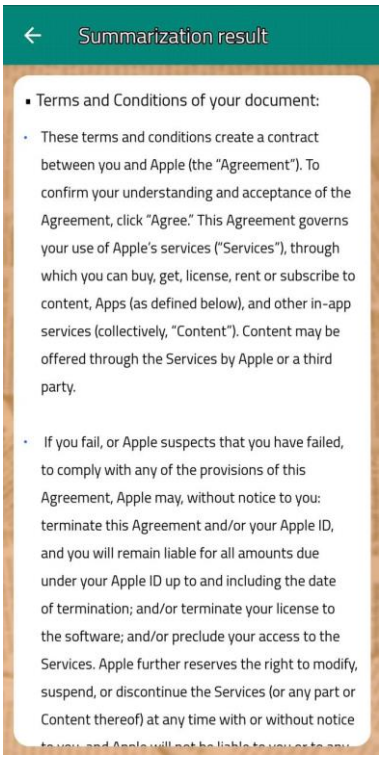


Fig.17: Summarization result

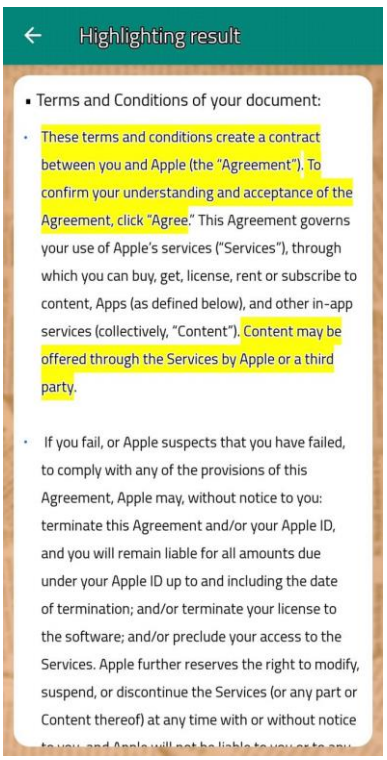


Fig.18: highlighting result

Fig.19: dictionary interface

8. Usability Test

Usability testing is the relation between the tools and the user they allow patrons to perform tasks or uses in the best possible way. This means that it can be used by the beneficiary. It is the degree of success of the beneficiary in learning and using the product to achieve a specific goal. Our system functions will be tested by following Nielsen criteria which are ten criteria, but here we only use five of them

Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design?

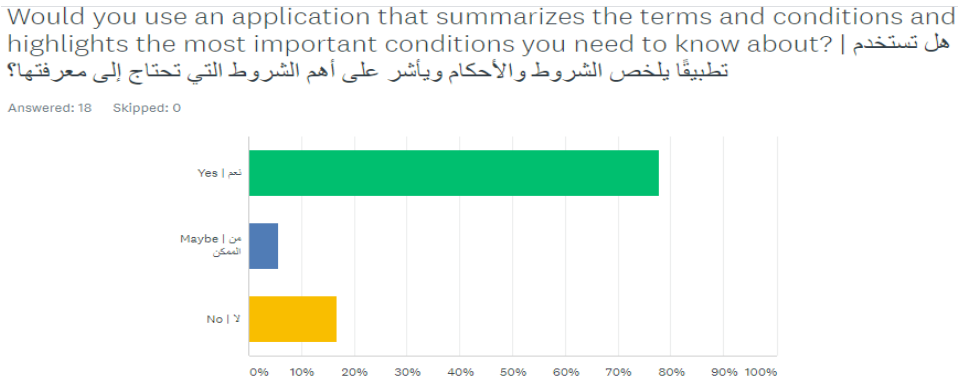
Efficiency: Once users have learned the design; how quickly can they perform tasks?

Memorability: When users return to the design after a period of not using it, how easily can they establish proficiency?

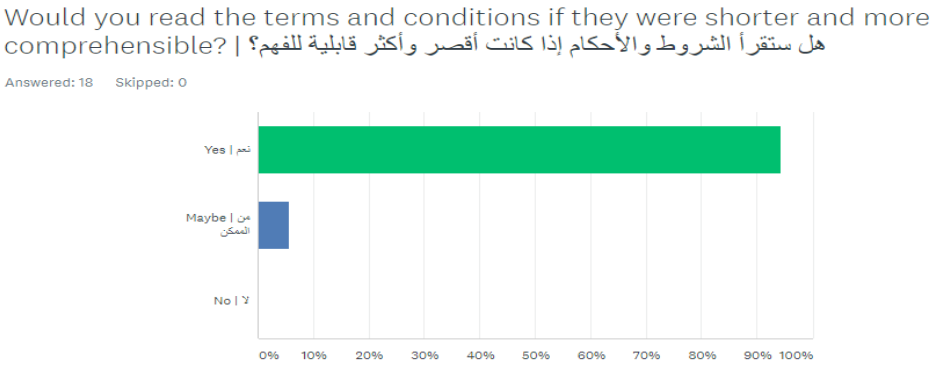
Errors: How many errors does user make, how severe are these errors? Satisfaction:

How pleasant is it to use the design?

We performed the usability testing; we will use android studio that testing by the users to get feedback. We evaluate the application's functionalities according to Nielsen criteria.[11]



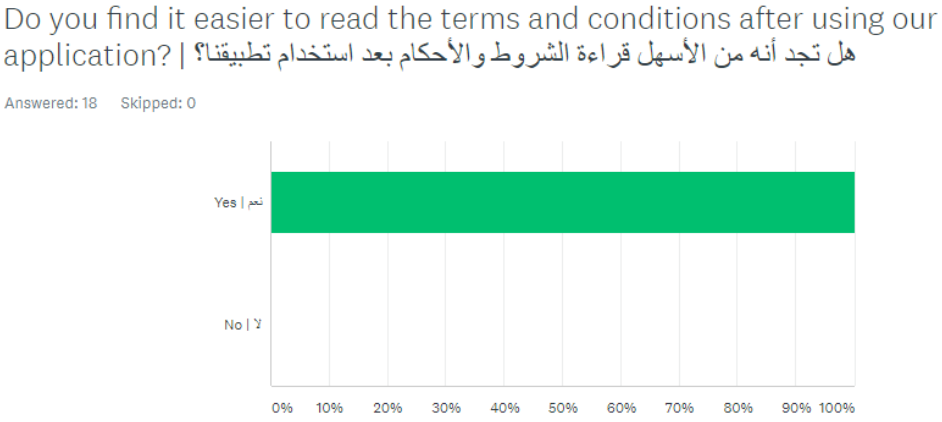
ANSWER CHOICES	RESPONSES	
Yes | نعم	77.78%	14
Maybe | من الممكن	5.56%	1
No | لا	16.67%	3
TOTAL		18



ANSWER CHOICES	RESPONSES	
Yes | نعم	94.44%	17
Maybe | من الممكن	5.56%	1
No | لا	0.00%	0
TOTAL		18

Fig.20: The application survey evaluation result

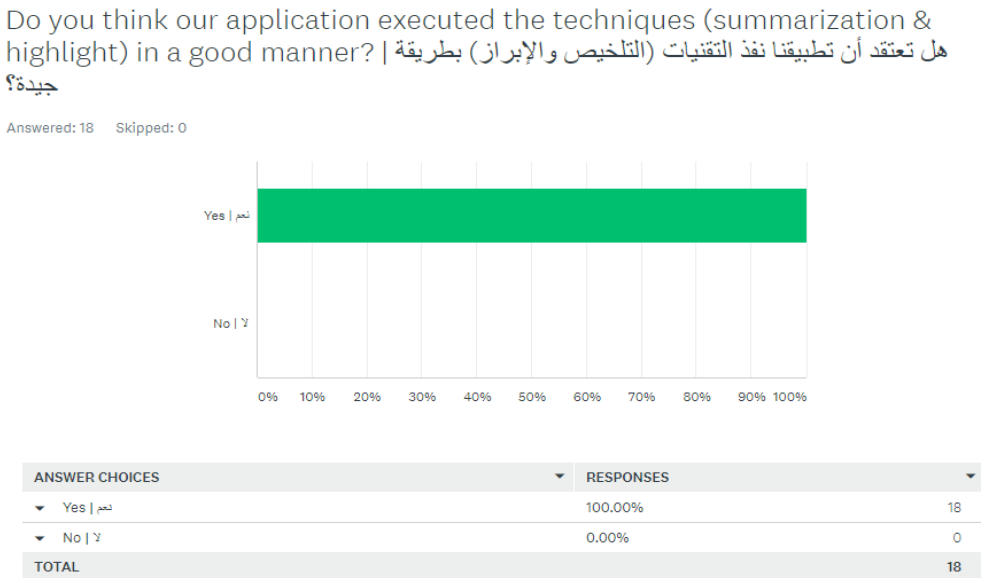
The first two question we created were general question to see if people did or didn't read the documents of terms and conditions if they were easier and more comprehensible to read, almost a 100% of the participants voted `yes', less than 10% voted `maybe'. The purpose of the second question is to know if people would use our application to facilitate reading the document of the terms and conditions, and the statistics showed that around 80% would use our application, 5% may or may not use our application, and almost 20% voted they wouldn't use our application idea. Figure 20



ANSWER CHOICES	RESPONSES	
Yes | نعم	100.00%	18
No | لا	0.00%	0
TOTAL		18

Fig.21: The application survey evaluation result (Learnability)

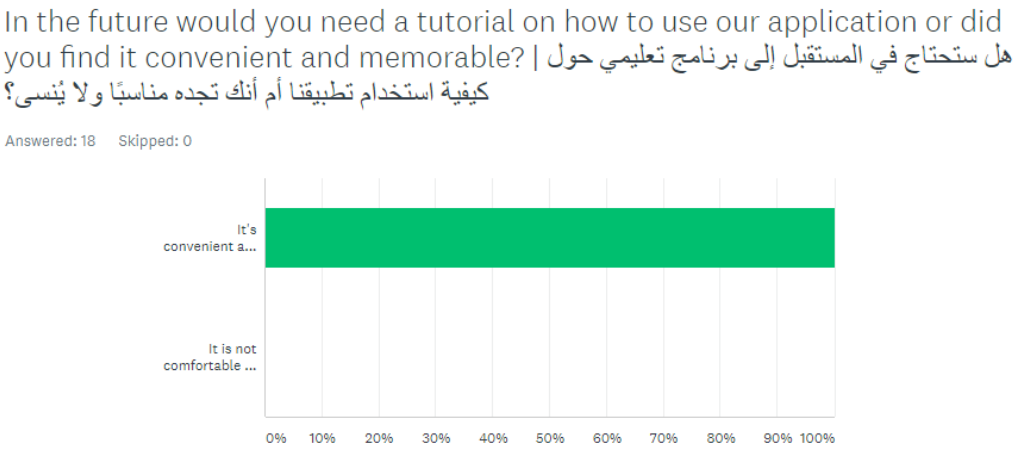
This is the statistics for,The statistics on the third question figure 21 which is (Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design?) show that 100%of the users strongly agree with functions and facility of learning all about the application



ANSWER CHOICES	RESPONSES	
Yes | نعم	100.00%	18
No | لا	0.00%	0
TOTAL		18

Fig.22: The application survey evaluation result (Efficiency)

The statistics on the fourth question which is, (efficiency: Once users have learned the design, how quickly can they perform tasks?) show that 100% of the user strongly agreedon the application executing it's tasks to the fullest. Figure 22



ANSWER CHOICES	RESPONSES	
It's convenient and memorable | إنها مريحة و لا تنسى	100.00%	18
It is not comfortable and it is forgettable | إنها ليست مريحة وأنها قابلة للنسيان	0.00%	0
TOTAL		18

Fig.23: The application survey evaluation result (Memorability)

The statistics on the fifth question which is (Memorability: When users return to the design after a period of not using it, how easily can they establish proficiency?) show that 100% of the users strongly agree on using the application is totally memorable and doesn't have any difficult steps that require memorizing .Figure 23

Fig.24: The application survey evaluation result (Errors)

The statistics on the sixth question which is (Errors: How many errors does user make, how severe are these errors?) show that 95% of the users did not face any errors whilst using the application, while 5% of user have face errors whilst using the application, which is their inability easily install the application. Figure 24

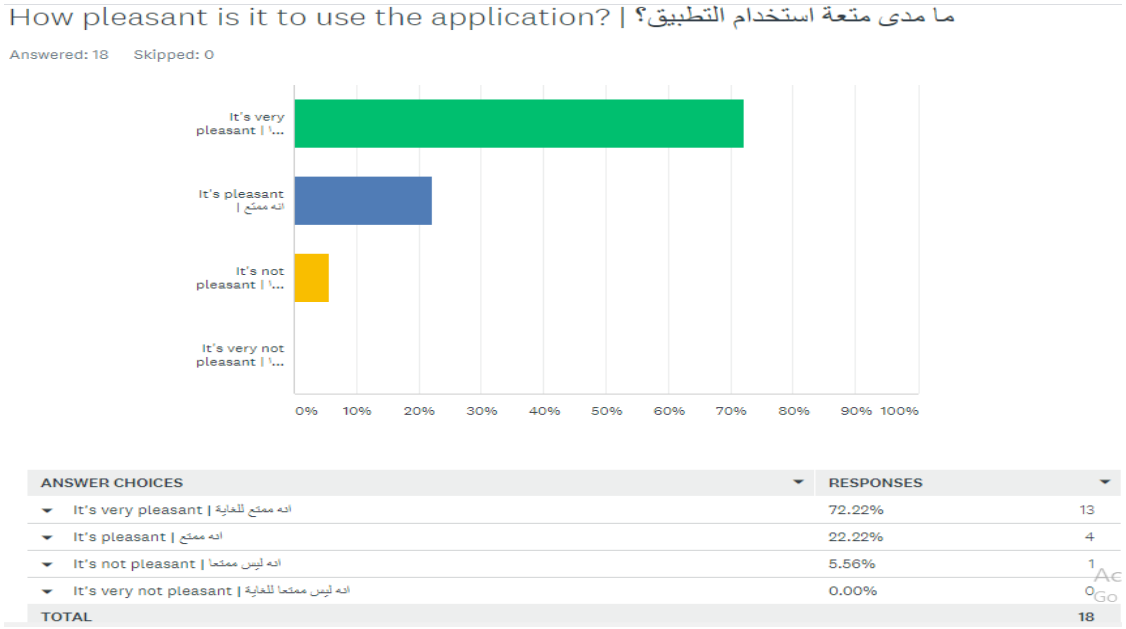


Fig.25: The application survey evaluation result (Satisfaction)

The statistics on the final question which is (Satisfaction: How pleasant is it to use the design?) show that 75% of found it very pleasant to use and work with, on the other hand around 5% did not enjoy the experience of using our application because they do not care about this aspect of applications. Figure 25

9. Conclusion and Future Work

Scanning T&C is a phone application designed and developed by our team. The application was designed to help facilitating reading any document or format of terms and conditions for the users to warn them on any harm or damages that might appear in their devices or warn them of legal agreements, or privacy policies. To get an outlook of the people's response to the application, a survey was established after collecting data of 338 people.

After using the scanning T&C to inquire more about the issue, We sent a link of our project application for several people to use and test the application along with a survey to answer if they have faced any errors or any inconvenience whilst using our application, it was also difficult to find people with compatible systems mobile devices (Android system) for the project application.

Due to the limited time and extensive range of possible improvement elements, we were left in a tight spot to execute some enhancement we hoped to provide. A list of possibilities are conducted, and hopefully, with an appropriate course of testing and user feedback, the project could reach its optimum potentials. The following list presents recommended future work:

- Supporting multiple languages to attend to a wider range of users Expanding the application's usability to be inclusive of users with different handicaps by reading the page using voiceover utility or voice aloud reader
- To expand the project as a website as well, so that it can be used on a laptop or computer devices
- Working with various types of files (word, PDF, text, etc...)
- Changing the highlighting colors based on the level of riskiness

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