Project #1
Software Requirements Specification

Group #6
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Executive Summary

To start, Project #1 Software Requirements Specification document serves as detailed description of what kind of service Project #1 software should provide, request by the STAKEHOLDERS, who are the Teaching Staff of CSCI-310 (Software Engineering) for the semester of Spring 2017, led by Professor William G. J. Halfond, including Teaching Assistants, and Course Producers. The main objective of this software system is to generate word cloud for lyrics of one specified artist or multiple ones.

This system only has one web portal for customers to use. The web portal are reachable on the four most popular web browser: Google Chrome, Safari, Firefox, and Internet Explorer. This system features the following major functionality:

- Instantaneous search of artist during input
- Auto-fill of artist's name
- Generating word cloud for lyrics of specified artists (priority algorithm)
- Adding artists into already generated word cloud
- Sharing the image of generate word cloud to logged-in Facebook timeline
- Displaying list of songs containing the chosen keyword
- Calculating the frequency of a chosen keyword in each song
- Displaying the title and lyrics of a chosen song, with the specified keyword highlighted

In order to achieve these major functionality listed above, this system will employ Spotify API and Facebook API. The Spotify API supports artist searching, auto-fill of search keywords, lyrics fetching; the Facebook API supports image sharing.

Certain constraints and assumptions apply to this system. Because this system is essentially a web application, it requires constant Internet connection. The performance objective of this system is to achieve 1-second response time. However, due to its dependency on the Internet speed, the actual response time may vary slightly. This system assumes users' literacy in English, and constant Internet connection.

In conclusion, all necessary factors regarding to the requirements engineering phase of Project #1 is comprehensively explained in the rest of this document. If any of the STAKEHOLDERS had any concerns or questions about specific part of the requirements specification of this system, please kindly refer to the actual document for details.

Table of Contents

1. Introduction

1.1 Purpose

The primary purpose of this document is to specify the requirements of the software product that we intend to build, which main objective is to generate word clouds for the lyrics of a specified artist.

This document is prepared for the intended viewing of the Teaching Staff of CSCI-310 (Software Engineering) for the semester of Spring 2017, led by Professor William G. J. Halfond, including Teaching Assistants, and Course Producers.

1.2 Scope

The name of this system is WoCow. This software product will ask for input of an artist (singer exclusively). It will then search for all of his/her songs, and generate the word cloud from his/her lyrics. It will not, however, play any music or return the search results done by the software. It will not return any results if the user is not connected with the server. The goal of this software product is to generate word cloud.

1.3 Definitions, Acronyms and Abbreviations

User: the person who operates or interacts with this software product.

Artist: a singer, exclusively, who is searchable on the Internet.

Non-Existed Artist: any people who is not searchable on the Internet, or who oneself doesn't have any production of songs with lyrics, such as a crew member from a band or Bach.

Lyrics: the complete script of a song.

Word cloud: a visualization of importance of each unique national language word. The importance of each national language word is represented by its font size and color.

Irrelevant Word: Word that is frequently appearance in language but has no much meaning, like auxiliary verbs, demonstrative pronouns.

Homepage: the page when a user navigates to the web portal of this system, allowing artist searching and word cloud display.

Second Page: the page that lists all the songs of the specified artist that contains the keyword, after the user clicks a specific keyword on the word cloud on the homepage.

Third Page: the page that display the title and lyrics of the song, after the user clicks a specific song from the second page.

Internet: It is the global system of the global system of interconnected computer networks that use Internet protocol suite (TCP) to link device.

Stakeholder: It is used to refer to any person or group who will be affected by the system, directly or indirectly. It includes end-users who interact with the system and everyone else in an organization that may be affected by its installation.

Mbps: Megabits per second: a measure of data transfer speed (a megabit is equal to one million bits).

Textfield: technical version of the search box where the user can type in whatever they want to search.

Facebook: it is American for-profit corporation and online social media company. More on www.facebook.com/about.

Copyright: it is a form of protection provided by the laws of the United States (title 17, U.S. Code) to the authors of "original works of authorship" including literary, dramatic, musical, artistic, architectural and certain other intellectual works.

Ram: Random Access Memory (RAM) provides space for your computer to read and write data to be accessed by the CPU (central processing unit).

Adobe Flash: Adobe Flash Player is a software product from Adobe Systems that can be used to create and view animations and movies using computer programs such as a web browser.

Google: It is an American multinational technology company specializing in Internet-related services

1.4 References

Documents referenced:

1. Sommerville, Ian, and Perdita Stevens. Introduction to Software Engineering. Frenchs Forest, N.S.W.: Pearson, 2012. Print.
2. "Mbps." Mbps | Gradlab. Maryland Institute College of Art, n.d. Web. 30 Jan. 2017.
3. Montecino, Virginia. "Copyright and the Internet." Copyright and the Internet. George Mason University, 1996. Web. 30 Jan. 2017.
4. "ARCHIVED: What is RAM?" What Is RAM? Indiana University, n.d. Web. 30 Jan. 2017.
5. "Install Updates to Adobe Flash Player (Information Technologies)." Information Technologies (Penn State College of Ag Sciences). PennState University, n.d. Web. 30 Jan. 2017.

1.5 Overview

The remainder of this documentation consists of three chapters and appendixes. The second one provides an overview of the system functionality and system interface with other systems, users, hardware, software, communication and memory. This chapter also provides the intended user characteristic. Further, this chapter mentions the constraints, assumption and dependencies as well.

The third chapter provides the requirement specification in detailed terms. The details of each interface is specified in here. Different technical functionalities are as well defined in this chapter.

The fourth chapter deals with the prioritization of the requirements. It includes a motivation for the chosen prioritization methods and discusses why other alternatives were not chosen.

The Appendixes in the end of the document include the all the constraints from different stakeholders and their interaction with the system.

2. General Description

This chapter will serve as an overview of the entire document. This chapter generally explains how this system will interact with other systems, what basic functionality this system will perform. In addition, it also characterizes the intended users of this system. At the end of this chapter, constraints and assumptions will be discussed.

2.1 Product Perspective

This system will be compatible on the following web browsers: Google Chrome, Safari, Internet Explorer, and Firefox. In order to expedite the engineering process, we will apply Musixmatch API for artist searching and lyrics fetching, and employ Facebook API for image sharing.

As for system interfaces, this system is designed to be generic. If the outer system has one of the following web browsers: Google Chrome, Firefox, Internet Explorer, and Safari. This system will consists of only one part that is web portal. The web portal will have every functionality of this system, including searching for specific artist, generating word cloud for that artist, displaying frequency of single word in all musical productions of this artist, input auto-fill.

In order to enable faster interaction, this system will employ graphical user interface. The GUI of this system will have a grey background, and all the buttons will be colored in purple. The first page will have a textfield for users to input their preferred artist, and a search button. The second page will be a list of songs that contain the chosen keyword and the keyword's frequency in those songs. The third page will display the lyrics of the song of your choice from the second page, with the specific keyword highlighted.

This system can function on any device that has one of the web browsers described in System Interface and with the internet connection. Therefore, the hardware interface is what is needed between the web browser and the hardware components of the device.

Two primary software interfaces will be utilized by this system: Musixmatch API and Facebook API. This system will use Musixmatch API for artist searching, auto-fill of search keyword, lyrics fetching. Facebook API will allow user to login with their account, and share the word cloud images of their preferred artists.

The device where users operate this system can be various. Mobile devices do have restriction on memory allocation. In order to avoid the potential problems that caused by limited memory space, this system is only allowed to use 20 megabytes of memory. The memory limit for hard drive space is also 20 megabytes.

As for communication, requests will go through the Internet.

2.2 Product Functions

With this system, the users will be able to search any of word from all the lyrics of any English-Language based artist's songs. The result will be displayed in a Rectangle-Shaped word cloud. The size of a specific word depends on the frequence of its appearance in all lyrics.
The user will be able to share the image of that word cloud to Facebook. The user can as well have multiple artists search result in one word cloud by using "ADD" button.
Each word of the generated word cloud should be clickable and navigating to the next page where all the songs which contain the specified word is listed. All the corresponding songs are listed with the number of and in the order of importance of that word. Clicking on any song name will lead the user to the lyrics with the specified word highlighted in yellow.

2.3 User Characteristics

The intended users of this system are people who are interested in songs, whose lyrics are written in English. Users are expected to have the ability to read and write in the language, in which the specified artists write their songs. Our users should understand the purpose of word cloud, which is to emphasize the different importance of keywords in lyrics. Because this would be a software product on web platform, our users are expected to know how to use web browsers to navigate the Internet.

2.4 Constraints

The Internet connection is a constraint for this system. This system will help the user fill the artist names and provide search results based on the information given on the Internet. It is crucial to have Internet connections while using this application. All of the features provided by the descriptions will not be fulfilled if Internet is not available.

The generation speed of the system is very dependent on the speed of the Internet. If users' connection to the Internet is low or Internet is not fast enough (standard around 20Mbps at testing), the generation time for this application will increase, thus will not fulfill the one second requirement. It is important to have a good Internet when using this application.

The system requires the user to have a Facebook account to share the word cloud. When the share button is pressed, a new page will pop-up either asking user to give access to his/ her Facebook account or asking user to login/ register an account. If user does not have a Facebook account or is not intended to register one, the share function will not be usable.

The system will only generate word cloud if the artist can be found on the Internet. It would return "Artist not found" if there are no results found.

The system does not hold or process any of the artist data or user inputs. All information is found online and copyright goes to the owner of those lyrics.

2.5 Assumptions and Dependencies

One assumption is that the user will spell the artist's name correctly in English. The system might not be able to work on other languages. Another assumption is that because our project is a web based application, the user's computer must be connected to Internet to get data from our server.

3. Specific Requirements

3.1 External Interface Requirements

This chapter will lay out the functional and quality requirements of this system. All features will be explained in detail.

3.1.1 User Interfaces

When a user navigates to the web portal of this system on the web browser, there will be a textfield and a "Search" button. The web portal will have a grey background. All the necessary buttons will be horizontally aligned to the center and be colored in purple as Figure 3.1.

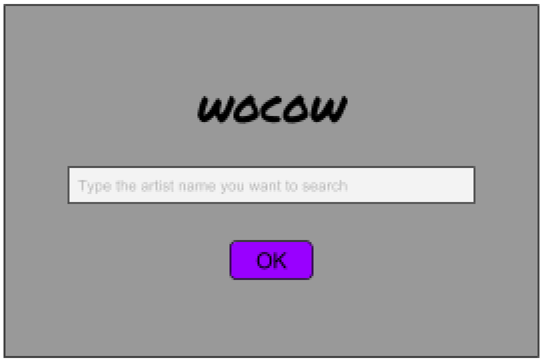


Figure 3.1

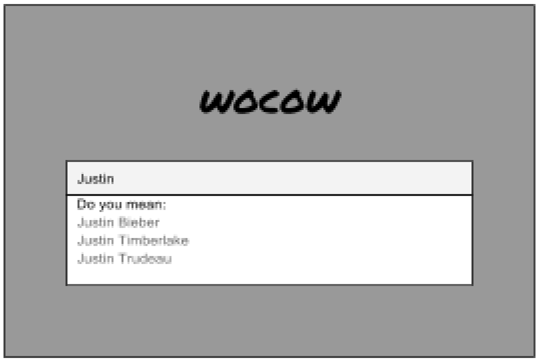


Figure 3.2

The textfield is for the user to input artist's name. Each time the user continues to input one additional letter into the textfield, this system will automatically generate a dropdown list of possible artists' names and their profile photos, according to the user's input, as Figure 3.2. If a preferred artist's name appears in the dropdown list, the user can click that name, so that that name will replace the input in the textfield.

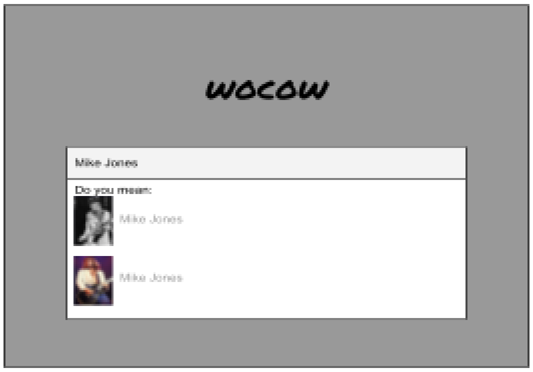


Figure 3.3

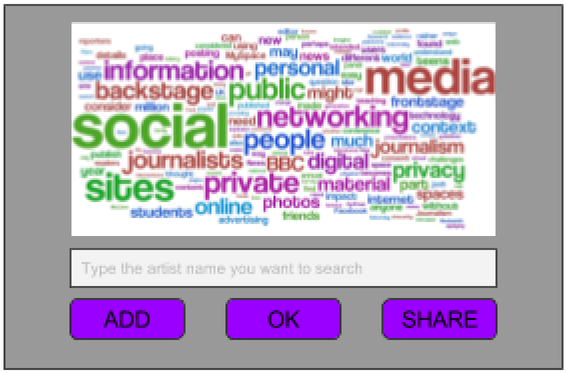
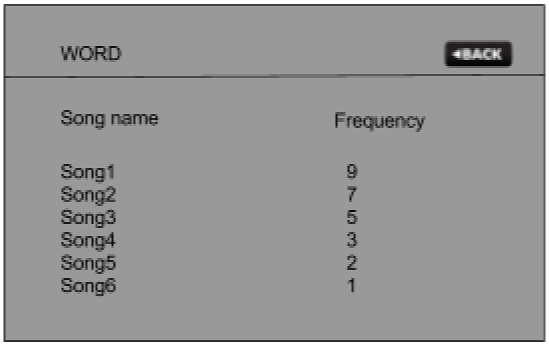


Figure 3.4

With the correct name of a specified artist in the textfield, the user can click the "OK" button, and the word cloud of this artist will be displayed right above the input textfield. At the same time, one more button will appear on each side of the "OK" button. On the left is the "ADD" button; on the right is the the "SHARE" button. If the "ADD" button is clicked, this system will add an additional specified artist into the process of generating the word cloud; if the "SHARE" button is clicked, the user can share the word cloud image to his Facebook timeline (Facebook login required), as Figure 3.3

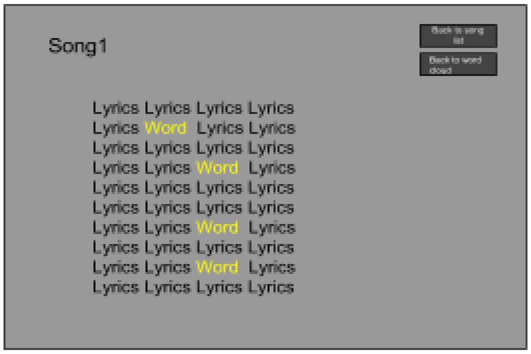
Each word in the word cloud is clickable. If the user clicks any keyword in the word cloud, the web portal will navigate to the second page (background color, and button color stay the same). This second page will list all the songs of this artist's, which contain this chosen keyword. To the right of each song is the frequency of this keyword's appearance in that song. At the upper-right corner of the page, there exists a "Back to Homepage" button, which, if be clicked, will navigate back to the homepage with the most recently searched word cloud still displayed as Figure 3.5.



WORD

Song name	Frequency
Song1	9
Song2	7
Song3	5
Song4	3
Song5	2
Song6	1

Figure 3.5



Song1

Lyrics Lyrics Lyrics Lyrics
Lyrics Word Lyrics Lyrics
Lyrics Lyrics Lyrics Lyrics
Lyrics Lyrics Word Lyrics
Lyrics Lyrics Lyrics Lyrics
Lyrics Lyrics Lyrics Lyrics
Lyrics Lyrics Word Lyrics
Lyrics Lyrics Lyrics Lyrics
Lyrics Lyrics Word Lyrics
Lyrics Lyrics Lyrics Lyrics

Figure 3.6

Each song listed on the second page is also clickable. If the user clicks any song listed, the web portal will navigate you to the third page, on which the song's title and lyrics will be displayed as Figure 3.6. At the upper-right corner of this page, there exists a "Back to Song List" button, which, if be clicked, will navigate back to the second page with all the songs that contains the specified keyword of your recent choice. The keyword of your choice will be highlighted among the lyrics. Right below the "Back to Song List" button, there exists a "Back to Homepage" button, which, if be clicked, will navigate back to the homepage with the most recently searched word cloud still displayed.

3.1.2 Hardware Interfaces

This system is not designed to serve on one specific hardware. Rather, it is to be generic and does not have direct hardware interfaces. However, the hardware interface must support a web browser from Google Chrome, Internet Explorer, Safari, Firefox in order to use the web portal for this system.

3.1.3 Software Interfaces

Musixmatch API is heavily applied in this system.

On the homepage of the web portal, the auto-fill functionality of the input textfield employs the simultaneous search functionality of Musixmatch API. Each time the user continues to input one additional letter into the textfield, this system will use Musixmatch API to automatically generate a new dropdown list of possible artists' names and their profile photos, according to the user's input.

When generating the word cloud for a specified artist, this system will fetch lyrics of all the songs by this artist from Musixmatch API. This system will generate word cloud according to the fetched lyrics using the proprietary algorithm.

When the user click any keyword on the generated word cloud from the homepage, this system will use Musixmatch API to search for the specified artist's songs that contains that specified keyword. The search result will be displayed on the second page.

When the user click any songs from the list on the second page, this system will use Musixmatch API to fetch the lyrics of this specified song. The title and lyrics of this specified song will be display on the third page.

3.1.4 Communication Interfaces

This system requires constant Internet connection, because this system applies Musixmatch API and Facebook API.

3.2 Functional Requirements

FR1: Search

Given the user gets into the web site, then the first page that is shown shall be the home page. The user should be able to search any English-Language based artist. The textfield will have a dropdown list right below, giving the autofill advice for the user.
If the user searches a non-exist artist, an error page will be shown up.

FR2: Auto fill of the search box

When the user is searching the artist with the textfield, every single letter the user types in, our system will automatically search for the possible artists' names and display them in a dropdown list right below the search box as Figure 3.2. If the user clicks the a name in the dropdown list, the search box will be filled with the name the user clicks.
If encountered with the situation where multiple artists have the same name, their profiles shall be present on their side in order to distinguish among them as Figure 3.3. If the user simply click "OK" in this situation, the system shall select the first one of them by default.

FR3: Search Result Display

Given the user searches an existed artist, the system shall be able to generate a Rectangle-Shaped word cloud containing at most 250 words. The size of each word depends on the frequency of its appearance among all of the artist's lyrics.

FR4: Add One More Artist to Word Cloud

Given the user adds one more artist to the current word cloud result, the system shall generate a new Rectangle-Shaped word cloud containing the words of all the artists' lyrics. The user is capable of adding any number of artist they want to one at a time, however the total number of words is limited to 250.

FR5: Share the image to Facebook

After the user clicks the "SHARE" button, the system shall start the Facebook interface. After the user logins into his/her facebook account, the image of word cloud shall be shared on user's timeline.

FR6: Sort the song names by frequency of the word

When the user clicks any word in the word cloud, our system shall search the songs of the singer that contains the word, and sort the songs by the frequency of the word. The songs in the sorted order and the frequency of the songs shall be displayed in the list view as Figure 3.5.

FR7: Display the lyrics

When the user clicks the song in the second page, the system shall navigate to the third page, as Figure 3.6, that displays the lyrics of the song with the specified word highlighted in yellow.

FR8: Back to the word cloud page

Our system allows the user to go back to the home page that displays the word cloud of the recently specified artist from the second or third page.

FR9: Back to the song list

Our system allows the user to go back to the song list (the second page) of the recently specified word from the third page.

3.3 Performance Requirements

The content in this section specify both static and dynamic numerical requirements on user interaction with this system.

ID: PR1
TITLE: Prominent search feature
DESCRIPTION: The search feature should be very evident to users as it is a prominent feature in this system.

RATIONAL: In order to help users easily notice the textfield.

ID: PR2
TITLE: Usage of search results on the dropdown list
DESCRIPTION: The results (artists) including auto-fill suggestions should be easy to understand and user-friendly. Selecting a result should take exactly one click.
RATIONAL: In order to be more user-friendly and serve better user experience.

ID: PR3
TITLE: Usage of keywords in word cloud
DESCRIPTION: Keywords in word cloud should be evident to users and selecting one of the words should take one click.
RATIONAL: In order to navigate to next page easily.

ID: PR4
TITLE: Usage of word frequencies in list view
DESCRIPTION: The frequencies of appearances of one word in each song should be clear and readable to user.
RATIONAL: In order to be easy for users to read and compare.

ID: PR5
TITLE: Response time
DESCRIPTION: The elapsed time of a single search
SCALE: Measurement obtained from 1000 testing case.
WISH: It would be best to not exceed one second 100% of the time.

3.4 Design Constraints

The generation speed of the WoCow is also dependent on the system memory and system profiles. It is not recommended to use this application on a very old device with old Internet module or with less RAM (standard iPhone 6 and MacBook Pro 2016 when testing).

It is required for the user to have Adobe Flash® installed on their device when they are using the application. If the user has a older version or does not have the software above, some of the features, including but not excluding the clicking on words might be disabled, the color might not work properly, etc.

Since our searching results are based on Google® and Musixmatch®, it is required that user is connecting to such Internet provider that have no restrictions on establishing connections to that website. If users are using this software product and connect to those Internet, the search results may be limited or will return a timeout error.

3.5 Software System Attributes

1. **Reliability:**
   System Reliability
   Description: The reliability of the system shall allow 1000 search during a short period of time without having the server crushed.
   Measurement: Measurements obtained from 1000 searches during testing
   MUST: More than 98% of the searches.
   PLAN: More than 99% of the searches.
   WISH: 100% of the searches.

2. **Availability:**
   System Availability:
   Description: The availability of the system shall giving the correct result for most of the time
   SCALE: The average system availability (not considering network failing).
   Measurement: Measurements obtained from 1000 hours of usage during testing.
   MUST: More than 98% of the time.
   PLAN: More than 99% of the time.
   WISH: 100% of the time.

3. **Maintainability:**
   Irrelevant Word Removal
   Description: With the further usage of the system, it should be able to update the library of irrelevant or unimportant words and automatically remove them from the result.

4. **Portability:**
   Application portability
   Description: The application should be portable with any devices that can run of the following web browsers: Google Chrome, Firefox, Internet Explorer, and Safari.

Appendix:

Jan 26th 2017, meeting with STAKEHOLDER Professor William Halfond. He gave the basic requirement for three web pages and some detail requirements and constraints.

Jan 26th 2017, meeting with STAKEHOLDERS CP Clarence Zhao and David Gershuni. They confirmed the most of requirements and constraints that were given by the other

STAKEHOLDER, except for the color of word cloud. Halfond required the word cloud should be black and white, while STAKEHOLDER CP mentioned that the word cloud should be colorful.

Negotiable:

Jan 26th 2017, meeting with STAKEHOLDERS CPs on Sunday evening. We tried to negotiate on the constraint of time of searching. The result of searching time depends on which music API we are going to be used. We currently agreed on the searching time will be within one second. The actual processing time of this system may vary due to actual Internet speed and API dependability.