Assignment M2:CS6750

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Abstract— Through the assignment M1 I will be looking into the search functionality for Apple Music. Apple Music is the second most popular music streaming App globally after Spotify and contains the largest music library of all music streaming applications. Apple Music is well integrated into the Apple ecosystem however the search functionality for Apple Music leaves a lot to be desired.

NEEDFINDING PLAN 1

The first needfinding plan that I conducted was *naturalistic observation*.

1.1 Results from Naturalistic Observation

I performed naturalistic observation in three different contexts of the gym, inside a car and in a house party. I've made notes during the observation which can be found here.

The **first low level** observation that I performed was at the gym of my apartment complex. I observed that some machines such as the cardio machines were used across all age groups. The participants that were lifting weight used their phones a lot more. The voice assistants were only used in isolation and in low noise areas and it seldom produced accurate results. I recorded the number of times phones were taking out during a session, the time taken for search results, error rate while searching.

The **second observation** that I performed was while taking a ride with friends there were multiple users and the driver used voice assistants to change songs from a shortcut on the steering wheel. Other participants primarily used the keyboard and search bar as the input. There was a higher level of error here as the music played was more obscure and multiple songs of the same name. Driver only operated the search at redlights or when stopped.

The **third observation** that I performed was at a house party. Local language search on Apple Music provided very poor results. Searching a song by name using a voice assistant brought up a cover more than once. There were more

errors as people the night progressed and the primary source of error was searching for a song in their playlist than the Apple music library.

1.2 Summary

Most users search the song name while using the search functionality. The most common method of searching is the keyboard. The voice assistant search was only accurate in extreme use cases. And the search in Apple Music vs Your Library provided a lot of confusion. There are no special interfaces to search other than voice assistants for cars without Apple CarPlay and the drivers would usually pull over to search.

1.3 Steps taken to control bias

To control confirmation bias, I specified my cases and then generalised. In order to reduce the recall bias in the house party setting I asked the users to perform think out loud exercises while searching. In order to reduce social desirability bias I recorded objective metrics like the errors per 10 searches and to prevent observer bias in the gym use case I limited my interaction with the user.

NEEDFINDING PLAN 2

The second needfinding plan will be based on *surveys*.

2.1 Results from Survey

For this needfinding method I opened a peer survey, which can be found [here](). I received 25 responses to my questions (link to the survey in the appendix 7.2) and got the below results

Based on the survey most respondents were satisfied with the search functionality of Apple Music and use it in multiple contexts. All responders exist within the Apple Ecosystem and use the search functionality about 3 times on average per session. They mostly use the search functionality within their own private playlist and the library as a whole. Almost all responders reacted positively to the idea of a user defined filter like bpm filter. Most responders used their keyboards to perform search with digital assistants being the second most frequent choice. Almost all users input the Song name or Artist Name when performing search functionality with only two responders searching for the lyrics of the song.

2.2 Summary

The users who are not entirely integrated within the Apple Ecosystem ie (listened in from a non Apple Device) reported lesser satisfaction with the search functionality. The users also responded positively to addition of filters within the search functionality.

2.3 Steps taken to control bias

To prevent biases like the social desirability bias I designed the survey questions to hide the optimal outcome but the survey primarily performed within GT bringing in considerable homogeneity into this survey. Another source of bias was the order of the questions and some questions may bias the answers of the following questions. I spent time to decrease this by trying to make sure each question was independant.

NEEDFINDING PLAN 3

The first needfinding plan that I conducted was *Participant observation*. I've made notes during the observation which can be found in (appendix 7.3).

## 2.1 Results from Participant observation

For my third needfinding plan of participant observation, I downloaded the popular music streaming applications like Spotify, Amazon Music, and Jio Music and tested the search functionality. I used multiple streaming platforms in as many primary streaming platforms and utilised the search functionality in as many different contexts such as while coding, exercising, driving, doing chores and drafting emails.

Spotify which is Apple Music's primary competitor provides a scan feature which allows easy sharing of songs between Spotify users. This feature came in handy when I was in a social setting. Additionally Spotify provides a genre filter beneath the search bar with the most commonly used genres provided at the top. Spotify is also really well integrated into third-party voice assistants and provides the most consistent search functionality across platforms be it on a Mac, Android, iOS or FireStick. Whereas Amazon Prime is really well integrated into the native voice assistant (Alexa). Prime also provides the ability to search from a playlist directly from the home screen without navigating to the playlist like on Apple Music which I found extremely useful.   I also found Amazon Prime to

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have the best voice assistant and best handsfree search experience. It had built in search filters like BPM, a genre filter which made getting to the content extremely easy. JioSaavn which is one of the most popular music streaming platforms in India provided a moving tiles interface as a filter which although visually pleasing was not very useful. The integration into the Google Assistant left much to be desired.

2.2 Summary

None of the streaming services that I used provided the split search functionality as shown below.
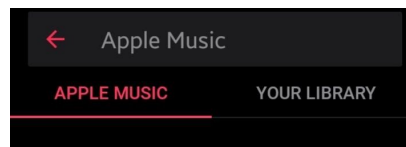
Figure 2—Split Search functionality in Apple Music

The lack of this filter has improved the efficiency of my searches. Apple Music contains the biggest library of songs and Siri does a good job in basic searching but can't perform filtering like Alexa does on Apple Music. Unlike all three of the applications that I've surveyed Apple Music does not have a genre filter and the trending suggestion was not helpful as it did not recognise the context of my search. (Mr Saxobeat was not useful at 11pm when I was trying to sleep). The gestures worked well within the Apple ecosystem but fell flat outside.

2.3 Steps taken to control bias

In this context I only explored the alternatives that I considered the best, this was relieved by doing an analysis of product reviews on the Appstore and PlayStore and trying the most popular applications. Another source of bias was confirmation bias which I tried to get around by constantly testing my beliefs by using the applications in multiple contexts.

4 DATA INVENTORY

After performing the naturalistic observation, administering a survey and analysing a competing interface. The study has sufficient data to answer the below questions.

Who are the Users? : From this survey, the identified users are GA tech students within the age range of 23 - 33 who subscribe to Apple Music.

Where are the Users?: Since Apple Music is found in a variety of devices such as Mac, iOS, iPhone, iPad, Android Devices and Smart Speakers locations vary. From the survey 95% of our survey population uses Apple Music while doing chores, driving and work.

What is the context of the task?: From the survey Apple Music is mostly used as a secondary task while doing a primary task (chores, driving, work). The users require a way to accurately filter music without disruption to the primary task

What are their goals?: From the survey the potential redesign will now consider listening to Apple Music as a secondary task and in this context the goal is to filter the playlist according to a user defined parameter. (eg name of the song, beats per minute, artist)

What do they need?: The users require a method of input (keyboard and search bar being the most popular one) for the user parameter, the required information relating to the context they are in and how that can be used to filter the music library.

What are their tasks?: Physically the task is to perform a search on the Apple Music library by clicking the search bar and entering the keywords or invoking a digital assistant. Cognitively the task is to detach from the primary task and perform the secondary task of filtering the music library.

What are their subtasks?: Based on my needfinding methods such as participant observation and naturalistic observation. I believe the subtasks are to divert attention from the primary task, find the search input method (voice assistant, keyboard), input the search parameter, filter the music library, resume playing, continue performing the primary task.

5 DEFINING REQUIREMENTS

The initial needfinding process consists of naturalistic observation, need finding surveys and participant observation. From these observations we've developed a focal point to build on. With 95%+ of our survey users using Apple Music as a secondary task when using it, further study would deal with designing the interface as such. A song should be searched when driving a car with an active internet connection in under a 20s without stopping and taking eyes off the road. The final interface should not contain any extra hardware or anything extra to the subscription fee such as Apple CarPlay and it should be compatible cross platform across Android as well. The identifier for success would be changed from how quickly the results are returned to how often the search is invoked in a single sitting.

6 CONTINUED NEEDFINDING

The initial needfinding process consists of naturalistic observation, need finding surveys and participant observation. We've developed a focal point to build on. To continue this development I would administer another survey with Apple Music as a secondary tool. Ideally there would be minimal interaction between the Apple Music and the main task (work, driving, chores). So I would also like to perform Think-aloud exercises when performing a task so that I can understand their thought process how the train of thought is interrupted to use the search functionality and how long it takes to resume the original state.

7 APPENDICES

7.1: Naturalistic Observation results can be found in the below link:

https://drive.google.com/file/d/1FY_OcoMrvUFJiY3uQ6H-ihIixaiATvRs/view?usp=sharing

7.2: Survey responses.

https://docs.google.com/document/d/17a59HpKU9IHd3tY9Lkfp2To4IMfubJfqc314TvPMvKI/edit?usp=sharing

7.3 Participant Observation notes:

https://drive.google.com/file/d/16ZK0roloknzRJgyzZo-h7JlUwHzy_zwk/view?usp=shari
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