PROJECT REPORT ON VIRTUAL ASSISTANT FOR VISUALLY IMPAIRED

Vision-A New Eye

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Abstract
Interacting with mobile applications can often be challenging for people with visual impairments due to the poor usability of some mobile applications. The goal of this paper is to provide an overview of the developments on usability of mobile applications for people with visual impairments based on recent advances in research and application development. This overview is important to guide decision-making for researchers and provide a synthesis of available evidence and indicate in which direction it is worthwhile to prompt further research. We performed a systematic literature review on the usability of mobile applications for people with visual impairments. A deep analysis following the Preferred Reporting Items for SLRs and Meta-Analyses (PRISMA) guidelines was performed to produce a set of relevant papers in the field. We first identified 932 papers published within the last six years. After screening the papers and employing a snowballing technique, we identified 60 studies that were then classified into seven themes: accessibility, daily activities, assistive devices, navigation, screen division layout, and audio guidance. The studies were then analyzed to answer the proposed research questions in order to illustrate the different trends, themes, and evaluation results of various mobile applications developed in the last six years. Using this overview as a foundation, future directions for research in the field of usability for the visually impaired (UVI) are highlighted

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Chapter

1. **Preamble**
    a. **Introduction**

The era of mobile devices and applications has begun. With the widespread use of mobile applications, designers and developers need to consider all types of users and develop applications for their different needs. One notable group of users is people with visual impairments. According to the World Health Organization, there are approximately 285 million people with visual impairments worldwide (World Health Organization, 2020). This is a huge number to keep in mind while developing new mobile applications. People with visual impairments have urged more attention from the tech community to provide them with the assistive technologies they need (Khan & Khusro, 2021). Small tasks that we do daily, such as picking out outfits or even moving from one room to another, How to cite this article Al-Razgan M, Almoaiqel S, Alrajhi N, Alhumegani A, Alshehri A, Alnefaie B, AlKhamiss R, Rushdi S. 2021. A systematic literature review on the usability of mobile applications for visually impaired users. PeerJ Comput. Sci. 7:e771 http://doi.org/10.7717/peerj-cs.7713 could be challenging for such individuals. Thus, leveraging technology to assist with such tasks can be life changing. Besides, increasing the usability of applications and developing dedicated ones tailored to their needs is essential. The usability of an application refers to its efficiency in terms of the time and effort required to perform a task, its effectiveness in performing said tasks, and its users' satisfaction (Ferreira et al., 2020). Researchers have been studying this field intensively and proposing different solutions to improve the usability of applications for people with visual impairments. This paper provides a systematic literature review (SLR) on the usability of mobile applications for people with visual impairments. The study aims to find discussions of usability issues related to people with visual impairments in recent studies and how they were solved using mobile applications. By reviewing published works from the last six years, this SLR aims to update readers on the newest trends, limitations of current research, and future directions in the research field of usability for the visually impaired (UVI). This SLR can be of great benefit to researchers aiming to become involved in UVI research and could provide the basis for new work to be developed, consequently improving the quality of life for the visually impaired. This review differs from previous review studies (i.e., Khan & Khusro, 2021) because we classified the studies into themes in order to better evaluate and synthesize the studies and provide clear directions for future work. The following themes were chosen based on the issues addressed in the reviewed papers:

‘‘Assistive Devices,’’ ‘‘Navigation,’’ ‘‘Accessibility,’’ ‘‘Daily Activities,’’ ‘‘Audio Guidance,’’ and ‘‘Gestures.’’ Figure 1 illustrates the percentage of papers classified in each theme. The remainder of this paper is organized as follows: the next section specifies the methodology, following this, the results section illustrates the results of the data collection, the discussion section consists of the research questions with their answers and the limitations and potential directions for future work, and the final section summarizes this paper’s main findings and contribution.

b. Problem Statement

Wikipedia says:

> However, inclusion will be only a slogan if there are inadequate resources for inclusion programmes. Inclusion is not a matter of placing children who are blind and low vision in regular schools but providing adequate resources in the form of funds for itinerant teaching service, teaching/learning materials, making schools more accessible and inclusive. Aside from allocation of resources, societal negative attitude however can also contribute to the exclusion of children who are blind and have low vision. Most people tend to see blind and low vision as liabilities and do not treat them with respect or give them their right due in society. The UNESCO Bulletin on special education (1994) observed that the blind and partially sighted children have greater problems in learning, communicating and interacting in an ordinary school than their sighted classmates. This is because children do not receive adequate educational and developmental help during their pre-school years, neither their parents nor regular classroom teachers are equipped to give them special assistance they require in the school situation. Therefore in this study we answer the following questions;

2. **System Design**
3. **SRS**

3.1 Functional Requirements:

Hardware Requirements

- Pentium Processor IV or Higher
- Min 10 GB HDD
- RAM 512 MB or Higher
- 2.4 GHz or faster Processor

Software Requirements

- Windows Vista onwards, Linux, Mac OS
- In the case of building the Project from the source
    - Python Compiler
    - Tensorflow Machine learning library
    - Keras
    - SciKit Learn
    - Pandas
    - Numpy
    - Flask

3.2 Non Functional Requirements:

Performance Requirements:

- The formats of the scanned copies should be in the standard format
- Should have a training error of as low as possible

Software Quality Attributes

- Robustness
- Reliability
- Better learning methods
- Acquiring good accuracy results

4. Implementation / Methodology

Data collection

Reddit, similar to Twitter allows developers to access their inventories and open data segments. Within the bounds of the Twitter/Reddit system, we built Twitter/Reddit bots (apps) that allow users to write scripts within it. These bots perform tasks similar to how a regular user would. The main objective of using bots is to search the specific keyword entered into it and retrieve all the data in the form of datasets.

The datasets are saved and converted into a CSV file that can be read by the sentiment analysis program. The dataset will be constantly upgraded and replaced with data from requested keywords. The keywords are then processed into the sentiment analyzer.

The data sets consist of

- Title of post
- Comments in the post
- Replies to these comments
- Upvotes and Downvotes
- Data processing

The data collected is saved and processed into a CSV file that holds text data and numerical data for the specific. The CSV file is set into the script of the sentiment analyzer that'll prepare the output data in two formats.

Word Cloud

A word cloud, or weighted list in visual design, is a novelty visual representation of text data, typically used to depict keyword metadata (tags) on websites or to visualize free form text. Tags are usually single words, and the importance of each tag is shown with font size or colour. This format is useful for quickly perceiving the most prominent terms and for locating a term alphabetically to determine its relative prominence. When used as website navigation aids, the terms are hyperlinked to items associated with the tag.

This will act as the forefront in the word analysis segments of reactions to the specific keywords.

Polarity Results

The up and down votes designated to each word in the dataset is graphically represented showing positive or negative feedback from the users and communities.

Experiment setup

Interest in **Machine Learning and Deep Learning** has exploded over the past decade. You see machine learning in computer science programs, industry conferences, and in many applications in daily life.

I am assuming you already know about Machine Learning, therefore I will not be explaining What and Why.

So, I find many beginners facing problems while installing libraries and setting up the environment. As I have faced the first time when I was trying. So this guide is totally for beginners.

In this story, I will tell you how you can easily set up a python environment on your system. I am using Windows but this guide is also suitable for Ubuntu & Linux users.

After completing this tutorial, you will have a working Python environment to begin learning and developing machine learning and deep learning software.

5. **Software Testing**

- The model is trained on images in the training directory and is tested with images, which the model hasn't seen previously

6. **Code**

https://drive.google.com/drive/folders/11mqj4TyWAnOSWjZ2yoJhstS0SrAvUmwh?usp=sharing

7. Conclusion

This paper proposes a much helpful voice assistant app for visually impaired people. This system will be very easy to use and will run on the Android operating system. The voice recognition API and text-to-speech (TTS) makes it very easy for users to navigate around different functionalities of the app. The application with its deep learning based technique to recognize and classify Indian currencies provides a reasonable accuracy and will help visually impaired people to be able to improve their quality of life by reducing their dependency and aiding them in their day to day life.

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