

Assignment3

May 17, 2023

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Computer vision 2022 Assignment 3: Deep Learning for Perception Tasks

2 Question 2: Proposal for Practical Applications (30%)

Assistance to people with visual impairments

According to the World Health Organization, 2.2 billion people worldwide will be visually impaired in 2022, affecting either near or distance vision [1]. Of these, 246 million have low vision (63% over 50 years old) and an estimated 39 million are blind (82% over 50 years old). Visual impairment is a condition that affects an individual's ability to see, resulting in difficulties in performing daily activities. For example, visually impaired people have difficulty doing their shopping as they cannot distinguish between two cans of food and therefore need help from their families. This problem is one of the many problems they face in their daily lives. Solutions exist but are all perfectible since they inform mostly about the presence of objects and not about their nature.

Assistive technology for the visually impaired is a growing field that aims to provide tools to overcome these difficulties. The main issue addressed by this technology is to improve the independence, mobility and quality of life of visually impaired individuals.

One of the most important aspects of assistive technology for the visually impaired is the use of computer vision techniques. Within the context of assistive technologies, computer vision can be used to identify and describe objects and people in the environment, recognize text, and provide navigation and orientation assistance.

Orcam is an Israel-based company that has developed MyEye [2], which is an example of technology designed for people with visual impairments. The system is a wearable device that uses computer vision to provide visual assistance to the user.

MyEye embeds a camera, a speaker and a processor. MyEye uses a combination of image processing and machine learning techniques to provide visual assistance to the user.

First, it allows to identify things in a scene. The camera captures an image of the user's environment, which is then processed by the device to identify objects and people in the scene. The device uses machine learning algorithms to recognize and classify objects, such as faces, objects and text. All this information is then disclosed to the user verbally.

In addition, it can also segment scenes to warn of an obstacle. The device can detect obstacles in the environment and provide audio feedback to help the user navigate around them. This feature can be particularly useful for outdoor activities, such as walking on a sidewalk or crossing a street.

MyEye is a groundbreaking technology that has the power to improve the independence and quality of life of people with vision disabilities.

One of the key advantages of MyEye is its ability to provide real-time visual assistance, enabling users to perform everyday tasks that would otherwise be difficult or impossible. For example, reading a menu at a restaurant, recognizing the faces of friends and family, and navigating unfamiliar environments. This can be a huge benefit for users, as it can significantly improve their independence and quality of life. Besides, the solution

is small and lightweight, making it easy to use while traveling, and it is very versatile, as it can recognize a wide range of objects and provide assistance in various situations. Finally, the device can help people with different degrees of sight loss to perform daily activities autonomously, such as reading text and orienting themselves in unknown environments.

However, MyEye also has some limitations. One of the biggest challenges is its cost (5000€). The device is fairly expensive, which may limit its accessibility for some users. In addition, the device may not be appropriate for all types of visual disabilities, since it relies on the ability to both hear and understand the audio messages provided by the device. As a result, users with hearing impairments may not be fully able to benefit from the system. Furthermore, although the system is capable of recognizing a large variety of objects and people, it is not perfect and can sometimes incorrectly identify objects as well as provide inaccurate information to the user, especially in low light conditions. It can be confusing for users, especially in situations where precision is key. Finally, users need time to learn this new technology to use it effectively.

In conclusion, OrCam's MyEye is a hopeful application of computer vision and deep learning to meet the needs of people with impaired vision. While the technology certainly has some limitations, the potential benefits of greater independence and improved quality of life for users make it a valuable area for further research and development.

[1] World Health Organization. "Blindness and Visual Impairment." WHO Fact Sheet, October 13, 2022. Available at: <https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>

[2] OrCam. "OrCam MyEye." Accessed May 17. Available at: <https://www.orcam.com/en-us/orcam-myeye>