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A Survey On Assist To Vision Impairement People With The Help Of Deep Learning Methods And Internet Of Things

[1]Shalini S, [2] Kavitha K S

[1]Associatet Professor, [2]Assistant Professor

[1]Computer Science and Engineering,

[1]Dayananda Sagar Academy of Technology and Management, Bangalore, India

Abstract: This paper presents a deep learning-based framework designed to aid vision impairment people by integrating Artificial Intelligence (AI) and the Internet of Things (IoT) for enhanced navigation, object identification, and daily task support. The proposed system utilizes deep learning models to process the data from cameras and sensors, enabling real-time object detection, scene interpretation, and obstacle avoidance. By connecting IoT-enabled devices, the framework allows for continuous interaction between smart environments and assistive technologies. The AI component continuously learns and adapts to the user's environment, preferences, and needs, offering personalized recommendations for navigation, mobility, and everyday activities. This combination of deep learning, AI, and IoT creates a robust, adaptive ecosystem that empowers visually impaired individuals with greater independence, safety, and quality of life.

Index Terms - Visually impaired, Sensors, Navigation, IOT, AI, Deep Learning.

I. INTRODUCTION

Visually impaired individuals[9] are those who encounter challenges with their sight. Partial or complete loss of vision that cannot be corrected by standard glasses, contact lenses, medication, or surgery. This impairment can range from mild difficulty in seeing to complete blindness. As reported by World Health Organization (WHO), around 2.2 billion people globally face some level of vision loss or blindness, with a considerable segment of this group residing in low- and middle-income nations.

Difficulties Encountered by Individuals with Visual Impairments:

1. **Mobility and Navigation:** Moving through unfamiliar or crowded environments can be difficult. Individuals with visual impairment frequently depend on a cane or a guide dog, but navigating public spaces without assistance can be a challenge.
2. **Access to Information:** Reading printed materials, using digital devices, and accessing visual data such as images, charts, or maps can be difficult for those with vision loss. Adaptations like screen readers or braille are often used to overcome these barriers.

3. **Social and Psychological Impact:** The loss of vision can result in feelings of isolation, dependency, and a reduced sense of autonomy. Social stigma and misconceptions about the capabilities of visually impaired individuals can also lead to exclusion.
4. **Employment and Education:** Finding accessible education and employment opportunities are difficult for visually impaired people due to a lack of appropriate resources, technology, or awareness in workplaces and schools.

1.1 ARTIFICIAL INTELLIGENCE (AI):

Artificial intelligence (AI)[4] aid visually impaired people in various ways, including:

- **Diagnosis:** AI can help doctors diagnose eye diseases like cataracts, diabetic retinopathy, and glaucoma.
- **Assistive reading:** AI can help people read by using audiobooks or other systems.
- **Obstacle avoidance:** AI can help people navigate by using smart glasses, smartphones, and Raspberry Pi.
- **Scene understanding:** AI help people in understand their surroundings.
- **Object detection:** AI help people in identify objects.
- **Labeling:** AI help people in label items in their environment with spoken audio labels.

1.2 DEEP LEARNING

Deep learning[2] is feasibly utilized in a variety of technologies to aid visually impaired people including reading text and images in books, navigate to known and unknown environments, it will provide real-time information about nearby people and items and also help doctors to diagnose eye diseases earlier, which can lead to better treatment and a higher chance of a cure.

The images are captured from the scene using a video camera and then pre-processed with deep learning techniques[3] such as DNN (Deep Neural Networks) , utilizing OpenCV.

1.3 INTERNET OF THINGS (IOT):

IoT[1] is a field that involves sensors, processing, software, and other technologies to connect devices and systems over the internet. It could be adopted used in assistive technology to aid visually impaired people in a number of ways including Smart sticks, Mobile applications, Screen readers, Braille displays, Magnification devices etc.

Combining IoT[5] and Deep learning[6] greatly benefits visually impaired individuals by creating smart assistive devices that interpret their surroundings through real-time data. These technologies enable object and facial recognition, provide navigation assistance, and enhance environmental awareness, fostering greater independence and safety. Additionally, personalized training and smart home integration can further improve their wellbeing of life by making daily tasks more manageable and intuitive.

II. LITERATURE SURVEY

Sl. No.	YEAR	AUTHOR	TITLE OF THE PAPER	REMARKS
1	2024	a harini et al.	IoT Based Smart Assistant Cane For The Visually Impaired	This paper presents the design and implementation of a Smart Cane for the vision impairment people, incorporating several sensors and features to improve their motility and safety.
2	2023	Hemavathy J et al.	AI based voice assisted object recognition for visually impaired society	The developed application serves a dual purpose: firstly, to effectively classify and identify objects, and secondly, to provide invaluable assistance to vision impairment people through vocal interactions.
3	2023	Bhasha Pydala et al.	Smart_Eye: A navigation and obstacle detection for visually impaired people through smart app	This paper presents a navigation and obstacle detection system called SMART_EYE, designed to aid visually impaired individuals through a smart application. The proposed system intended to address difficulties faced by visually impaired people in manoeuvring through unknown surroundings.
4	2023	Vijaya Vardan Reddy S et al.	Smart Blind Assistant using Deep Learning for the Visually Impaired Users	The outcomes of the intended technique identify the individual and multiple obstacles in the outdoor and indoor surroundings. The obtained mean accuracy of the assistive system to identify the barriers in the proposed method is around 81.5%.
5	2023	Adel B. Abdel - Rahman et al.	A Smart Blind Stick with Object Detection, Obstacle Avoidance, and IoT Monitoring for Enhanced Navigation and Safety	This research paper introduces a Smart Blind Stick, equipped with deep learning-based object recognition, health, and location monitoring through IoT capabilities and ultrasonic sensors based obstacle avoidance. The system enhances independence and safety for visually impaired individuals, providing real time feedback and remote monitoring.
6	2022	Laila Khalid et al.	Vision4All — A Deep Learning	In this paper, the proposed Vision4All model assists users in identifying colors, clothing categories, textures, fabric,

			Fashion Assistance Solution For Blinds	style, graphic, and text-based content on clothes. We enhanced FashionNet, a deep model that learns clothing characteristics by predicting garment qualities and categories together.

III. FUTURE SCOPE

Emerging prospects for adaptive tools for vision impairment people using deep learning and IoT is quite promising and expansive. Here are several important aspects where these technologies are expected to make significant advancements:

1. **Enhanced Object Detection and Recognition**: Deep learning models like YOLO-V7 are being refined to improve the accuracy and speed of object detection. This will aid vision impairment people better recognize and connect with their surroundings.
2. **Real-Time Navigation Assistance**: Wearable devices, such as smart caps and voice assistants, are being developed to provide real-time navigation and obstacle avoidance. These devices use IoT to connect to cloud services and deep learning algorithms to process environmental data2.
3. **Integration with Blockchain**: Blockchain technology is being explored to securely store and share data collected by assistive devices. This ensures privacy and reliability in the data exchange process3.
4. **Cost-Effective Solutions**: Researchers are focusing on creating affordable and accessible assistive devices. This includes using open-source software and hardware to reduce costs and make these technologies available to a wider audience1.
5. **Personalization and User-Friendliness**: Future devices will likely offer more personalized experiences, adapting to the specific needs and preferences of individual users. User-friendly interfaces and intuitive feedback mechanisms will enhance the overall user experience2.
6. **Cloud-Based Processing**: Shifting data processing to the cloud can address latency issues and maximize the effectiveness of assistive devices. This allows for faster and more reliable performance.

IV. CONCLUSION

The eyes play a vital role in how humans observe and be aware of the world, enabling individuals to conduct various tasks. However, visual impairment can create significant challenges in the lives of those affected. In this paper survey done on different recent work. Still many advancements are necessary for visual impairment people. As a result, it is important to prioritize the needs of the visually impaired community.

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