SMART VISION ASSISTANT FOR THE VISUALLY IMPAIRED: OBJECT DETECTION AND AUDITORY FEEDBACK

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ABSTRACT-For individuals with visual impairments, it is crucial to be able to distinguish the products they use daily. Therefore, we have implemented a method utilizing a camera to assist in product recognition during their daily activities. To separate an object from un-necessary background, movement-based technique is used to spot object of concern from the camera by instructing person about recognized objects. The aim of this current project is to develop an object detection system tailored for visually impaired individuals and other commercial applications. This system is designed to effectively recognize objects within a predetermined range, fulfilling the requirements of the target audience. Traditional methods of object detection required extensive training data it takes more time and it's quite complicated and it's a difficult task. Object detection is used in many scenarios. Conventional methods of these object detection depend on huge number of datasets and it also takes large amount of time to train these data. Training of small or unseen objects is a more challenging task. Human brains and visual systems are more accurate and faster in detecting objects in real time and has conscious thoughts in detecting obstacles. Due to the availability of large amount of data and with more advanced technologies and better working algorithms, classification and detection of multiple objects in the same frame has become easy with high accuracy. The main objective of the project is to design and implement a real time object recognition using real time camera. And also using implement text detection and recognition system to extract the text from captured image using Optical character recognition algorithm. We can implement the system in real time environment using Python as front end.

***Keywords*: Object detection, Visually impaired, Real-time recognition, Optical character recognition, python**.

INTRODUCTION - Product identification and text recognition for blind individuals using deep learning algorithms represent a transformative application of technology aimed at enhancing accessibility and independence. Leveraging deep learning techniques, particularly convolutional neural networks (CNNs) and recurrent neural networks (RNNs), enables the development of sophisticated systems accurately identifying capable products of and recognizing text from images captured by smartphones or wearable devices.In this context, the system first processes the input image to identify objects, such as packaged goods or printed text, using CNNs trained on large datasets of labelled images. Object detection algorithms like YOLO (You Only Look Once) or Faster R CNN can efficiently locate and classify objects within the image. Once the products are identified, text recognition algorithms, often based on RNNs with attention mechanisms, extract and interpret textual information present on the packaging or signage. These algorithms are trained on datasets of labelled images containing annotated text regions, allowing them to accurately transcribe text even in complex backgrounds or varied fonts. The system then utilizes natural language processing (NLP) techniques to convert the recognized text into audible or tactile output, providing spoken descriptions or braille representations to the blind user through assistive devices such as screen readers or braille displays. Additionally, integration with voice-controlled interfaces or haptic feedback mechanisms further enhances user interaction

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and accessibility. Future advancements in this area may involve improving the robustness and accuracy of object detection and text recognition algorithms through larger and more diverse training datasets, as well as exploring multimodal approaches that combine image, audio, and textual cues for enhanced perception. Furthermore, efforts to optimize computational efficiency and reduce hardware facilitate real-time requirements performance can on resource-constrained devices, ensuring widespread accessibility and usability of such systems for blind individuals in various contexts, including shopping, navigation, and information access.

LITERATURE REVIEW

[1]YANFANG LIU, NAIMING QI, AND ZHI LI2

This proposed system expands upon the saturated capacitor model to incorporate temperature-dependent hysteresis. Instead of using constant parameters, functions of temperature are utilized. These functions are derived by identifying multiple sets of constant parameters at various temperatures, followed by fitting each parameter term as a function relative to temperature. In this curve fitting process, parameter sensitivity serves as a weighting factor. The efficacy of the proposed modeling approach and parameter determination method is validated through experimentation with collected data. The total normalized root mean square error is estimated to be around 5%, with 3% attributed to the identified parameters. In this document, the SCH model is expanded to characterize the temperature-dependent aspect of the hysteresis observed in piezoelectric materials. The SCH model is first generalized to capture convex and concave hysteresis. Then, the constant parameters are extended as functions of temperature. The parameter determination procedure is also presented. The effectiveness is verified by experimental data. The identified results contain approximately 3% error. Including this error, the overall error of the proposed model is approximately 5%. Consequently, the proposed model and parameter determination method demonstrate the ability to characterize temperature dependent hysteresis effectively.

[2] SHUO GAO, YANPEI SHI, QIANG LIU

In this innovative system, we introduce a method combining piezoelectric and capacitive technologies to achieve four dimensional detection, encompassing location tracking along the x-y axis, force detection, and hover sensing for interactive displays. Here, electrodes are positioned both above and below the piezoelectric layer, forming a device structured like a sandwich. A technique based on self capacitance is utilized for detecting location and hover gestures. Force-induced charges are gathered and interpreted to determine the magnitude of the force. Since capacitive and piezoelectric sensing operate within distinct frequency bands, the signals they generate can be effectively isolated. This enables simultaneous four dimensional touch sensing, facilitating the detection of static interactions and hovers touch events. In this paper, we introduce a flexible touch panel based on piezoelectric technology for interactive touch sensing in four dimensions. , challenges in the recognition of hover touches and static force touch signals in conventional capacitive and piezoelectric based touch panels are addressed, using the developed algorithm to interpret correlation between capacitive and force touch outputs. The high flexibility is ensured by graphene EXISTING SYSTEM electrodes. The work in this article not only showcases a multidimensional sensing touch panel, but also demonstrates a way of improving the detection accuracy of one dimensional signal by using signals in other dimensions.

[3] Mazin Hnewa, Hayder Radha

CONVOLUTIONAL Neural Networks (CNNs) have been achieving exceedingly improved performance for object detection in terms of classifying and localizing a variety of objects in a scene. [1]–[7]. However, under a domain shift, when the testing data has a different distribution from the training data distribution, the performance of state-of-the-art object detection methods, drops noticeably and sometimes significantly. This domain shift may arise from variations in data capture conditions, such as differences in lighting or weather, or from viewing objects from varying perspectives, resulting in alterations in object appearance and background. For instance, the training data typically acquired for autonomous vehicles are obtained in favorable, clear weather

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conditions, whereas testing may occur under adverse weather conditions such as rain or fog. In this context, the domain used for training is referred to as the source domain, while the domain in which testing is performed is known as the target domain.

3.EXISTING SYSTEM

- The system employs two cameras, GPS-free service, and an ultra sonic sensor to provide comprehensive information about the surrounding environment to assist blind individuals.
- A dataset of objects commonly found in daily scenes is utilized for object recognition, allowing the system to identify objects such as faces, bicycles, chairs, doors, and tables in real-world scenarios.
- The use of two cameras enables the generation of depth information through the creation of a disparity map, enhancing the accuracy of object detection and obstacle avoidance.
- GPS service is leveraged to categorize objects based on their locations, facilitating more efficient navigation and pathfinding for the blind user.
- The ultra-sonic sensor is employed to detect obstacles at medium to long distances, enhancing safety during navigation. A 'vision to sound' conversion system is implemented to assist blind users in autonomous navigation.
- This involves capturing images, processing them in MATLAB, comparing them with a database, and conveying structured acoustic signals to the user through earphones.
- The system evaluates color information from objects of interest and communicates this information to the blind user via headphones, enhancing their understanding of the environment.

4. PROPOSED SYSTEM

- The proposed system develops a novel approach to object detection by combining top-down recognition with bottom-up image segmentation. This involves two main steps: hypothesis generation and verification.
- An enhanced Shape Context feature is designed to generate hypotheses of object locations and figure-ground masks. This feature is robust to object deformation and background clutter, ensuring high recall and low precision rates.
- In the verification step, a CNN procedure is proposed for object detection and recognition. This exploits feature vectors for accurate detection and recognition of objects.
- The proposed system aims to expand possibilities for individuals with vision loss to achieve their full potential by providing advanced object detection and recognition capabilities.
- Furthermore, alongside object detection, the system incorporates text recognition methodologies employing Optical Character Recognition (OCR) algorithms. This allows for the identification of text strokes from uploaded images, which can then be converted into voice for the user.
- Experimental results demonstrate the real-time performance of the proposed system, indicating its feasibility and effectiveness in assisting individuals with vision impairments.

SYSTEM REQUIREMENTS

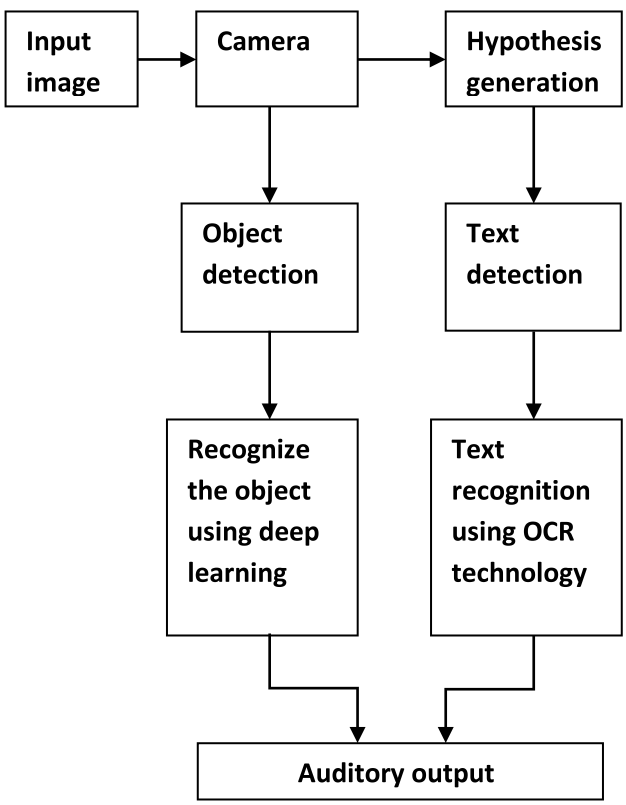
HARDWARE REQUIREMENTS

- Processor: Intel Core Processor clocked at 2.6 GHz
- RAM : 1GB Hard disk¬ : 160 GB
- Keyboard : Standard keyboard
- Monitor : 15-inch color monitor
- Camera : 2-Mega pixel
- Speaker : Standard Speaker

SOFTWARE REQUIREMENTS

- Operating System : Windows OS
- Front End : PYTHON
- IDE : PYCHARM
- Back End : MYSQL
- Application :WEB APPLICATION

BLOCK DIAGRAM



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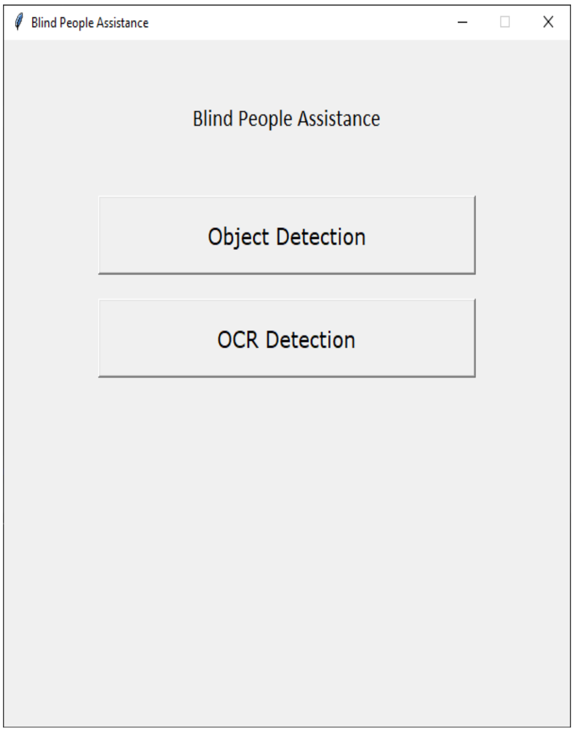
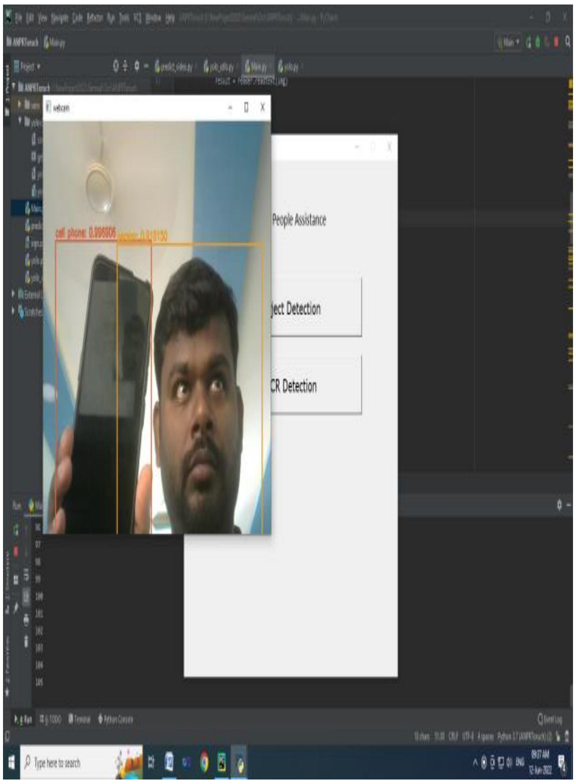
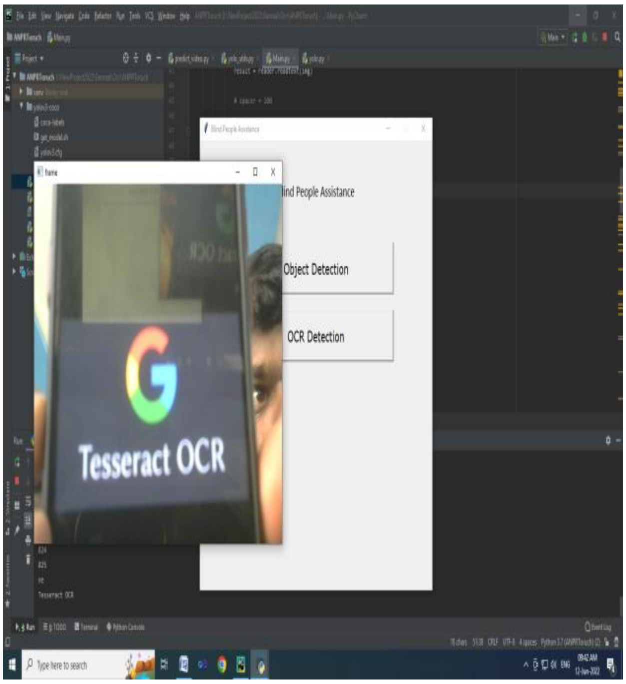
SCREEN SHOT



OBJECT DETECTION



TEXT RECOGNITION



CONCLUSION

- The development of assistive technologies for visually impaired individuals represents a significant step towards promoting independence and accessibility. Through the integration of advanced computer vision algorithms, such as SPDA-CNN, and the utilization of innovative hardware solutions like rapid response smart sticks, we have demonstrated the potential to enhance the lives of those with visual impairments.
- Our review of assistive devices and¬ smart solutions highlights the importance of interdisciplinary collaboration and technological innovation in addressing the diverse needs of individuals with visual impairments. By providing an overview of existing technologies and presenting novel approaches such as the Intelligent Eye mobile application, we aim to contribute to the ongoing efforts to create inclusive environments for all.
- Moving forward, it is essential to continue refining and optimizing these technologies to ensure their effectiveness and usability in real world scenarios. This requires ongoing research, user feedback, and collaboration with stakeholders, including

individuals with visual impairments, caregivers, and advocacy groups.

- Ultimately, our goal is to empower individuals with visual impairments to lead fulfilling and independent lives by leveraging the power of technology. By bridging the gap between innovation and accessibility, we can create a more inclusive society where everyone has the opportunity to thrive.

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