

# Machine Learning Based Assistive System for Visually Impaired People

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**Abstract-** In this paper, we are going to invent a camera-based assistive text identification tool to help blind people read text from images and household objects in their daily life. The system implementation depends on three main components: First, image capture-using a system camera with the help of Open-CV, the text from this image get extracted further, second, data processing - where text will be evaluated from the images and will be identified by optical character recognition (OCR) tool, and finally, Speech output generated with respect to identified text The text will be given to input for GTTS for audio output. In addition to text identified by using OCR tool and machine learning methodologies are advantages for our implementation. The text extraction methods are used to extract the text from image or document. The extracted text is then converted into a voice and output is given to the user. We have challenges to overcome text generation and voice generation accuracy over existing work done. We are going to invent a system which will assist blind people to read text documents without any person's help.

**Keywords-** Convolutional Neural Network, Optical character recognition, Google Text To Speech, Open Compute Vision.

## I. INTRODUCTION

Nowadays the most important and essential work for the visually challenged user is to identify and choose the right documents. The proposed application uses the inbuilt camera of the system for capturing the text data from image. The captured image is initially processed using text localization algorithms to separate the text from the background. Then text extraction methods are used to extract the text from image or document. The extracted text is then converted into a voice output and is given to the user. The spread of visual impairment is a very sensitive issue worldwide. Blind people have to face different difficulties in everyday actions. These include the difficulty of moving in complete autonomy and the ability to seek and recognize objects. Until a decade ago, the only aid that a blind person had are sticks, guide dogs accompanying persons or to move, while the technique of reading Braille is used for collecting information about objects. To develop this system is to help blind people by reading out all types of text documents. The proposed application uses the inbuilt camera of the system for capturing the text data from image. The captured image is initially processed using text localization algorithms to separate the text from the background.

## II. LITERATURE SURVEY

Sneha.C.Madre et al. [1] proposed text detection in indoor/outdoor scene images- proposes a novel methodology for text detection in indoor/outdoor scene images. It is based on an efficient binarization and enhancement technique followed by a suitable connected component analysis procedure. Connected component analysis is used to define the final binary images that mainly consist of text regions. It invented a portable camera-based assistive text reading framework to

help blind people to read text labels and product packaging from hand-held objects in their daily lives.

Georgie V Rajan et.al[2] offers an application in order to expedite easy and innate way to find the medicine for the visually impaired people and to take it according to their Doctors prescription. Visually impaired people need not be dependent and seek help from others to find the medicine to be taken. This android application is used to overcome the difficulties they face in this scenario. In this application, a reminder is set which tells the user when to take the medicines, as voice output. The pictures of the medicine strip held in the hand are captured by the inbuilt camera of the mobile. The image is processed and consequently text localization and extraction is done by which the name of the medicine is identified.

Dr. D. Jayashree et.al [3] proposed about the authentication of different currency notes with basic image processing techniques. The image is converted from RGB to Grayscale for easy preprocessing of the acquired image. The edges are detected using Sobel operator and edge-based segmentation is applied to the image. Features are extracted using ORB feature detector. Extracted features include security threads, intaglio printing, micro-lettering etc. It may face many challenges such as old notes, worn out notes, image quality etc. the features are compared with the features of the original currency which is templated in the dataset. Template matching is performed to obtain the output.

Sonal I Shirke et.al[4] propose a camera-based assistive text reading framework to help blind people read text labels and product packaging from hand-held objects in their daily lives. To isolate the object from cluttered backgrounds or other surrounding objects in the camera view, we first propose an efficient and effective motion-based method to define a region of interest (ROI) in the video by asking the user to shake the object. This method extracts moving object region by a mixture-of-Gaussians-based background subtraction method. In the extracted ROI, text localization and recognition are conducted to acquire text information. To automatically localize the text regions from the object ROI, we propose a novel text localization algorithm by learning gradient features of stroke orientations and distributions of edge pixels in an Ada-boost model.

Ani R. et.al [5] proposed that a camera-based assistive system is for visually impaired or blind persons to read text from signage and objects that are held in the hand. The system is able to read text from complex backgrounds and then communicate this information aurally. To localize text regions in images with complex backgrounds, we design a novel text localization algorithm by learning gradient features of stroke orientations and distributions of edge pixels in an Ad boost model. Text characters in the localized regions are recognized by off-the-shelf optical character recognition (OCR) software and transformed into speech outputs.

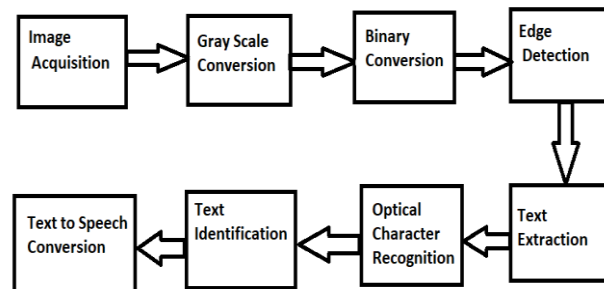
Sushma R G et.al. [6] Introducing Counterfeit notes are one of the biggest problems occurring in cash transactions. For a country like India, it is becoming a big hurdle. Over the past few years, as a result of the great technological advances in color printing, duplicating and scanning, counterfeiting problem has become more and more serious. At present the Currency denomination recognition is becoming a dynamic topic for researchers in different potential applications. It is very difficult to count different denomination notes in a bunch. This paper proposes an image processing technique to identify paper currency denomination and fake note recognition. It also includes designing a system that helps in identification of Indian currency notes to check whether it is valid or invalid according to the RBI rules and regulations.

### III.EXISTING SYSTEM APPROACH

After studying multiple papers on blind people systems we reach to a point that every system uses a separate system for processing, a wearable camera and a Bluetooth earpiece which increases the hardware utilization. All existing systems are based on sensors and hardware devices which are very expensive. Existing work on object detection is based on sensors and wearable devices. So there is a need of a system which assists blind people to read text documents as well. So we are working on a system for giving the best solution over this problem by automatic text reader and voice generator.

### IV.PROPOSED SYSTEM APPROACH

In this system, we are proposing solutions over existing work done by providing most promising blind assistive tool.



**Fig.1 Block Diagram of Proposed System**

We are going to invent a system which will assist blind people to read text documents without any persons help. Our work is based on machine learning techniques for text reading using OCR tool with better performance and with advantages of voice generation.

We are going to develop following modules like Text reading from images, Reading books page by page, Reading confidential documents, Currency identification for Indian currency. Main motive behind this system is to help blind people by reading out all types of text documents.

- ◆ The most important and essential work for the visually challenged user to identify and choose the right documents.
- ◆ The proposed application uses the inbuilt camera of the system for capturing the text data from image.
- ◆ The captured image is initially processed using text localization algorithms to separate the text from the background.
- ◆ Then text extraction methods are used to extract the text from image or document.
- ◆ The extracted text is then converted into a voice output is given to the user.

- ◆ We have to imagine text data set for pre-processing and achieving more accuracy in text generation and voice conversion outputs.

## V. METHODOLOGY

### 1. Image Acquisition (Open-Computer Vision)

The Image acquisition is the process of collecting input image sample. The component collects scenes containing objects of interest in the form of images. Here, generally system webcam is used for image acquisition. We use Python and Open-CV to make our very own image detector. We are working with all image operations by using open computer vision python library.

### 2. Gray Scale Conversion

After get image acquired by open-cv this color image is further converted into a gray scale by reducing noise. Gaussian filtering is used for blur images and remove noise. Image shown below:

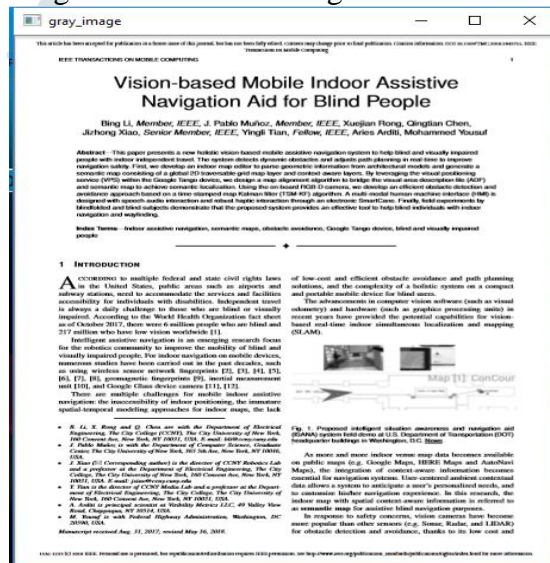


Fig.2 Gray Scale Conversion

Pre-processing of document images is the way of using image processing techniques to enhance the quality of images. Its purpose is to improve and extract objects information of images for later processing purposes. Two pre-processing works, binary conversion and noise removal, are performed here.

### 3. Binary Conversion

Threshold image color values are 0s and 1s that are black and white form. Image gets converted in binary form by changing its other RGB values to zero. Otsu's method of binary conversion is used to do this. Binary image shown below:

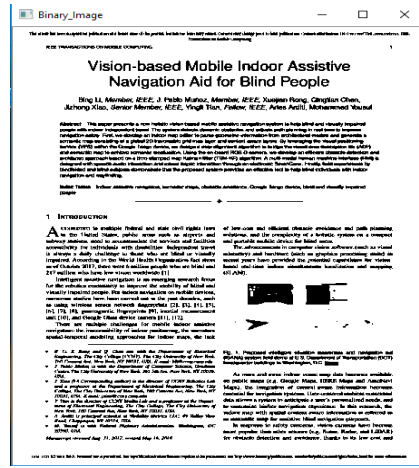


Fig.3 Binary conversion

It is the simplest technique of image segmentation from a grayscale image. Thresholding can be used to create binary image. The method used in thresholding is Otsu's method. Otsu's method selects the threshold by minimizing the within-class.

### 4. Edge Detection

After getting binary image object recognition done by using canny edge detection method, in which edges draw around the object of images. Edge detected image shown below:

Edge Image

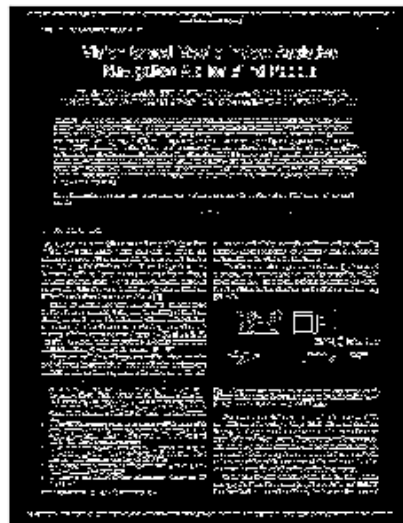


Fig.4 Edge Detection

Edge detection is a set of mathematical method which aims at identifying point in an image at which the image brightness changes sharply or has discontinuities. Such points are typically organized into a set of curved line segments called as edges. The Canny Edge Detection Algorithm is used in edge detection. The algorithm runs in various separate steps:

1. Smoothing
2. Finding gradients
3. Edge tracking by hysteresis (Final edges are determined by suppressing all edges that are not connected to a very certain (strong) edge).



## 5. Optical Character Recognition (OCR)

Optical character recognition (OCR) is going to be used for text recognition after getting edge detected image. The recognition of printed or written text from input image is recognized by a computer. This involves photo scanning of the text character-by-character, analysis of the scanned-in image, and then translation of the character image into character codes, such as ASCII, commonly used in data processing.

When we read from the computer screen our eyes and brain are carrying out optical character recognition without us noticing. Our eyes recognize the patterns of light and dark that make up the characters (letters, numbers, and punctuation marks) printed on the screen and our brain uses those to figure out what the opposite person is trying to say. Computers can do this too, but it's really hard work for them. The first problem is that a computer has no eyes, so we are using OCR tool which is used to recognize text from images or documents, which will help visually impaired people read out without vision.

## 6. Text To Speech (GTTS)

After extracting the text from the OCR tool we get text as an output. The text recognized by OCR further is given to GTTs for speech processing. The GTTs recognizes text character by character and is converted into an audio file with drafting feature. Here we are going to capture the image of a product or any kind of image which has a text on it through a system camera using open computer vision. After getting audio output we give it to speech recognizer of python which play this voice with the help of systems music player.

## V. CONCLUSION

We are going to propose assistive system for blind people based on machine learning and algorithms. We are going to solve the problem of visually impaired people. We are going to develop currency reader, newspaper reader, book reader and confidential file reader system. All our implementation based on machine learning and algorithms using OCR tool.

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