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# Automating Tactilegraphics for Visually Impaired to Have a Sophisticated Insight

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**Abstract:**
According to the survey carried out by the World Health Organization (WHO), a staggering population of around 285 million is visually impaired. It is indeed disconcerting news. The development of the world is highly dependent on the education. However, most of the visually impaired community faces a lot of hindrances in getting school education or imparting knowledge. The major resources in education are books .Unfortunately there are not many ways to transform these literary forms into vocalizations or tactile which usually help them in learning or to enhance knowledge in general.

**Keywords:** blind people, pattern recognition, tactile, enlarge text

## I. INTRODUCTION

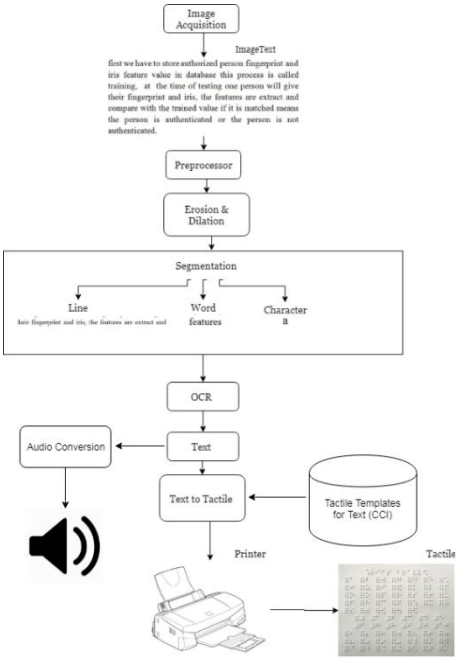
The human beings with normal vision obtain the information heavily dependent on vision in daily living. Unfortunately, blind people obtain the information only through touching, listening, smelling, tasting, and moving. In a survey conducted by World Health Organization (WHO) in 2010, the statistical result showed that there were approximately 285 million people suffer visual impairment, of whom 39 million were blind; 246 million had low vision [1]. About 90% of the visually impaired lived in developing countries. An estimated 19 million of the visually impaired were children aged under 15. The number of visually impaired people is increasing rapidly with the growth of newborn population and so on; and every year, this number grows by up to 2 million worldwide. Because of visual disability, the abilities for performing daily tasks like reading, walking, driving, or recognizing objects, finding and interacting with surrounding world are limited or influenced. They need assistance from their family members, friends and caregivers. If the assistive technologies like can support visually impaired people in at least one of daily tasks, it is going to make a very relevant social impact [2]. Corrective lenses are glass or plastic worn on or in front of the eye that are used to improve the focus and correct the blur. They are mainly used to treat myopia, hyperopia, presbyopia and astigmatism [3]. However, corrective lenses are useless for blind people. Some of the technologies have been developed for the solution of walking assistance in the following aspects like obstacle avoidance, navigation and orientation, and accessing environment. The most traditional mobility tools is the long cane (i.e., white cane) which is used to detect obstacles in the path of the visually impaired. However, it provides only limited information about the environment due to its short length. Guide Dogs can be trained to lead visually impaired people around obstacles which is time consuming as well as expensive to train a dog suitable only in small environment and a low probability of success restricts their use. Electronic Travel Aids (ETAs) using different types of range sensors are commonly introduced to help the visually impaired people to avoid obstacles [4, 5]. However, multiple factors contribute to low market acceptance for these devices such as cost, portability and performance. Braille for the feet and traffic lights with acoustic devices are common methods for assisting the visually impaired to walk outdoors which requires wide laying and installation. Nowadays, a number of assistive navigation systems are designed based on the application of Global Positioning System (GPS). However, GPS devices have a similar characteristic: poor resolution in urban-environments and unavailable indoors[23]. A robotic indoor navigation system is proposed by Kulyukin et al. [24]. In this system, Radio Frequency IDentification (RFID) is utilized to read IC tags, but it is difficult for blind people to locate the tags at close range. Wi-Fi techniques are gaining momentum now, and they are expected to provide solutions for indoor localization [25]. A number of devices have been developed to support the visually impaired to access public places and locations. For example, audible indicators are used to alert when doors open and cross the pedestrian. Infrared talking signs can be widely installed to aid blind people to cross light-controlled intersections and locate bus stops and so on. Through a hand-held receiver, blind users can receive the broadcasted information [26]. But infrared signs require costly installation and maintenance. Tactile maps [27] or talking tactile maps [28] also are widely used to indicate the layout of a street environment.

## II. RELATED WORK

[1] A rotationally invariant optical character recognition system for Sinhala language is developed using Two Dimensional Fourier Transform and Artificial Neural Networks. Sinhala Optical Character Recognition (SOCR) algorithms are used convert Sinhala documents into a digital form. The first is segmentation, i.e., given a binary input image, to identify the individual glyphs (basic units representing one or more characters, usually contiguous). The second step is feature extraction. Searching old information becomes faster. [4] we propose a hybrid approach to haul out the text from videos by integration of the two popular text extraction methods. Text and non-text characters are filtered out. Niblack's binarization algorithm is used. The Niblack binarization technique will convert the gray scale image into

binarized image.[7] multilayer Feed Forward neural network is used. The pre-processed image is segmented into individual characters. [8] concept of Artificial Neural Network and Nearest Neighbour approach is used. Three layers are used for classification purpose. First is the input layer consist the input given by the segmented characters, then hidden layer consist the neurons trained by the training network and the output layer consist output neurons to generate unicode.[10] Statistical, Geometric and Directional Feature Extraction techniques is used. The objective is to develop an offline OCR system to recognize Hand printed English Characters, Numerals and Special Characters from the document images, which comprises of text in hand printed format, which would be converted into editable form.[13] A hetero-associative neural network is proposed to train the system for deciphering is used. The proposed genetic algorithm repeatedly performs crossover on sections and parts of text data from an image file to train the system. The genetic algorithm after training with text data in image converts it into a form that can be recognized easily. The proposed approach gives the results which are significant encouraging.[14] automatic system to recognize the Braille pages is used. Chain Code algorithm is used. It detects the boundary coordinates of the Braille dots[15].

## III. PROPOSED METHOD




The given architectural block diagram (Fig 3.1) gives the overview of the project. It gives better understandability of flow of the project. The following sub-sections provide a more detailed description of given components of the project.

## IV. INPUT ACQUISITION

The first step for the Automating tactile Algorithm is image acquisition. Image acquisition in image processing is also known as the way of retrieving an image from some source, basically a hardware-based source. Basically any type of document is to be processed. This answers to the question on why an image is taken as input.

### Preprocessor

Preprocessor is an improvement of the image data that suppresses unwanted distortions to give an enhanced image . Optical character recognition research faces several challenges in areas such as identification and illumination changes. only image enhancement has been discussed in this paper. Enhancement Method modifies the values of pixels in the original image to create the values of the corresponding pixels in the enhanced image. This is expressed as

$ß(x,y) = α[μ(x,y)]$

Where, μ (x, y) is the original (input) image, ß(x, y) is the enhanced image and α describes the transformation between the two images. Enhancement techniques based on this type of approach are called mask processing or spatial domain approach. In this spatial domain, maximum and minimum filters techniques are used.

### Segmentation

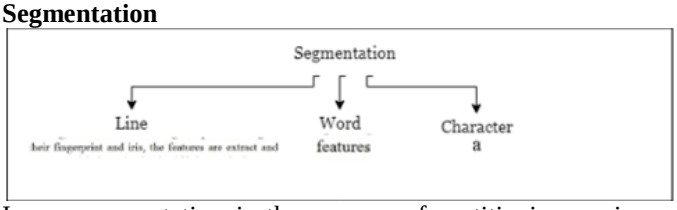



Image segmentation is the process of partitioning an image into parts or regions. This division into parts is often based on the characteristics of the pixels in the image. For example, one way to find regions in an image is to look for abrupt discontinuities in pixel values, which typically indicate edges. These edges can define regions. Other methods divide the image into regions based on color values or texture.

### Image Text to Text

OCR is a field of research in pattern recognition. OCR based devices are developed to recognize printed text. First, the image Text is Captured by a digital camera and then by mobile scanner or hardware gadgets. Digital Image is recognized to generate text file using the optical character recognition (also optical character reader, OCR) which is the mechanical or electronic conversion of images of typed, handwritten or printed text in to machine-encoded text, whether from a scanned document, a photo of a document from subtitle text superimposed on an image. It is widely used as a form of information entry from printed paper data records. It is a common method of digitizing printed texts so that they can be electronically edited, searched and stored more compactly.

### Text to Tactile

During the second half of the process, the files of text format are accepted as inputs, and converted into tactile equivalents. This process is automated, so that there is no need for human intervention for every input. The system is well aware of converting the given input text to tactile text. The algorithm for the tactile conversion process is specified in the following section. The result of the algorithm is a single text file containing tactile values corresponding to the content of the input text files.

## V. EXPERIMENTAL RESULTS

The prime way of doing this is by considering 3 parameters. which are discussed in the following . These are used for finding the accuracy and detecting the defects. Firstly, for determining the accuracy, "A" is used as "the amount of content to be converted into tactile" and is represented as "α", The amount of content retrieved from the tactile is represented as "β".

***Accuracy(A)= No of text content accepted(α)-No of text***

***retrieved from the database(β)***

Performance is calculated by converting the accuracy into percentage .we convert the obtained values into percentage scale by dividing the lesser value by a greater value and multiplying the obtained result by 100.

***Percentage value = ( lowest value / highest value ) x 100***

The various types of the performance evaluated for Accuracy is.

- if the value of alpha is greater than Beta, $\alpha > \beta$ , A is +ve, all the elements are not retrieved.
- if the value of alpha is less than Beta, $\alpha < \beta$ , A is -ve, there are excess elements retrieved.
- if the value of alpha is equal to Beta., $\alpha = \beta$ , A is 0, means the algorithm is accurate

**Table.1. CASE :Evaluation using softwares:**

| SL.NO | SOFTWARE | CHARACTER RECOGNIZED | ACCURACY |
|---|---|---|---|
| 1. | OCR 1 | α = 32<br>β = 30<br>A = 2 | Accuracy obtained is 90% |
| 2. | OCR 2 | α = 35<br>β = 28<br>A =7 | Accuracy obtained is 70% |
| 3. | OCR 3 | α = 41<br>β = 41<br>A = 0 | Accuracy obtained is 100% |

Table Software Evaluation From the above tabular column, the evaluation is made using different softwares and their accuracy is calculated. Although above cases shows the accuracy levels, OCR1 uses Matlab 2015a , shows an overall of 64% in Accuracy. This is because while using this software, many error factors like Spacing ,Size and Fonts arre considered a major affecting factors. Even though ,these factors are prevailing, this gives a likely output but not an appropriate and Exact one. OCR 2 is a combination of java with Net beans 8.0.This software also produce the same error factors like above one, but these factors are more error prone. The accuracy rate is more lesser in obtaining the required output. The Overall Accuracy obtained in this case is 40% which is far lesser when compared to first case. OCR 3 is an software called ASPIRE, which produce an exact and appropriate output .The result obtained is more accurate and this software overcomes all the error obtained in above cases. The amount of character accepted is equally same as the one retrieved. The Overall Accuracy Obtained in this case is 100%.

## VI. CONCLUSION

As this technique was figured out to be in efficient, he introduced a 6 dot technique which covers all the letters. Until now the visually disabled are struggling to decipher even a small piece of text. So, we have devised an algorithm that would aid converting a scanned image into a tactile in a short span of time.

**There are a few ideas we have formulated, which would make significant difference in this algorithm.** They are,

1.Using Dot Matrix printer for printing Braille output.
2.Increasing the code efficiency.

This would enable them to enjoy the comforts and perks of a normal life corresponding those with a normal vision.

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