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NEURAL NETWORK BASED ASSISTIVE SYSTEM FOR TEXT DETECTION WITH VOICE OUTPUT

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Abstract – *As per the World Health organization (WHO), 285 million people are estimated to be visually impaired worldwide among which 90% live in developing countries and 45 million blind individuals world-wide Even though there are many existing solutions to the problem of assisting individuals who are blind to read, none of them provide a reading experience that in any way equivalent to that of the sighted population. In specific, there is a need for a portable text reader that is reasonable and readily existing to the blind community. Addition to the specially enabled in the IT revolution is both a social responsibility as well as a computational test in the rapidly advancing digital world today. This work suggests a smart reader for blind people using raspberry pi. This paper lectures the assimilation of a complete Text Read-out system designed for the blind. The system consists of a webcam interfaced with raspberry pi which accepts a page of printed text. The OCR (Optical Character Recognition) package installed in raspberry pi tests it into a digital article which is then subjected to skew modification, segmentation, before feature extraction to perform sorting.*

***Key Words*: Raspberry pi, Web Cam, Optical character recognition, Audio amplifier.**

1. INTRODUCTION

Reading is apparently essential in today's society. Printed text is everywhere in the form of reports, receipts, bank statements, restaurant menus, classroom handouts, product packages, instructions on medicine bottles, etc. And while optical aids, video magnifiers, and screen readers can help blind users and those with low vision to access documents, there are few devices that can provide good access to common hand-held objects such as invention packages, and objects printed with text such as prescription medication bottles.

2. EXISTING MODEL

Today, there are already a few systems that have some ability for portable use, but they cannot handle product labeling. For example, portable bar code readers designed to help blind people pinpoint different products in an extensive creation database can enable users who are blind to access material about these products.

The restriction is that it is very hard for blind users to find the position of the bar code and to properly point the bar code reader at the bar code.

3. PROPOSED SYSTEM

To overcome the hitches sharp and also to assist blind persons to read text from those kinds of inspiring patterns and backgrounds found on many everyday commercial products of Hand-held objects, then have to conceived of a camera-based assistive text reading basis to track the object of interest within the camera view and extract print text evidence from the object. Text localization to obtain text comprising image regions then text acknowledgment to renovate image-based text information into clear codes. The audio output factor is to inform the blind user of predictable text codes in the form of speech or audio .The projected system is a camera based system in which the image is captured by the camera and the text is vague using neural OCR .Then the text is rehabilitated into audio in the speech synthesizer and can be caught using a headphone.

3.1 BLOCK DIAGRAM

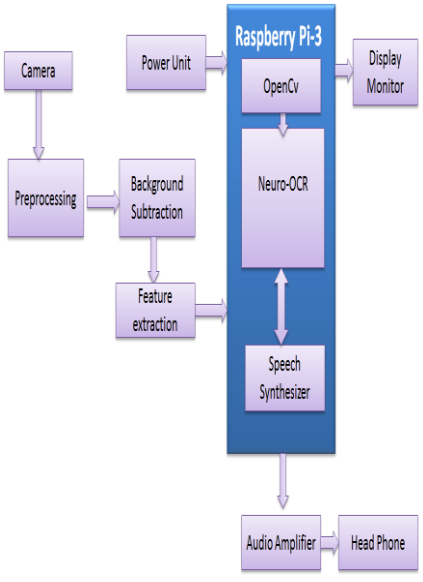

Fig.1 Block diagram

3.2 BLOCK DIAGRAM DESCRIPTION

3.2.1 Raspberry Pi

Raspberry Pi is a credit-card sized computer synthetic and considered in the United Kingdom by the Raspberry Pi foundation with the intent of teaching basic computer science to school students and every other person interested in computer hardware, programming and DIY-Do-it Yourself projects. The Raspberry Pi is man-made in three board configurations through licensed manufacturing deals with Newark element14 (Premier Farnell), RS Components and Egoman. These companies sell the Raspberry Pi online. Eg.The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU and was originally shipped with 256 megabytes of RAM, later upgraded (Model B & Model B+) to 512 MB. It does not include a built-in hard disk or solid-state drive, but it uses an SD card for booting and persistent storage, with the Model B+ using a Micro SD.

3.2.2 Artificial Neural Network (ANN)

Artificial neural networks (**ANNs**) are used in computer science and other research corrections, which is based on a large collection of simple neural units, loosely analogous to the observed comportment of a brain's axons. Each neural unit is connected with many others, and links can enhance or inhibit the initiation state of adjoining neural units. Each individual neural unit computes using summation function. There may be a threshold function or restrictive function on each connection and on the unit itself. It's a self-learning system.

The feed forward neural network was the first and simplest type of artificial neural network developed. In this network, the information moves in only one direction, forward, from the input nodes, through the hidden nodes (if any) and to the output nodes. There are no cycles or loops in the link.

3.2.3 Optical Character Recognition

Optical character recognition (**OCR**) is the mechanical or electronic alteration of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned article, a photo of a article, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text covered on an image (for example from a television broadcast). It is widely used as a form of information entry from printed paper data records, whether passport forms, invoices, bank statements, computerized receipts, business cards, mail, printouts of static-data, or any suitable certification.

4. METHODOLOGY

4.1. PRE PROCESSING

Pre-processing stage consists of three steps: Skew Correction, Linearization and Noise removal. The taken image is checked for skewing. There are options of image getting skewed with either left or right coordination. Here the image is first brightened and binarized.

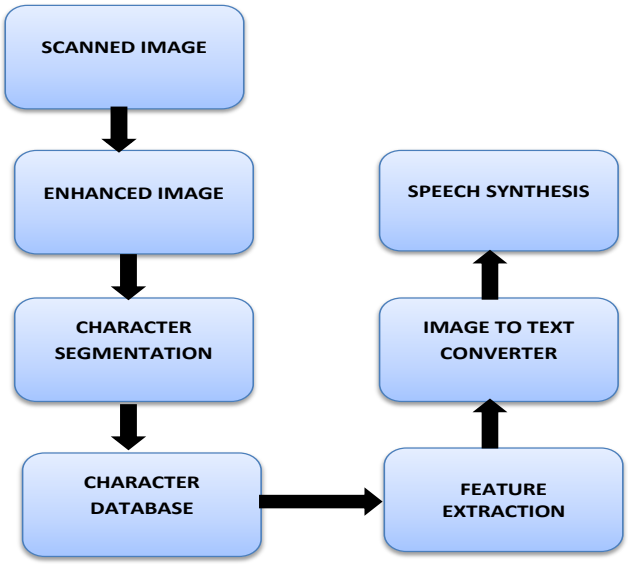

Fig .2 Flow diagram

The task for skew detection checks for an angle of orientation between ±15 degrees and if spotted then a simple image rotation is carried out till the lines match with the true horizontal axis, which produces a skew corrected image. The noise announced during capturing or due to poor quality of the page has to be cleared before more processing.

4.2. BACKGROUND SUBTRACTION

Background subtraction, also known as foreground finding, is a technique in the fields of image processing and computer idea wherein an image's foreground is take out for further treating (object recognition etc.). Generally an image's regions of interest are stuffs (humans, cars, text etc.) in its foreground. After the stage of image preprocessing (which may include image denoising post dispensation like morphology etc.) object localization is required which may make use of this skill.

Background subtraction is a widely used approach for spotting moving objects in videos from standing cameras.

The rationale in the approach is that of noticing the moving objects from the difference between the recent frame and a situation frame, often called "background image", or "background model". Background subtraction is mostly done if the twin in question is a part of a video stream. Family subtraction battings important cues for numerous applications in mainframe vision, for example surveillance hunt down or human poses valuation.

Background subtraction is commonly based on a static background hypothesis which is often not related in real environments. With indoor scenes, images or animated images on screens lead to background changes. Also, due to wind, rain or illumination changes brought by weather, static backgrounds methods have worries with outdoor scenes.

4.3 FEATURE EXTRACTION

Feature abstraction is the individual image glyph is considered and extracted for features. First a eccentric glyph is defined by the following traits:

1. Height of the character;
2. Width of the character;
3. Numbers of horizontal lines present—short and long;
4. Numbers of vertical lines present—short and long;
5. Numbers of circles present;
6. Numbers of horizontally oriented arcs;
7. Numbers of vertically oriented arcs;
8. Centroid of the image;
9. Position of the various features;
10. Pixels in the various regions.

4.4 SPEECH RECOGNITION

Speech acknowledgment is the process of translating an acoustic signal, caught by a microphone or a telephone, to a set of words. The predictable words can be an end in themselves, as for tenders such as directions & control, data entry, and article research.Speech acknowledgment is the ability of a machine or program to detect words and phrases in spoken language and convert them to a machine-readable organization. Rudimentary speech recognition software has a inadequate jargon of words and phrases, and it may only detect these if they are pronounced very unmistakably. More chic software has the ability to accept natural dialogue.

5. RESULT

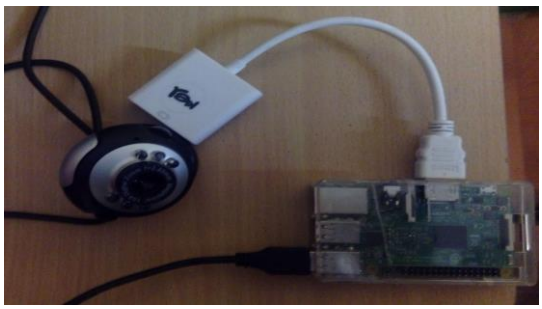

Fig.3 Hardware module

Thus the text can be spotted by using neuro OCR and is renewed to audio. However due to the less steadfastness of the webcam, the output obtained is not 100% truthful. The accuracy can be improved by building use of a HD camera or mobile camera. Figure 5 shows the output of the tesseract OCR device. Figure.6 indicates the harvest of the spell corrector to correct the misspelled words from the OCR.

6. CONCLUSION

By using this innovative idea we implemented this project. This is very indispensible for the blind people. The 'Reading Junior for the Visually Impaired' is not just a mission that empowers the blind to become sovereign, but is also a resource saver. It cuts down the cost of lithography Braille books along with the spell and energy spent into doing so. This is a less costly explanation to one of the many challenges that the visually decreased face.

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