A Survey on Blind Optical Character Recognition Techniques

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Abstract- *Optical character recognition (OCR) is the recognizable proof of printed characters utilizing photoelectric gadgets and PC programming. It coverts pictures of wrote, manually written or printed content into machine encoded text from examined report or from subtitle text superimposed on a picture. In this research these images are converted into audio output. OCR is utilized as a part of machine process, for example, psychological figuring, machine interpretation, content to discourse, key data and text mining. It is fundamentally utilized as a part of the field of research in Character recognition, artificial insight and PC vision. In this examination, as the acknowledgment procedure is finished utilizing OCR the character code in content documents are prepared utilizing Raspberry Pi gadget on which it perceives character utilizing tesseract calculation and matlab programming and sound yield is tuned in.*

Keywords- Optical character Recognition, Image Processing, Segmentation, Feature Extraction, TTS Module A text-to-speech

I. INTRODUCTION

OCR (Optical Character Recognition) interprets pictures of typewritten or transcribed characters into machine editable organization. OCR peruses harmed or low-quality codes and returns the best speculate what the code is. It is broadly utilized as a type of data passage from printed paper information records, regardless of whether identification reports, solicitations, bank articulations, electronic receipts, business cards, mail, printouts of static information, or any appropriate documentation. OCR does not manage quality and sharpness of characters. To conquer the confinements of OCR another approach comes into picture which is OCV. [1].

Gives a calculation for identifying and perusing text in normal pictures for the utilization of visually impaired and outwardly hindered subjects strolling through city scenes. The general calculation has a win rate of more than 90% on the test set and the new content is regularly little and far off from the watcher. [2] Have proposed a novel plan for the extraction of literary territories of a picture utilizing all inclusive coordinated wavelet channels. A grouping based procedure has been contrived for assessing all inclusive coordinated wavelet channels utilizing an accumulation of ground truth pictures. Advises about the navigational advances accessible to dazzle people to help free travel, our emphasis is on daze route on vast scale. presents a way to deal with programmed identification and acknowledgment of signs from regular scenes and its application to sign interpretation assignment that further propose a neighborhood force standardization strategy to successfully deal with lighting varieties took after by a gabor filter to get nearby highlights. Presents a similar review among versatile/wearable obstruction location/shirking frameworks to educate about the advance in assistive innovation for outwardly weakened individuals.

Fig.1: OCR based reader.

In the model frameworks two adjustment were done to plan for the framework test. In the first place we teach the visually impaired individual to put the hand held questions inside camera see. Second, in a pertinent visually impaired assistive framework, a content limitation calculation may lean toward higher review by giving up some exactness. At the point when the application is begun first it checks whether every one of the gadgets are accessible and furthermore it checks for the association. The graphical user interface (GUI) has than discretionary name for showing the picture from the camera, a status box for speaking to the picture. The Raspberry board accompanies incorporated peripherals like USB, ADC and Serial. On this board we are introduce the LINUX working framework with fundamental drivers for every fringe gadget.

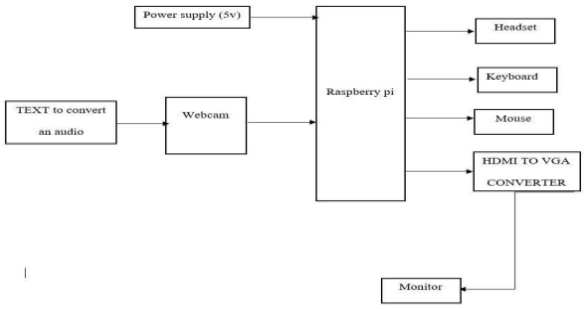

Fig. 2: Block diagram of book reader with Raspberry pi.

A. Finger Reader Module

The reader module was originally developed for reading text formats. The reader module can be a finger-based shape factors including little rings. In our present model, the camera is appended to a customizable Velcro ring with the camera embedded on the focal point of the ring and the vibration sensor which at the edge of the ri g for finger development and control. For preparing, utilize a wrist-mounted Arduino board with a joined Bluetooth module that controls the haptic input prompts. The video feed from the camera is currently processed in real time on a laptop computer.

B. Optical Character Recognition

OCR is optical character recognition module is the mechanical or electronic change of pictures of composed, manually written or printed content into machine-encoded content. It is a typical strategy for digitizing printed message with the goal that it can be utilized as a part of machine process, for example, content to-discourse. OCR is optical character acknowledgment module is the mechanical or electronic change of pictures of wrote, manually written or printed content into machine-encoded content. The info is given as content, utilizing a finger gadget mounted camera which catches message and sends the information content to the OCR procedure where the extraction of content to discourse is been finished. From the caught input content is fragmented as word by word location along these lines to peruse it as discrete word. Limit recognition is finished by distinguishing words which are fit inside the limit, if not it dispenses with the content which is unfit to peruse. The process of text extraction is carried out by matching with templates one by one and then forming a whole word. The mentioned line or a word will be read from the captured input text with a suitable coding. After matching with the templates and displays it as a text and reads it aurally. In this technique a USB camera which catches the info given in content organization and it is sent to OCR process which forms it as content and changes over it into a speech frame.

C. TTS Module A text-to-speech (TTS)

framework changes over ordinary content into discourse different frameworks render emblematic semantic portrayals like phonetic interpretation into speech. A text to-speech framework is utilized to peruse each word as the user`s finger disregards it, and unmistakable sound as well as haptic prompts can be utilized to flag different occasions, for example, end of line, beginning of line and so forth. It is made out of two sections: a front-end and a back-end. The frontend has two noteworthy undertakings. To begin with, it changes over crude content containing images like numbers and condensing into what might as well be called composed out words. This procedure is regularly called content standardization, pre-preparing, or tokenization the front-end at that point allots phonetic translations to each word, and partitions and denotes the content into prosodic units, similar to expressions, provisos and sentences. The way toward doling out phonetic translation to words is called textto phoneme or grapheme-to-phoneme conversion.[3]

II. TYPES OF CHARACTER RECOGNITION

A. Offline Character Recognition

In offline character recognition all printed or type-written characters are classified in offline mode. Offline character recognition can perceive the characters in a content that have been examined from a surface, for example, a sheet of report and are put away carefully in dim scale sort out. The storage of scanned documents have to be huge in size and many processing applications as searching for a content, editing, protection are either hard or impossible. These types of documents need human beings to process them manually. Character recognition system unravels such examined pictures of printed archives into machine encoded content. These interpreted encoded substance can be easily adjusted, looked and these substance can be taken care of in various diverse courses as demonstrated by necessities. It additionally requires tinny size for capacity as opposed to examined records.

B. Online Character Recognition

The characters can be recognized by using online mode of recognition. In this the character is caught and put away in computerized shape through various means. Typically, an exceptional pen is utilized as a part of conjunction with an electronic plane. In this method as the pen moves over the surface, the progressive purposes of two-

dimensional directions can be spoken to as a component of time and are put away all together. Presently a days, because of enhanced utilization of handheld gadgets online manually written acknowledgment concerned learning of overall specialists. The difference in customer and PC correspondence has transformed into a great potential for online acknowledgment. With a particular true objective to recognize and amend misrecognized characters on the distinguish the customer can checking the affirmation happens as they appear. The client is certain to adjust his composition style in order to enhance acknowledgment precision. Likewise, a machine can be refined to a specific client's style. Trial of his misrecognized characters is secured to help character recognition. Accordingly both writer modification and machine alteration is possible [4].

2.1 Phases of General Character Recognition System

Digitization:- Digitization is the way toward changing over a paper-based manually written record into electronic organization. Here, each archive comprises of just a single character. The electronic transformation is proficient by utilizing a technique whereby a record is filtered and an electronic portrayal of the first archive as a picture document design is created. We utilized different scanner for digitization, and the advanced picture was go for following stage that is preprocessing stage.

2.1.1 Pre-processing

In The pre-preparing stage, there is a progression of activities performed on the examined input picture. It improves the picture rendering it appropriate for division the gray level character picture is standardized into a window measured. After commotion diminishment, we created a bitmap picture. At that point, the bitmap picture was changed into a diminished picture.

2.1.2 Segmentation

The Segmentation stage is the most critical process. Division is finished by partition from the individual characters of a picture. Division of transcribed characters into various zones (upper, center and lower zone) and characters is more troublesome than that of printed archives that are in standard shape. This is fundamentally a direct result of inconstancy in passage, expressions of line and characters of a word, skew, inclination, measure and bended. Now and then segments of two neighboring characters might be touched or covered and this circumstance makes challenges in the division undertaking. Touching or covering issue happens much of the time due to adjusted characters in upper-zone and lower-zone. Division is a vital stage.

2.1.3 Feature Extraction

In this stage, highlights of individual character are removed. The performance of an each character recognition system that depends on the features that are extracted. The extracted features from input character should allow classification of a character in a unique way. We utilized inclining highlights, convergence and open end focuses highlights, change highlights, zoning highlights, directional highlights, parabola bend fitting– based highlights, and power bend fitting– based highlights keeping in mind the end goal to discover the list of capabilities for a given character.[5]

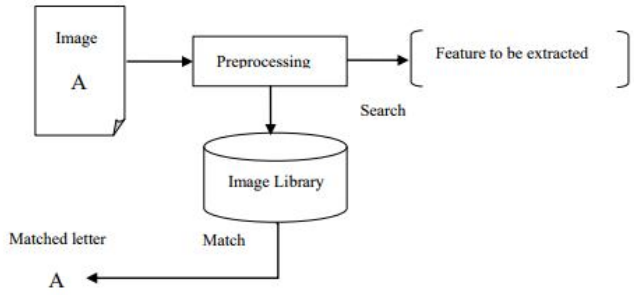

Figure 6 Phases of General Character Recognition System

III. APPLICATION

The last years have seen a extensive appearance of commercial optical character recognition products meeting the requirements of different users. In this area we can disscuss a part of the unmistakable regions of usage for CR. Three principal application ranges are customarily depicted; information section, content passage and process robotization.

A. Data entry:-

This application area describes technologies for entering huge amounts of limited data. Initially such document reading machines were used for banking applications. The systems are depicted by scrutinizing just to an awesome degree compelled game plan of printed characters, regularly numerals and a few exceptional pictures. They are designed to read data like account numbers, customer's identification, article numbers, amounts of money etc. The paper formats are constrained with a limited number of fixed lines to read per document. Because of these restrictions, readers of this kind may have a very high throughput of up to 150.000 documents per hour. Single character blunder and reject rates are 0.0001% and 0.01% individually. Additionally, because of the constrained character set, these perusers are generally to a

great degree wide to awful printing quality. These systems are specially designed for their applications and prices are therefore high.

B. Text entry:-

The second branch of reading machines is that of page readers for text entry, mainly used in office automation. As showed by constraints concerning content style and printing quality the imprisonments on paper plan and character set are exchanged. The examining machines are used to enter a ton of substance, frequently in a word taking care of condition. These page perusers are in solid challenge with electronic trade of information and direct key-input. This territory of utilization is as the result of decreasing significance. As the character set read by these machines is generally tremendous, the execution is especially subject to the nature of the printing. However, under controlled conditions the single character error and reject rates are about 0.01% and 0.1% respectively. The perusing speed is commonly in the request of a couple of hundred characters for each second.

C. Process automation:-

Within this area of application the main concern is not to read what is printed, but rather to control some particular process. This is actually the technology of automatic address reading for mail sorting. Hence, the goal is to direct each letter into the appropriate bin regardless of whether each character was correctly recognized or not. The general approach is to read all the information available and use the postcode as a redundancy check On the introduce of properties of mail the affirmation rate of these systems is unmistakably to a great degree penniless. These rate then changes with the rate of written by hand mail. [6].

IV. CHARACTER RECOGNITION APPROACHES

There are distinctive methodologies utilized for the plan of OCR frameworks is talked about beneath:

A. Matrix Matching :-

The technique through which each character can changes over into a case inside a structure, and after that differentiations the case and a document of perceived characters is known as lattice coordinating. The acknowledgment of this stage is most grounded on monotype and predictable single segment pages.

B. Fuzzy Logic :-

The traditional evaluations like yes/no, veritable/false, dull/white et cetera into which the widely appealing characteristics are portrayed is called fluffy rationale. In this approach an undertaking is made to perspective a more human-like strategy for sensible reasoning in the programming of PCs. Right when answers don't have a specific zero or one characteristics and there are ambiguity included then fluffy basis have been used.

C. Feature Extraction:-

For the meaning of each character by the nearness or nonappearance of key components, including tallness, width, thickness, circles, lines, stems and other character qualities highlight extraction is utilized. Feature extraction is a set up approach for OCR of magazines, laser print and awesome pictures.

D. Structural Analysis:-

Auxiliary investigation approach gives an approach to dissect the character by looking at their sub highlight states of the picture, sub-vertical likewise, level histograms. Character repair constrain is astounding for low quality substance and newsprints.

E. Neural Networks :-

This technique mirror the way the human neural framework works; it tests the pixels in each picture and matches them to a known record of character pixel plans. The capacity to perceive the characters all through deliberation is awesome for settled records and harmed content. For these sorts of issues, such as preparing securities exchange information or discovering patterns in graphical examples neural system end up plainly perfect. In all these approaches Neural Networks are efficient than others [7].

V. LITERATURE SURVEY

Cui Xiaoxiao,et.al [8] Another strategy for computerized number acknowledgment for mechanical advanced meters in substation is clarified in this paper, which acknowledge straight SVM endless supply of Oriented Gradients (HOG) highlights. The grids of Histograms of Oriented Gradient descriptors considerably exceed for feature detection of the gray image which has more information than binary image. A unique approach with division of district of character picture is proposed in this paper, which is imperative to the further HOG highlight discovery. SVM classifier is utilized as a part of the recognition parade and result demonstrates that HOG has better execution on digit

arrangement in the substation examination robot device acknowledgment.

Monika Lusa,et.al [9] Automatic movement sign acknowledgment by PCs is ending up generally alluring in all actuality. Strategies for programmed activity sign location are utilized as a part of the car business, in models of car autos, as well as in mass-created models and cell phones. In this paper, a two-stage calculation in light of key focuses includes finders to identify and perceive street signs will be introduced. The principal phase of the calculation finds objects introduce in the scene and decides their shape in view of geometric properties.In order to reduce the number of found objects first phase includes two additional steps to remove too large and too small objects, and to merge objects of the same shape found in a similar area of the scene into one object. The second stage includes appropriate correlation of recognized question with street signs from the learning database in view of identified keypoints.

Hojin Cho [10] This paper gives a novel scene content location calculation, Canny Text Detector, which takes advantage of the contrast between picture edge and content for viable content limitation with enhanced review rate. As closely associated edge pixels construct the structural information of an object, we observe that consistent characters compose a meaningful word/sentence which can shared a parallel properties such as spatial location, size, color, and stroke width in spite of language. In any case, basic scene content location approaches have not completely used such comparability, but rather for the most part depend on the characters characterized with high certainty, can lead to a low review rate. With a specific end goal to rapidly and heartily confine an assortment of writings we can misuse a correlation. By the utilization of unique Canny edge indicator, our calculation makes utilization of twofold limit and hysteresis following to recognize writings of low certainty. As indicated by exploratory outcomes on open datasets we can show that our calculation beats the state-of the-art scene content identification techniques in wording of detection rate.

Karishma Tyagi**,** et.al [11] The application of OCR has become important in day-to-day life. OCR has been broadly utilized as a part of managing an account, legitimate, social insurance, back and so forth. The most intriguing and testing research regions in field of picture handling and example acknowledgment in the current years is penmanship acknowledgment. This paper gives different thoughts for changing over literary substance from a paper record into machine lucid frame. The PC really perceives the characters in the report amid a changing method called OCR. A few procedures like OCR utilizing connection strategy and OCR utilizing neural systems has been talked about in this paper.

Shalin A. Chopra1, et.al [12] presently days, keyboarding remains the most well-known method for contributing information into PCs. This is presumably the most tedious and work serious operation. OCR is the machine delineation of human perusing and has turned into a serious research for over three decades. The procedure through which filtered pictures where pictures can be written by hand, typewritten or printed content can be depicted as mechanical or electronic trade is known as OCR. This is a system for digitizing printed messages with the objective that they can be therefore looked and can be used as a piece of machine strategies. It is a procedure of changing over the pictures into machine-encoded content that can be utilized as a part of machine interpretation, content to-discourse and content mining. This paper gives a simple, efficient, and less exorbitant definition to build OCR for perusing any record that has settle text dimension and style or manually written style. In this paper OCR utilizes database for the accomplishment of conviction and less computational cost to perceive English characters which makes this OCR extremely easy to oversee.

Ntirogiannis et al. [13] has considered that the report picture binarization is of extraordinary significance in the record picture investigation and acknowledgment pipeline since it influences additionally phases of the acknowledgment procedure. The assessment of a binarization strategy helps in concentrate its algorithmic conduct, and also confirming its adequacy, by giving subjective and quantitative sign of its execution. This paper tends to a pixel-based binarization assessment philosophy for recorded written by hand/machine-printed archive pictures. In the proposed assessment conspire, the review and accuracy assessment measures are appropriately changed utilizing a weighting plan that decreases any potential assessment predisposition.

Badawy, W. et al. [14] has examined the Automatic license plate recognition (ALPR) is the extraction of vehicle tag data from a picture or a grouping of pictures. The extricated data can be utilized with or without a database in numerous applications, for example, electronic installment frameworks (toll installment, stopping expense installment), and interstate and blood vessel observing frameworks for activity observation. The ALPR utilizes a shading, high contrast, or infrared camera to take pictures.

Yang et al. [15] has proposed a novel versatile binarization strategy in view of wavelet channel is proposed in this paper, which indicates practically identical execution to other comparative strategies and procedures speedier, with the

goal that it is more reasonable for constant handling and relevant for cell phones. The proposed strategy is assessed on complex scene pictures of ICDAR 2005 Robust Reading Competition, and test comes about give a help to our work.

Chattopadhyay et al. [16] has taken a shot at a low multifaceted nature video OCR framework has been exhibited, that can be conveyed on an inserted stage. The curiosity of the proposed strategy is the utilization of low preparing cycle and memory but then getting an acknowledgment precision of 84.23% which is higher than the typical video OCR acknowledgment exactness. Additionally, the proposed strategy can perceive around 180 characters by and large per outline in 26.34 milliseconds.

Malakar et al.[17] has depicted that extraction of content lines from archive pictures is one of the critical strides during the time spent an OCR framework. In the event of manually written report pictures, nearness of skewed, touching or covering content line(s) makes this procedure a genuine test to the scientist. The present system removes 87.09% and 89.35% content lines effectively from the said databases individually.

VI. CONCLUSION

The paper presents a brief survey of the applications in various fields along with experimentation into few selected fields. The paper will go about as a decent writing review for scientists beginning to work in the field of OCR. In this exploration, we have depicted a model framework to peruse printed content and hand held items for helping the visually impaired individuals. To separate content districts from complex foundations, we have proposed a novel content restriction calculation in view of models of stroke introduction and edge dispersions. The comparing highlight maps appraise the worldwide auxiliary component of content at each pixel. Piece designs venture the proposed highlight maps of a picture fix into an element vector.

TABLE I. SUMMARIZATION OF FEATURE SELECTION APPROACH [18]

Author. (Years)	Feature Selection	
	Approach	*Algorithm*
Nasien D. et al. (2010) [88]	Meta heuristic	Genetic Algorithm (GA) and Ant Colony Optimization (ACO)
Reza A. et al. (2010) [89]	Metaheuristic	Hybrid Genetic Algorithm (GA) + Simulated Annealing (SA)
A. Marcano-Cedeno et al. (2010) [90]	Heuristic	Sequential Forward Selection
Nasien D. et al. (2011) [91]	Heuristic	Randomized and Enumeration based Algorithms
Abandah G. et al. (2011) [92]	Heuristic	Scatter criterion Symmetric uncertainty Fast correlation-based filter (FCBF) Minimal-redundancy-maximal-relevance (mRMR) Non-dominated sorting genetic algorithm (NSGA)
Das N. et al. (2012) [93]	Metaheuristic	Genetic Algorithm based Region Sampling
Roy A. et al. (2012) [94]	Metaheuristic	Artificial Bee Colony (ABC)
Li L. et al. (2012) [64]	Metaheuristic	Nearest Neighbor (NN)
Nagasundara K.B. et al. (2012) [95]	Metaheuristic	Multi cluster feature selection (MCFS)
Stefano et al. (2014) [96]	Meta heuristic	Genetic Algorithm (GA)
Roy A. et al. (2014) [97]	Metaheuristic	Axiomatic Fuzzy Set (AFS)
Gharch Mohammadi F. et al. (2014) [98]	Metaheuristic	Artificial Bee Colony (ABC)

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