

Character Recognition Using Neural Networks

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Abstract- Various advances have been made in creating clever frameworks, some roused by natural systems. The paper plates about then helpfulness of neural systems, all the more particularly the inspirations driving the improvement of neural systems, the diagram system architectures and learning procedures.

Neural systems are for the most part used to take care of test acknowledgment issues. One of these is character acknowledgment. The Artificial Neural Networks is prepared utilizing the Back Propagation calculation. In the proposed Character acknowledgment framework, each wrote English letter is spoken to by twofold numbers that are utilized as data to a basic component extraction framework whose yield, notwithstanding the info, are bolstered to an Artificial Neural Networks. A short time later, the Feed Forward Algorithm gives understanding into the enter workings of a neural system took after by the Back Propagation Algorithm which bargains Training, Error figuring, and Modifying Weights.

We finish up with character acknowledgment, an effective layered neural system application.

Keywords- Artificial Neural Networks, Character Recognition, Pre processors

I. INTRODUCTION

Neural systems are a capable model to manage numerous example acknowledgment issues. One of them is Character Recognition, for the most part alluded to as CR, is the procedure of scanning so as to change over the picture acquired a content or a record into machine editable configuration.

Acknowledgment of printed characters is itself a testing issue following there is a variety of the same character because of progress off on its or presentation of diverse sorts of clamors. Contrast in textual style and sizes makes acknowledgment undertaking troublesome. In the event that pre-handling, division, highlight extraction and acknowledgment are not strong. Consequently, a great character acknowledgment methodology must dispose of the clamor in the wake of perusing paired picture information, smooth the picture for better acknowledgment, concentrate highlights proficiently, prepare the framework and characterize designs. Many people today are attempting to

compose their own CR (Character Recognition) System or to enhance the nature of a current one.

In numerous applications a complete administered methodology is expected. Neural systems classifiers (NN) have been utilized widely as a part of character acknowledgment [2, 3, 5, and 7]. The utilization of counterfeit neural systems administration CR applications and enhance nature of acknowledgment while accomplishing great execution. There are two essential techniques utilized for CR: Matrix coordinating and highlight extraction. . Of the two approaches to perceive characters, lattice coordinating is the more straightforward and more basic. Network Matching looks at what the CR scanner sees as a character with a library of character lattices or layouts. At the point when a picture matches one of these recommended networks of dabs inside of a given level of similitude, the PC names that picture as the comparing ASCII character. The PC searches for general components, for example, open regions, shut shapes, inclining lines, line crossing points, and so on. This system is substantially more adaptable than grid coordinating. Topological Feature Analysis, this system differs by how much "PC knowledge" is connected by the maker.

In this paper we research the characters acknowledgment utilizing diverse number of classes and distinctive grouping procedures. Segment 2 shows the essentials of neuronal systems. Area 3 displays a few techniques to regulated learning and exhibited three principle classes of learning methodology. The application is portrayed in Section 4. A few conclusions are attracted Section 5.

II. STRUCTURE OF CHARACTER RECOGNITION SYSTEM

The primary practical modules in our OCR frameworks are: picture procurement module, pre-handling module, and highlight extraction module and example era. The principle assignment of picture securing module is to get content picture from a scanner or a pre-put away picture record. It is called "picture" in light of the fact that scanner intrinsically examines pixel of the content and not characters when examples are checked and digitized, the information may convey some undesirable commotion. For instance, a scanner with low determination may create touching line sections and spread pictures. A pre-processor [3,4] is utilized

to smooth the digitized characters. Besides, the framework must have the capacity to handle touching characters, corresponding dispersing, variable line dividing and change of textual style in the examined content, notwithstanding the issues of multi-text styles.

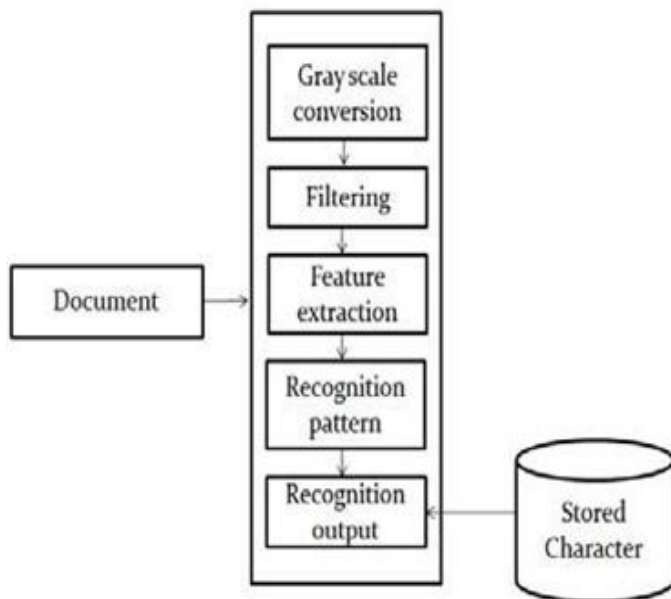


Figure 1. System Block Diagram

2.1 Grayscale

Grayscale images have many shades of gray. Grayscale images is result of measuring intensity of each pixel. For achieving accuracy input document should be grayscaled. To convert a colour from a colourspace based on an RGB colour model to a grayscale representation following function is used

$$Y = 0.2126R + 0.7152G + 0.0722B$$

Figure 2 and 3 shows an image before and after grayscaling respectively.

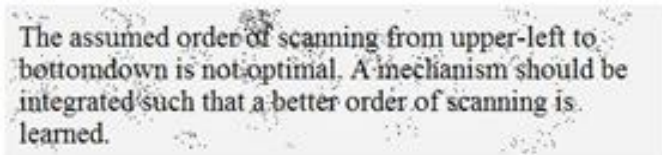


Figure 2 Before Grayscaling

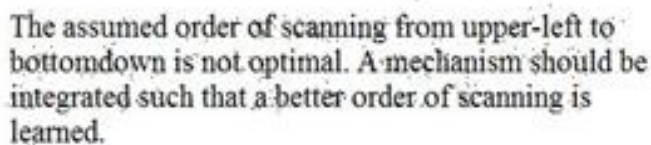


Figure 3 After Grayscaling

2.2 Feature Extraction

Feature extraction [4] is the process of getting information about an object or a group of object in order to facilitate classification. This is an important part in our system.

The input document may contain several lines of text that needs to be categorized into single character for recognition. For this purpose the following steps are to be applied:

1. The document is to be scanned for the initial darker pixel to be named as top of the row.
2. Now for bottom the next blank line is detected. The area between this is row of characters in image.

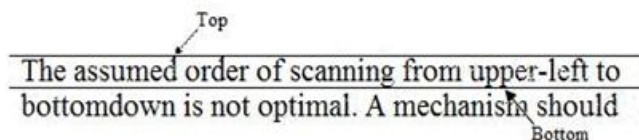


Figure 4 Row Detection

3. Now each character is to be identified for the row obtained earlier. This is done by scanning the row vertically from top to bottom, the first darker pixel detected is the leftmost (left) pixel of character.
4. Now if all pixel are found to be blank then this is right of character.

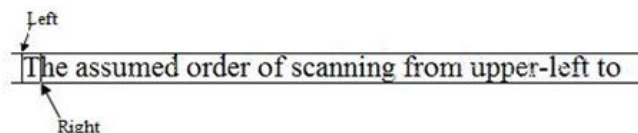


Figure 5 Boundary

5. The character from the scanned image is normalised from any pixel size to 15 X 15 pixel. It cropped the image by using top, left, right, and bottom boundaries as in figure

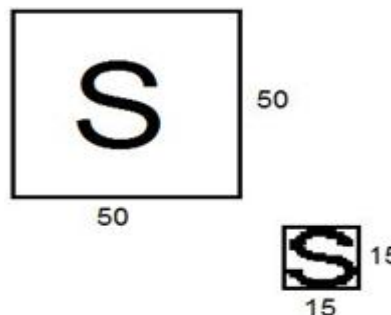


Figure 6 Scaling

- Now the cropped image of 15 X 15 can be binarized into array of 15 X 15, where black representing 1 and white representing 0 as shown in figure 7.

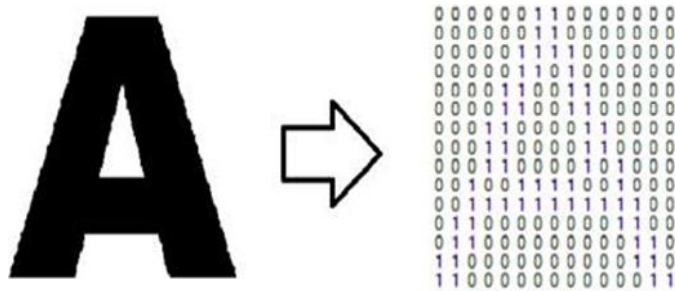


Figure 7 Binarization of character

2.3 Recognition of Pattern

Pattern based recognition require matching of generated binary format with the existing template for this purpose the binary has been divided into 5 tracks and each track subdivided into 8 sectors. A corresponding track-sector matrix is to be generated, identifying number of pixels in each region.

This procedure is shown in figure 8.

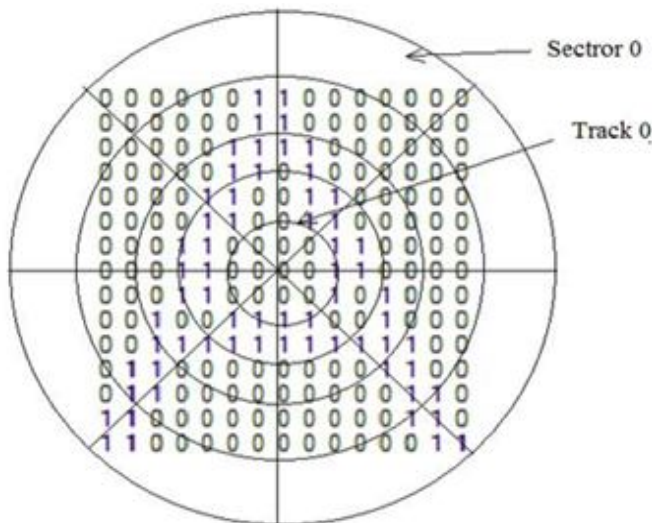


Figure 8 Division into tracks and sectors

This can be done using following procedure

- Identify center of matrix
- Calculate radius say rad by finding pixel with maximum distance from center using distance formulae.
Dist= $((2 - 1) + (2 - 1))$
- Perform $(rad \div 5)$ to identify size of each imaginary track.
- Identify imaginary sectors.
- Generate track- sector matrix by calculating number of 1's in each intersection of sector and track.

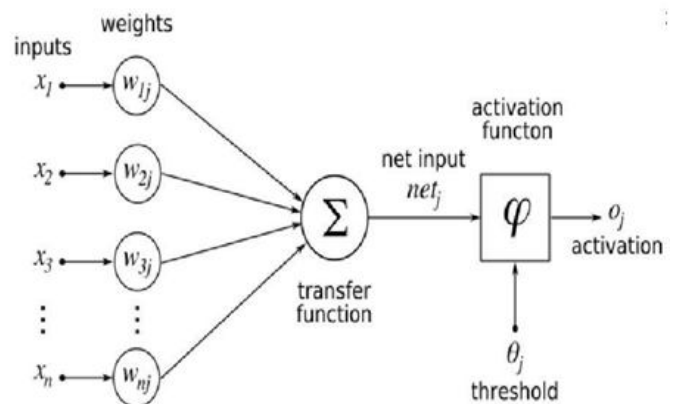
2.4 Recognition of Output

The track-sector matrix generated above is then matched with existing template. The existing template consist of each track-sector intersection value, each track value and each sector value. If all these parameters are found to match with the template values then the resultant is the character identified. The resultant matrix contain unique value for each font and thus makes it easy to identify each font separately.

III. NEURAL NETWORKS

A neural system is an intense information demonstrating too that can catch and speak to complex data/yield connections. The inspiration for the advancement of neural system innovation originated from the craving to add to a fake framework that could perform "wise" undertakings like those performed by the human mind. Neural systems [2] look like the human mind in the accompanying two ways:

- An Artificial neural system secures information through learning.
- An simulated neural system's information is put away inside between neuron association qualities known as synaptic weights.



All neural networks have in common the following four attributes:

- a set of processing units;
- a set of connections;
- a computing procedure;
- a training procedure.

IV. RESEARCH RESULTS

The acknowledgment rate for character pictures of same textual style utilized of up scaling is right around 100%. However, for down scaling the acknowledgment rate

decreases. Calculation was tasted for written by hand characters where two perception influences the acknowledgment rate.

1. People tend to utilize distinctive text styles than the calculation has been prepared on.
2. Characters may have been composed in terrible penmanship.

V. CONCLUSION

Artificial neural networks are commonly used to perform character recognition due to high noise tolerance. The systems have the ability to yield good results. The feature extraction step of character recognition is the most important. A poorly chosen set of features will yield poor classification rates by any artificial neural network. At current stage of development, the software does perform well either in terms of speed or accuracy but not better. A simple approach for recognition of Optical characters using artificial neural networks has been described.

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