

# **A Literature Survey on Handwritten Digit Recognition**

## **ABSTRACT**

Handwritten Digit Recognition System involves analysis and interpretation of handwritten digits by a system. Because of variation in shape and format of handwritten digits, it is tedious process for a system to interpret handwritten digits. Hand written digit Recognition has a wide area of study and research due to its enormous applications like automatic bank cheques processing, billing and automatic postal service.. The performance of the system is measured in terms of Sensitivity, Accuracy, Reliability and Specificity. In this paper, an extensive literature review handwritten digit recognition by describing the survey of some research articles have been involved for better analysis in order to enhance the system efficiency.

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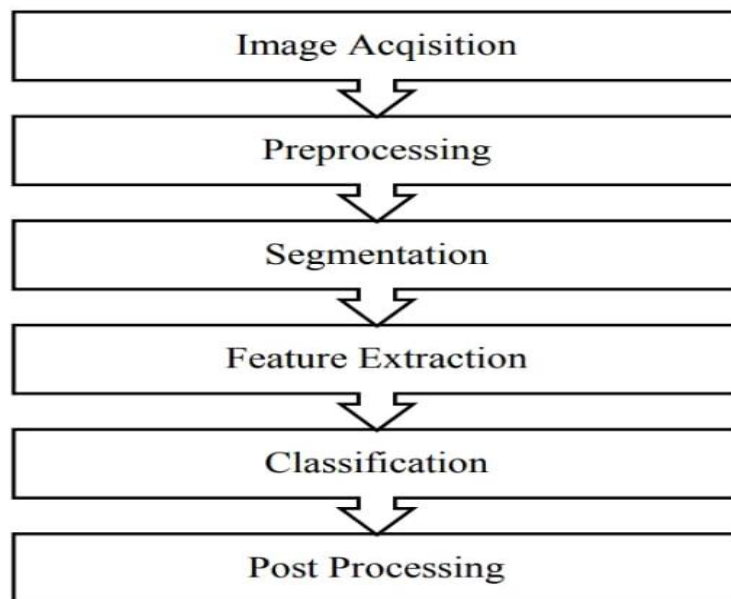
## **INTRODUCTION:**

Handwritten Digit Recognition is the capability of a computer to fetch the mortal handwritten integers from different sources like images, papers, touch and classify them into 10 predefined classes (0-9). Handwritten digits recognitions have become most important in today's digitized world due to their practical applications in various day to day activities. In recent years, different recognition systems have been proposed to be used in various fields where high classification efficiency is needed. Systems that are used to recognize digits help people to solve more complex problems that otherwise it would be time-consuming one. An example is the use of automatic processing systems which are used in banks to process bank cheques. Without automated bank cheque processing systems, the bank would be required to employ many employees who may not be as efficient as the computerized processing system. Digit recognition is the process of detecting and recognizing Handwritten digits from the input image and converts it into ASCII or other equivalent machine editable form. The technique by which a computer system can recognize digits and other symbols written by hand in natural handwriting is called handwriting recognition system.

## **WORKING PRINCIPLE:**

Writing styles differs in shape and orientation from person to person that makes handwriting digit recognition a challenging task. For the development of reliable

handwritten digit recognition, two steps are important. The first step is extraction of discriminating feature from handwritten images and the second method is the classification of new digit images. Handwritten recognition is divided into six phases namely which are image acquisition, pre-processing, segmentation, feature extraction, classification and post processing. The block diagram of the basic character recognition is shown in below fig.



## **LITERATURE REVIEW**

In the year of 2013 Yang Zong-chang, In this study, to the main problem of establishing structure for the Artificial Neural Networks (ANN), from a microscopical perspective, two ideas called the fractal measurement of association multifaceted nature (FDCC) and the fractal measurement of the desire many-sided quality (FDEC) are presented. At that point a paradigm reference for setting up ANN structure taking into account the two proposed ideas is displayed that, the FDCC won't not be lower than its (FDEC), and when FDCC is equivalent or surmised to FDEC, the ANN structure may be an ideal one. The proposed measure is inspected with great results.

In the year of 2013 Selvi, P.P.; Meyyappan, T, In the Study of the authors propose a method to recognize Arabic numerals using back propagation neural system. Arabic digit are the ten digits that were descended from the Indian numeral system. The recognition phase recognizes the numerals precisely. The prospect technique is implemented with Matlab coding. Model andwritten descriptions are tested with the proposed method and the results are plotted.

In the year of 2013 Sahu, N.; Raman, N.K., In the Study of Character recognition systems for various languages and script has gain importance in recent decades and is the area of deep interest for a lot of researchers. Their growth is strongly integrated with Neural Networks.

In the year of 2012 Nguang Sing Ping; Yusoff, M.A., Investigated on describes the application of 13-point feature of skeleton for an image-to-character credit. The representation can be a scanned handwritten character or drawn character from any graphic designing tool like Windows Paint clash. The representation is processed through conventional and 13-point feature of skeleton methods to extract the raw data.

In the year of 2012 Pradeep, J.; Srinivasan, E.; Himavathi, S., In the Study of, an off-line handwritten English character recognition system using hybrid feature extraction technique and neural network classifiers are proposed. Neural Network (NN) topologies, namely, rear spread neural network and radial basis function network are built to classify the font. The k-nearest neighbour network is also built for evaluation. The nosh onward NN topology exhibits the highest recognition accuracy and is identified to be the most suitable classifier.

In the year of 2011 Budiwati, S.D.; Haryatno, J.; Dharma, E.M., Investigated on Japanese language has complex writing systems, Kanji and Kana (Katakana and Hiragana). Each one has different style of writing. One simple way to differentiate is Kanji have more strokes than Kana. Meanwhile, it needs a lot of effort to remember characters of Katakana and Hiragana, thus it will be very difficult to distinguish handwritten Katakana and Hiragana, since there are a lot of similar characters. This is the reason why we need pattern recognition.

## **CONCLUSION:**

The purpose of this review was to view the trends in composition studies within the past years and see how commentary on handwritten digit recognition has changed and is still changing. It is clear from the research reviewed that digit recognition is very immersed and widely practiced throughout several areas. Along with this, it is also clear that the field of this research engage students to continue to be studied and analyzed in order to increase the accuracy and improve the efficiency of the recognition system.