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Combined Effect of Neutroscopic set and Fuzzy logic for Enhancing old manuscripts

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Abstract- *The handwritten documents in the collection preserve the process of human thought and creativity from mind to pen to paper.Many documents that are produced today, such as personal letters, pictures, contracts, newspapers, and medical records, would be considered valuable historical documents in the future for some people. However most of these will be lost in the future since most of the documents are made from fallible materials that often fade, rip or degrade over time or even stored in digital formats then lost track over time.So Preserving old manuscripts against degradation is one of the Library's primary jobs. For protecting artifacts a combined approach of neutroscopic and fuzzy type is used for enhancing the degraded document. Neutroscopic set is used for separating the foreground and background and then fuzzy set is applied to enhance the document to make them visible . hence it is indicated that combined affect of techniques help to produce better result for enhancing image of documents.*

Key words— Enhancement, oldmanuscripts, degraded images , Fuzzy logic, Neutroscopic Set.

1.INTRODUCTION

The Old manuscripts are the most important source for our knowledge as it contain information about a person, place, or event. These documents connect past and present in order to find right path toward future.Many documents that are produced today will be used as historical document in future by some people . However most of these will be lost in the future since most of the documents are made from fallible materials that often fade, rip or degrade over time or even stored in digital formats then lost track over time. Preserving historical documents are very important. It holds very great value not only in terms of fortune but also significantly to the present way the world is at present. By ensuring that these documents are still physically present, one may continue to use them as a reference in making further discoveries about the world, and most importantly, in creating necessary actions to ensure peace, equality and freedom all over the world. The main purpose of preserving documents is so people can study them. For preserving we use combined effect of neutroscopic and fuzzy type for enhancing and to make them visible .the novel approach of neutrocopic set is applied for image segmenting.In neutroscopic the image is first converted into NS domain which is described by using three membership function: : True (T), Indeterminacy(I), False (F)[6]. The neutroscopic set is defined and used to evaluate the indeterminacy. After this the foreground and background is separated and then image is again converted from NS domain into normal image . then fuzzy type is applied on segmented image to enhance it.Fuzzy set enables one to work in uncertain and ambiguous situations and solve problems with incomplete information. Fuzzy logic, unlike probability, handles imperfection in the informational content of the event.

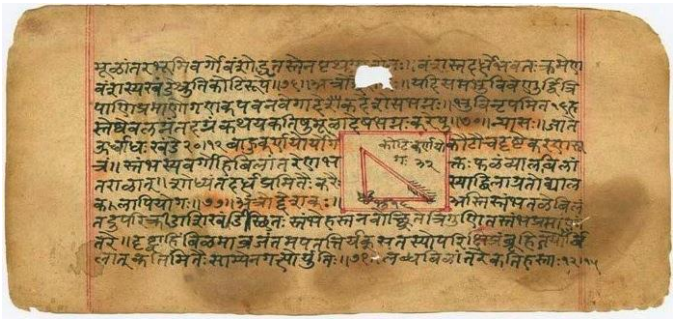

Fig -1: Degraded historical document

2.LITERATURE SURVEY

In 2009 Zhixin Shi[13], Srirangaraj Setlur and Venu Govindaraju proposed the methods for enhancing digital images of palm leaf and other historical manuscripts. They approximate the background of a gray-scale image using piece-wise linear and nonlinear models. Normalization algorithms are used on the color channels of the palm leaf image to obtain an enhanced gray-scale image. A technique to separate lines of text from the enhanced image using an adaptive local connectivity map has also been described.

In 2010 Sitti Rachmawati Yahya[12] proposed an enhancement method for enhancing degrade images. The various techniques for image enhancement on old manuscripts were classified into three types of methods which are (a) image enhancement using binarization/ thresholding method, (b) image enhancement using a hybrid of binarization/thresholding and other methods, and (c) image enhancement using non-threshold based methods. Finally we found that the second method is becoming more popular and has a great potential for improvement in future.

In 2011 N.Venkata Rao, A.V.Srinivasa Rao ,S. Balaji and L. Pratap Reddy[10] proposed Modified Iterative Global thresholding method in the present work. The document image under test is attempted to binarize with the help of clustering apparoach while estimating most likely background information using iterative algorithm. In each iteration the average intensity of the document image is adopted as midpoint between the clusters. In the next step the remaining pixels are equalised so as to compand the histogram. The number of iterations depends on the sensitivity of successive thresholds. This algorithm is found to be effective on historical document images as well as camera captured stone carvings.

In 2011 Laurence Likformann –Sulem[6] used enhancement methods. This paper propose a novel method for document enhancement which combine two powerful noise reduction approaches. First step is based on total variation. It flattens background grey – levels and produce an intermediate image where background noise is reduced. The second step is applied to the cleaner image and consist of a filter based on Non – linear means.

In 2012 J. Almaz´an, D. Fern´andez, A. Forn´es, J. Llad´os[5] propose an approach for word spotting in handwritten document images. This method combines an efficient indexation method for spotting interesting regions and a precise discriminative model of appearance for ranking this regions and retrieving similar images to the query.

In 2012 Marte A. Ramírez-Ortegón[8] , Lilia L. Ramírez-Ramírez , Ines Ben Messaoud , Volker Märgner , Erik Cuevas , Raúl Rojas used local pixels methods to explain the observed a symmetrical gray-intensity histograms of the fore- ground and background. In the context of historical handwritten documents, they have experimentally proved that the gray-intensity distributions of both fore- and background are skewed due to pixels around the contours, named frontier pixels.

In 2013 Brij Mohan Singh[2] , Rahul Sharma , Debashis Ghosh , Ankush Mittal presents a new adaptive binarization method for the degraded document images.in this paper they used four steps: contrast analysis, which calculates the local contrast threshold; contrast stretching, thresholding by computing global threshold; and noise removal to improve the quality of binarized image.This method is tested on the four types of datasets including Document Image Binarization Contest (DIBCO) series datasets (DIBCO 2009, H-DIBCO 2010, and DIBCO 2011), which include a variety of degraded document images.

In 2013 Insaf Setitra address the problem of manuscripts restoration, a very challenging problem in the case of old manuscripts and used exemplar-based technique to find the most similar pixels to the degraded region and then paint the missing texts by following continuity of contours.

In 2014 Abderrahmane Kefali[1], Toufik Sari, and Halima Bahi used the various techniques for enhancing damaged images. The technique used is Foreground-Background Separation (FBS). The idea is to train the ANN on a set of pairs of original images and their respective ideal black and white ones relying on global and local information. The purpose of using ANN, and especially Multilayer Perceptrons, for image binarization is to fill the lack of employing the techniques of soft computing and machine learning in such problem, and to take advantages of the generalization abilities of the MLP.

In 2014 Haneen Khader, Abeer AI-Marridi, Hena Alpona, Suchithra Kunhoth, Abdulaali Hassaine, and Somaya Al-maadeed make the use of a novel tool to assist the indexing of offline handwritten historical documents. Novel tool performing annotations in the scanned or digitized copies of historical handwritten documents containing English as well as Arabic scripts. Annotation tool completely eliminate the segmentation errors. The annotated text and the

corresponding word locations are then saved to an xml file which can later on be used for indexing.

In 2014 Insaf Setitra consider restoration of Algerian old manuscripts which present much degradation due to physical conditions and human handling. He used image preprocessing to enhance luminosity and threshold images and then used a K nearest neighbors' segmentation to separate spurious content from original one. And then eliminate this spurious content by a weighting method.

In 2015 Mrs.Preeti.Kale[7] used a hybrid binarizatin approach . This method is used for improving the quality for the old documents. A hybrid binarization approach is presented aiming at removal of background noise from the ancient and historical documents. Combination of global and local thresholding techniques are used for the same. . Hence it is indicated that this technique is pretty effective in removing background noise and improving the quality of degraded images.

In 2015 Neelu Maheshwari[9], Pankaj Singh Parihar, Anurag Maloo used the gamma variation method and histogram balancing techniques. This paper provides a review of various methods for digital enhancement of ancient documents that have gone through degradation process over time.

3. RESULT AND DISCUSSION

For Proposed work we collect the degraded old images . input can be any scanned document or camera grabbed images.after collecting database we applied the neutroscopic to separate foreground and background and the output of neutroscopic act input for fuzzy type-1and after fuzzy type we have enhancedimage. Following are the screenshots related to work:-

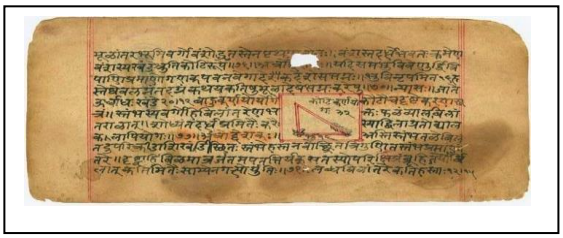

Fig.2- original document

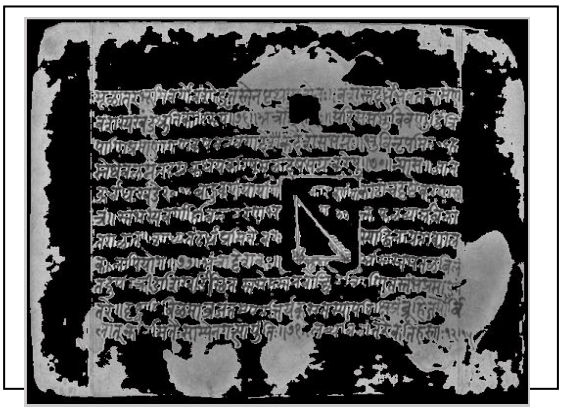

Fig.3- Neutroscopic Output

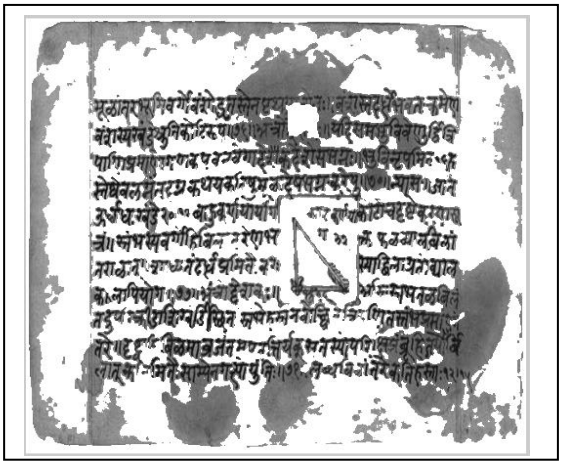

Fig.4- Enhanced document

4.CONCLUSION

In this work we attempt to address the problem of old manuscripts and other historical document that has been degraded due to various reason like poor paper quality and ink expand or background damage. In our solution we used the combination of neutroscopic set and fuzzy type 1 and hence it is indicated that combined techniques help to produce better result for enhancing image.

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