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EFFICIENT MODELLING TECHNIQUE FOR CLASSIFICATION AND TRANSLITERATION OF ANCIENT STONE INSCRIPTION

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ABSTRACT

The ancient stone inscriptions and epigraphy corroborate information from other sources; afford the dossier and habit of pharmaceutical remedies and also the hints of Ayurveda significance, which provides an insight into early Indian bureaucratic structure, legal codes, and myth practices. Hence here proposed a theme to analyze and translate the epigraphs of Bhrami, Grantha, Vattezhuthu and Devenagiri font into our 21st century Tamil fonts using segmentation technique integrated using Sobel edge detector, Otsu thresholding and Particle Swam Optimization (PSO) technique whereas the filtering techniques play a crucial role in enhancing the quality of an image. Probabilistic Neural Network (PNN) involves to identifying the noise as well as help to predict the suitable filter for the removal of a specific type of noise, along with the PNN for noise removal and accurate segmented image, there were mapping technique of ancient Grantha font to our 21st century image are wrought by Lab VIEW thus the recognized and translated output is been obtained.

Keywords: stone inscriptions, sobel, probabilistic neural network (PNN), Lab VIEW, recognition, segmentation, gradient.

1. INTRODUCTION

Tamil antique and other Indian antique are thought to be evolved from the Bhrami script. The inscription from the second century AD uses the letter from of Tamil Brahmi script. Most interestingly, they use the pull to suppress the inherent vowels so the Tamil letter thereafter evolved towards a more form and by the 5th or 6th Century AD had reached a form called the early Vatteluttu. In 7th century, the Pallava dynasties introduce a new script called Grantha script. By the 8th century vatteluthu continued to be used in the southern part of the Tamil speaking region until 11th century. This paper executes with the 7th century Grantha characters will be recognized and segmentation is followed by the Edge Detection using SOBEL detector then the gray scale image again undergoes to Otsu thresholding techniques for the back ground image elimination and then the image is given to the particle swarm optimization for segmented is means, after segmentation the received image is employed with the Probabilistic Neural Network to get accurate image without any noise then followed by the mapping technique of the Lab VIEW database with the ancient Grantha and 21st century Tamil letters and thus obtained the segmented and translated ancient Grantha inscription into our 21st century inscription. [2] Beibei chengu is combined with the sobel and PSO techniques the kernel values are analyzed and with the help of Otsu filtering techniques are used thus an Figure of noise is employed along with this method the fitness function not only includes the size and shape of each letter, only the similar shapes of the letter can only be identified the larger characteristics of the some images are not easy to identify. [5] Hima bindu *et al*, adopted the Otsu method for thresholding, and her work endover the accuracy of Otsu thresholding so to eliminate the background pixel from the fore ground we adopted the Otsu thresholding. [7] Mallikarjunaswamy adopted the technique of graph pyramid approach to eliminate the back ground pixel of

stone inscription [11] Mahalakshmi *et al*, presented the work of ancient stone inscription recognition the segmentation work were done by the PSO Particle Swarm Optimization. Her work confirm that the PSO segmentation technique is one the optimized technique for segmentation of ancient stone inscription so the proposed work uses the PSO segmentation technique for image segmentation [14] Sridevi *et al*, evolves with the Otsu thresholding, projection profile, Zernike moments, probabilistic neural network and it is trained with different samples of handwritten ancient characteristic and the result has been observed that it has highest classification accuracy of 80.52% is obtained only for handwritten character. Digitizing the Tamil script document work has been done where the input document may be rotated or skewed at an angle depending on how it was place on the scanner and the outcome of the skewed image thus the skewed image is nothing but the rotated output of a input documented image. Where the accuracy is reduced when the skew angle is less than 3 degree then the skew is operated by the modified projection profile method along with PSO. Thus in [14] only the Otsu classification with PNN is concentrated. Configuring the. [18] pinaki prathim achariya *et al*, implemented various edge detection technique. His work confirm that sobel edge detector is more efficient technique than other so in ordet to detect the edges of epigraphs we adopt the sobel edge detection for better accuracy [19] Rajkumar *et al* adopted the technique of SIFT for recognition and involved in the technique of bag-of-key points they achieved the accuracy of 84%.so to increase the accuracy of the recognition of antique epigraphs we adopted the Probabilistic neural network for better results, [22] Sowmiya *et al*, involved in making survey of different antique inscription. [29] Santham *et al*, implement the PNN for noise classification, this work confirm that PNN noise classifier provide the better performance than SVM classifier

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2. EDGE DETECTION BYSOBELOPERATOR

The local changes of intensity are so called as Edges in images. Edge detection is one of the segmentation processes were the Edges are segmented by various edge detection operators. Among the various operators, sobel edge operator is affirm to yield the better outcome than other operator. The seventh century grantha stone inscription is given as the input of sobel edge detector. The edge of the stone inscription image was detected by computing the gradient of Gx and Gy. The gradient vector of horizontal and vertical direction of each pixel in the stone inscription image was evaluated. Sobel edge operator committed to find out the various discontinues in the antique stone inscription. The masking manipulation of Gx, Gy disparately on the input image this results combat to find the absolute magnitude of the gradient this process let to acquire the outcome of sobel operator.
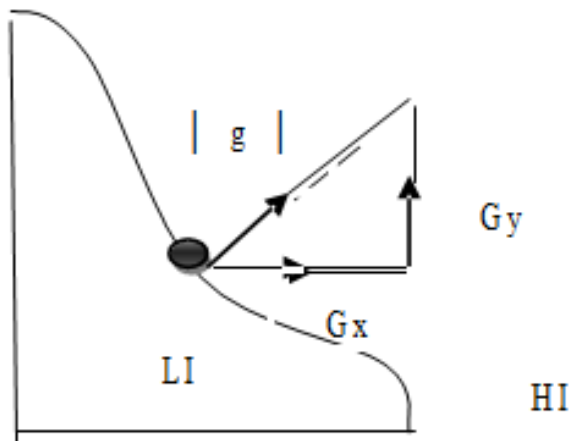

Figure-1. Operation of sobel operator.

After sobel edge detector the out come is supposed to given to the Otsu thresholding for separation of dual pixels

3. OTSU THRESHOLDING

Eliminating the back ground pixel of the antique stone inscription is more significant .whereas to eliminate that pixel adoption of Otsu thresholding is significant. Otsu thresholding implicate in the isolation of dual pixel. There is evidence that the Otsu thresholding perfume the better solution than other thresholding techniques.

FLOW GRAPH
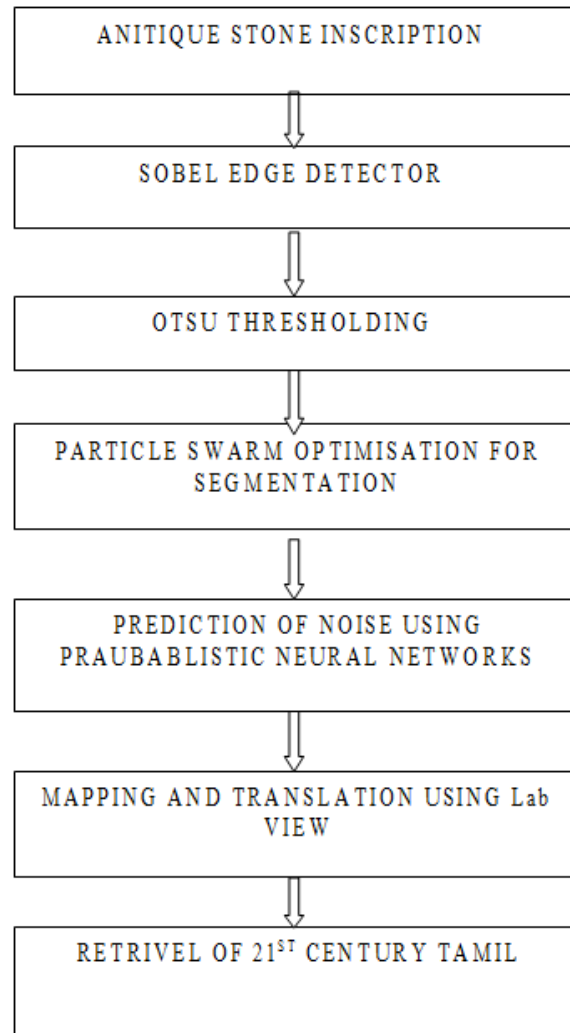
The parameter such as weight, mean, and variance were computed foe each pixels. Sum of the two variance and their associate weights provide the inter class variance. Otsu thresholding compute the iterative threshold values of all possible pixels falls in fore ground and back ground in the antique stone inscription it is significant to eliminate the background pixels in order to obtain the characters from it the Difference in the intensity level of dual pixels leads to the isolation of fore ground and back ground pixels. After the extraction of fore ground pixel as the character it is then given to the Particle Swarm Optimization to acquire the optimum outcomes of the image.

4. PARTICLE SWARM OPTIMISATION

The process of Segregation of digital image in to consequential form of image is said to be segmentation. However there are many segmentation techniques so far done but in the proposal we embroil the century identification of ancient stone inscription so we need optimum segmentation techniques. In proposal we benefit with optimum segmentation technique called particle swarm optimization technique. Particle swarm optimization turn out better gain over complex, multimodal optimization problem at high magnitude. It was first proposed by James Kennedy and Russel Eberhart in 1995. This behavior is similar to the behavior of bird in flocks. This algorithm utilizes number of particles that provide the swarm movement around the stone inscription provide the best solution. This PSO algorithm uses a set of parameter to control the curve shape of the stone inscription. The particles in the PSO keep moving on tracking the best position to attain the optimum image by evaluating the fitness score function's algorithm set the curve parameter in order to obtain the optimum letter in the stone inscription. The segmetation process were evaluating the curve position of the given stone inscription, iterating the best position of the particle. Computing the velocity of the particle. Iterating the best velocity of the particle.
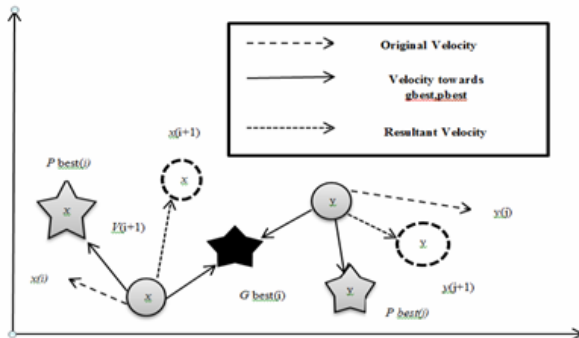

Figure-2. Working of PSO.

The best velocity and the best position of the particle is calculated to obtained the optimized character from the stone inscription.

5. PROBABLISTIC NEURAL NETWORK

PNN networks employ vital role in classification of noises as well as identify the filter to remove the noises which is involving in the image of stone inscriptions .Probabilistic neural network finding the statically features such as skewness and kurtosis. skewness is the measurement of symmetry and the kurtosis involves in measuring whether the data's in the images are peak or flat related to the normal distribution. The nature of the noises can be identified by approximating these two stastical character. Using PNN network approach non Gaussian white noise, gaussion white noise and salt and pepper

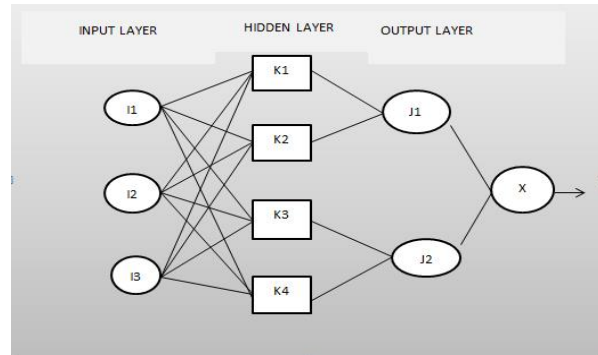noise can be efficiently identified. PNN gives the statically outcomes.

Figure-3. Hidden layers of PNN.

PNN are built with three hidden layers which performs the training of pulses. Rather than several passes only one of the each passes can be trained. The implementation of PNN is used to identify which type of noise presented in the antique stone inscription it is easy to implement the filter to remove the noise after identifying the type of noise in the image.

6. RESULTS AND SIMULATIONS

The below shown stone inscription is interestingly a name of musical instruments commonly used in the period of Pallavas and this grantha script belong to 7th century and is a specimen for our work. Considering this grantha letter as the input here proposed the simulation results.


Figure-4. Input image.

This output from the sobel edge detector is processed with image emphasizes on the selected edges and transitions. The sobel edge operator is based on convolving the image with a small, separable, integer valued filter horizontal and vector direction. The operator uses two 3×3 kernels which are convolved with the original image to calculate approximation of the derivatives-one for horizontal changes, and one for vertical. To simplify matters even more, the gray scale

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version of the original image is usually used supplely a new method employed returns a gray scale pixel at a specific location. Finally here used the gradient and set a gray scale pixel based on the gradient value, on a new image. And thus the output of the sobel edge detector is shown below.
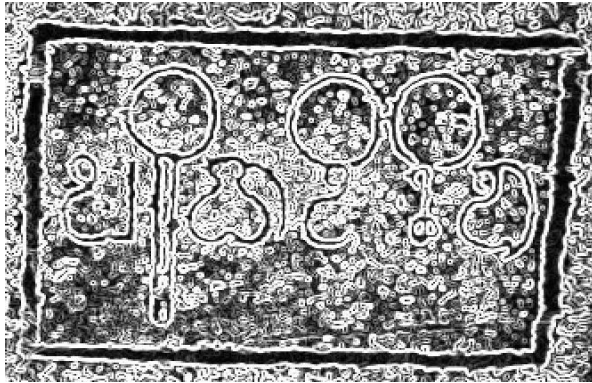
Figure-5. Stone inscription of Grantham letter after the execution of Sobel Edge Detector.

After the execution of sobel edge detector the same output is given as input to Otsu thresholding thus the separation of the background and foreground plane is obtained as the same. Otsu's thresholding assumes that the image contain two classes of pixels following bi-model histogram(foreground pixels and back ground pixels), it then calculates the optimum threshold separating the two classes so that their combined spread (intra-class variance) is minimal. In Otsu's method we exhaustively search for the threshold that minimizes the intra class variance (the variance within the class), defined as a weighted sum of variances of the two classes. Finally finding the threshold values to obtain the optimum output. Here shown the output of Otsu Technique simulated results along with the Sobel edge detector.
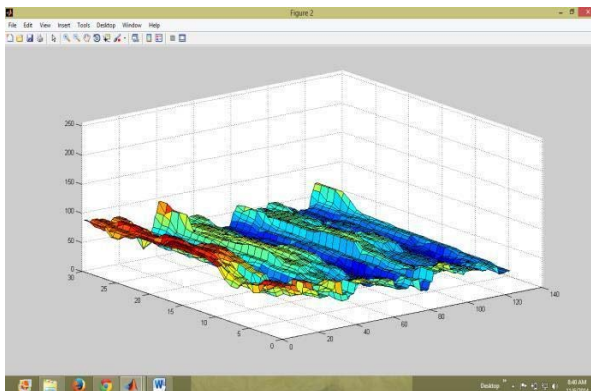
Figure-6. Thresholding graph of stone inscription.

Figure-7. Otsu Thresholding employed after Sobel Edge Detector.

Figure-8. PSO segmented output.

7. CONCLUSIONS

The proposed depicts design development and translation of ancient inscription for knowledge discovery of ancient Tamil epigraphs and stone inscription Where the image from the stone inscription is been captured and processed under segmentation Sobel edge detector combined with the PSO technique, The same image has undergone the process of Otsu thresholding for the separation of the pixel values in the foreground and background which can easily separate the image from the stone inscription and epigraphs .The PSO employed image is processed under the Probabilistic Neural Networks to identify the types of noise in the segmented image Thus the image has been segmented from the stone inscription for all the ancient epigraphs of different centuries. The century identification and segmentation of image from the stone inscription has been retrieved followed by the translation of respective century letters are to be proposed.

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