Recognition Number Plate Using ACA for Improved Segmentation and Classification

Dr.Savithri.V & Ms. P.vani
Asst. Professor & Research Scholar
Women's Chrisitian College & M.T.W.U., Kodaikanal

Abstract: In this paper a number plate recognition system which has been designed using the ant colony optimization technique. This system can be implemented in surveillance systems, detection of stolen vehicles and checking of vehicles at toll plazas, posts, barriers sand other entry points. This research is focusing, an ant colony based number plate extraction method is proposed. Ant colony optimization technique gives better results in edge detection while applying image segmentation. So Better accuracy can be achieved by using this concept in number plate recognition. The natural behavior of ant species that the ant deposit pheromone on the ground for foraging is the inspiration for the Ant colony optimization (ACO) algorithm. For the better image edge detection ACO is used in number plate recognition .This approach is able to establish a pheromone matrix that represents the information presented at each pixel position of the image and according to the movements of the number of ants which are dispatched to move on the image. The local variation of the images intensity values are driven by the movements of the ants. This system classification neural network in pattern recognition, artificial neural network (ANN), eventually this gives the number plate area extracted from the image with improved accuracy. Finally a character recognition model is used to give out the final vehicle license number.

Keywords: Number Plate recognition, number plate localization, Ant colony system, edge detection, character recognition, Number segmentation.

1. INTRODUCTION

The Image processing is the means a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing. Vehicle number plate recognition can be used for the task of vehicle identification. It can be used in many applications such as entrance admission, security, airport or harbor cargo control, traffic control and speed control. Our approach can be broadly divided into the following two methods: (i) extraction of the vehicle number plates from captured source images using ant colony optimization (ACO) and (ii) the recognition of character of the vehicular number plate. We have used image processing techniques such as edge detection using ACO, thresholding thinning, dilation and erosion for locating and isolating the number plate and characters. ACO is used in our system to extract the number plate edge information directly in contrast to it serving as a post processing algorithm to enhance the edge information that has already been extracted by conventional edge detection algorithms. This system used in neural network. Pattern recognition is the association of an observation to past experience or knowledge. Humans continuously perform perceptual pattern recognition.

Ant colony optimization (ACO) is a nature-inspired optimization algorithm that is motivated by the natural foraging behavior of ant pieces. Ants deposit pheromone on the ground to mark paths between a old source and their colony, which should be followed by other members of the colony. Over time, pheromone trails evaporate. The longer it takes for an ant to travel down the path and back again, the

more time the pheromones have to evaporate. Shorter –and thus, favorable – paths get marched over faster and receive greater compensation for pheromone evaporation. Pheromone densities remain high on shorter paths because pheromone is laid down faster. This positive feedback mechanism eventually leads the ants to follow the shorter paths. It is this natural phenomenon that inspired the development of the ACO met heuristic. Dario et al. Proposed the first ACO algorithm, ant system since then, extensions to. AS have been developed. One of the successful ones is ant colony system (ACS), ACO has been used to solve a wide variety of optimization problems. In this paper, an ACO-based method for image edge detection is proposed.[1][4

Vehicle license plate recognition (VLPR) is an image processing system whereby it is used to recognize the vehicles by identifying the license plate. It is basically used for traffic and security purposes. The cycle will start when the vehicle steps over the detector. It will activate a signal to the vehicle license plate system of the presence of the vehicle. The illumination will be activated and images of the front picture of the vehicle will be taken. The system will read the information pixels of the vehicle and run the recognition process and system will apply error back-propagation algorithm to analyze the vehicle image. Besides analyzing, the images will be enhanced, locating the vehicle plate position and extract the characters from the vehicle plate. The characters will be recognized by using neural network. Then system will try to match the recognized vehicle plate number with the car plate database. If access granted, the gantry will open and allowed the vehicle. Previously different neural models were designed to filter the noisy sign. So, many researches of car identification have been approached by car license plate extracting and recognition, some of the related work is as follows. Lotufoet. [2] Proposed automatic number-plate recognition using optical character recognition techniques. Johnson and Bird [3] proposed Knowledge –guided boundary following and template matching for automatic vehicle identification. Filmy proposed bidirectional associative memories (BAM) neural network for number plate reading. It's appropriate for small numbers of patterns. Nijhuis et. al proposed fuzzy logic and neural networks for car LPR. This method used fuzzy logic for segmentation and discrete-time cellular neural networks (DTCNN'S) for feature extraction.[7] proposed the method based on vertical edge using Hough transform (HT) for extracting the license plate. a genetic algorithm based segmentation to extract the plate region. Proposed an approach to form orientation map as recognition feature using a Gabor filter for recognizing characters.Yoshimura used Gabor jets projection to form a feature vector for recognizing low resolution gray-scale character. Hontani proposed a method for extracting characters without prior knowledge of their position and size in the image. Park a method to extract Korean license plate depending on the color of the plate. H.J. Kim proposed a method of extracting plate region based on color image segmentation. In this study, the proposed approach is based on extraction of plate

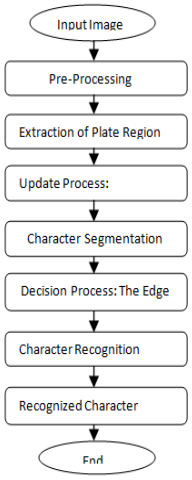
region, segmentation of plate characters and recognition of characters.[7]

Image processing is any form of signal processing for which the input is an image, such as a photograph or video frame; the output of image processing may be either an image or, a set of characteristics or parameters related to the image. Most image processing techniques involve treating the image as a two-dimensional signal and applying standard signal processing techniques to it. Edge is an important feature in an image and carries important information about the objects present in the image. Extraction of edges is known as edge detection. Edge detection aims to localize the boundaries of objects in an image and significantly reduces the amount of data to be processed. Ant colony optimization (ACO) is a nature-inspired optimization algorithm [1], [2], which is motivated by the natural phenomenon of ants. The ants deposit pheromone on the ground to denote the shortest path that is to be followed by other members in the colony. The ACO algorithm is first referred as Ant System, proposed by [3]. Many growths have been developed on ACO [4] like Max-Min ant system [5] and the Ant Colony System [6]. In this paper, ACO is used for image edge detection. The aim of ACO is to extract the edge information of the image, as it plays a crucial role to comprehend the image's content. The proposed approach exploits the movement of the number of ants on the image which is based on the local variation in the Intensity value of the image. This information is used to establish a pheromone matrix, which gives the edge information of the images.[5]

3. Methodology

The ACO-based image edge detection approach aims to utilize a number of ants to move on the image for constructing a pheromone matrix, each entry of which represents the edge information at each pixel location of the image. Furthermore, the movements of the ants are steered by the local variation of the image's intensity values. Preprocessing is required for the character segmentation to precede smoothly the steps involved in preprocessing are: Conversion to Grayscale, Binarization. Image linearization is performed using the information of intensity of characters. The proposed approach follows the following processes. The first ACO algorithm, ant system since then, extensions to. AS have been developed. One of the successful ones is ant colony system (ACS), ACO has been used to solve a wide variety of optimization problems. In this paper, an ACO-based method for image edge detection is proposed.[1] The process of partitioning a digital image into multiple regions or sets of pixels is called image segmentation. Edge is a boundary between two homogeneous regions. Edge detection refers to the process of identifying and locating sharp discontinuities in an image.[12]

Refer to the below mentioned flow chart the following methodology



2. Related work

This paper introduces the ant colony system (ACS), a distributed algorithm that is applied to the traveling salesman problem (TSP). In the ACS, a set of cooperating agents called ants cooperate to find good solutions to TSPs. Ants cooperate using an indirect form of communication mediated by a pheromone they deposit on the edges of the TSP graph while building solutions. We study the ACS by running experiments to understand its operation. The results show that the ACS outperforms other nature-inspired algorithms such as simulated annealing and evolutionary computation, and we conclude comparing ACS-3-opt, a version of the ACS augmented with a local search procedure, to some of the best performing algorithms for symmetric and asymmetric TSPs.[2]

Edge detection is a technique for marking sharp intensity changes, and is important in further analyzing image content. However, traditional edge detection approaches always result in broken pieces, possibly the loss of some important edges. This study presents an ant colony optimization based mechanism to compensate broken edges. The proposed procedure adopts four moving policies to reduce the computation load. Remainders of pheromone as compensable edges are then acquired after finite iterations. Experimental results indicate that the proposed edge detection improvement approach is efficient on compensating broken edges and more efficient than the traditional ACO approach in computation reduction. [5]

Ant Colony Optimization is a relatively new class of meta-heuristic search techniques for optimization problems. As it is a population-based technique that examines numerous solution options at each step of the algorithm, there are a variety of parallelization opportunities. In this paper, several parallel decomposition strategies are examined. These techniques are applied to a specific problem, namely the travelling salesman problem, with encouraging speedup and efficiency results. [9]

Digital image processing deals with manipulation of digital images through a digital computer. It is a subfield of signals and systems but focus particularly on images. DIP focuses on developing a computer system that is able to perform processing on an image. The input of that system is a digital image and the system process that image using efficient algorithms, and gives an image as an output. The most common example is Adobe Photoshop. It is one of the widely used

applications for processing digital images. [13]

REFERENCE

[1] M. Dorigo, M. Birattari, and T. Stutzle, "Ant colony optimization,"IEEE Computational Intelligence Magazine, vol. 1, pp. 28–39, Nov. 2006.

[2] M. Dorigo and L. M. Gambardella, "Ant colony system: A cooperative learning approach to the traveling salesman problem," IEEE Trans. on Evolutionary Computation, vol. 1, pp. 53–66, Apr.1997

[3] M. Dorigo, V. Maniezzo, and A. Colorni, "Ant system: Optimization by a colony of cooperating agents," IEEE Trans. on Systems, Man and Cybernetics, Part B, vol. 26, pp. 29–41, Feb. 1996.

[4] H. Nezamabadi-Pour, S. Saryazdi, and E. Rashedi, "Edge detection using ant algorithms," Soft Computing, vol. 10, pp. 623–628, May 2006.

[5] D.-S. Lu and C.-C. Chen, "Edge detection improvement by ant colony optimization," Pattern Recognition Letters, vol. 29, pp.416–425, Mar.2008.

[6] N. Otsu, "A threshold selection method from gray level histograms,"IEEE Trans. Syst., Man, Cybern, vol. 9, pp. 62–66, Jan. 1979.

[7] S.Kranthi, K.Pranathi, A.Srisaila, "Automatic Number Plate Recognition" International Journal of Advancements in Technology, vol 2, No 3, July 2011.

[8] Er. Aashima, and Dr. Parvinder Singh Sandhu, "A Review Of Computer Vision Using Ant Colony Optimization" International Journal of Research in Engineering and Technology (IJRET) Vol. 2, No. 6, 2013

[9] M. Randall and A. Lewis, "A parallel implementation of ant colony optimization," Journal of Parallel and Distributed Computing, vol. 62, pp. 1421–1432, Sep. 2002.

[10] Shalin A. Chopra, Amit A. Ghadge, Onkar A. Padwal, Karan S. Punjabi, Prof. Gandhali S. Gurjar, "Optical Character Recognition" International Journal of Advanced Research in Computer and Communication Engineering" Vol. 3, Issue 1,pp 4956-4958,January 2014

[11] Jing Tian, Weiyu Yu, and Shengli Xie "An Ant Colony Optimization Algorithm For Image Edge Detection"IEEE Congress on Evolutionary Computation (CEC),2008,pp 751-756,1-6 June,2008

[12] Rebika Rai, Ratika Pradhan and M.K Ghose, "Ant Based Computing Techniques For Edge Detection Of Images- A Brief Survey" International Journal of Emerging Technology and Advanced Engineering, Vol 3, Issue 4, April 2013

[13] R. C. Gonzalez and R. E. Woods, "Digital image processing", Harlow: Prentice Hall, 2007

[14] R. Maini and J. S. Sohal, "Performance evaluation of prewitt edge detector for noisy images," ICGST International Journal on Graphics, Vision and Image Processing, vol. 6(3), pp. 39–46, 2006