ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

Detection and Recognition of License Number Plate from Fast Moving Vehicle

RM.Pethaperumal [1], Dr. V. Palanisamy [2]

M.Phil. Student, Department of Computer Applications, Alagappa University, Karaikudi, Tamil Nadu, India [1]

Prof & Head, Department of Computer Applications, Alagappa University, Karaikudi, Tamil Nadu, India[2]

ABSTRACT: Abstract: Recently, the study on License number plate recognition is one of the most inspiring and ambitious task. Since, it is applied to Border crossing vehicle, toll-collection at highways, traffic management, parking management at variant locations etc. In addition to, when any vehicle is missing, the license plate assists to find the missing vehicles and also location of the accidents. The over-speed vehicle captured in the surveillance camera is not visible to human because of its low-resolution. Thus, the issue, license plate image blurring under fast motion is convoluted in linear with modeled angle and length should be studied. In this paper, we have proposed a sparse-representation model that detects the number plate in fast motion system. To do so, the sparse coefficients are calculated for recovered image when kernel angle corresponds to motion angle. Then, the kernel length is estimated with radon transform in Fourier domain. Atlast, plate number recognition process is then applied for blur removal. The plate number recognition process is done in three steps, namely, Character segmentation, Optical character recognition and template matching. Experimental analysis is carried out using MATLAB, programming language. A performance result is achieved in terms of accurate detection with minimized time duration.

KEYWORDS:License number, Plate recognition, Surveillance camera, Template matching, Image blurring and Fast motion.

I. INTRODUCTION

Presently, the technology developed in License Plate Recognition (LPR) [1] has been implemented in our daily life in extensive manner. The applications like toll-collection at highway, managing the traffic, parking management, border crossing vehicle etc, which are collectively known as 'Intelligent Transportation Systems (ITS)' [2]. The identification of the vehicle system operated by three processes, namely, license plate location, license plate segmentation and character recognition systems. The license plate location helps to find the location of the vehicles and extracts the number plate. Segmentation process helps to segment the number from the plate which eliminates the special symbols and characters. The character recognition systems analyse the image and then recognizes the patterns. Generally, the license plate is captured in low-resolution which will not effective to directly extract the images [3].

Motion blurring is one of the major reasons for poor image quality [4]. The captured objects are moving rapidly if the period of exposure time is adaptive. In that case, the image appears blurry in relative motion between object and the scene. In order to enhance the image quality, the camera resolution has to be increased. The role of the signal processing techniques is to retrieve the High Resolution (HR) image from obtained low-resolution images. Henceforth, resolution enhancement is one of the most inspiring research topics in the image processing systems. The maintenance cost for LR images is very low than the existing images. Since, license plate is the primitive proof of a vehicle. The image capturing on the location framework over the urban communities is a highly risky tasks. Presentation time of the image is one of the measuring parameter of the blur image. In the video shooting scenario, the presentation time is largely dependent on image enhancement [5].

Anyhow, under poor enlightenment circumstances, the camera needs to delay the presentation time to acquire a completely uncovered image, which effectively causes the movement blur. Furthermore, for high-determination

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

digital cameras, fast videography is likewise defenseless to the blur movement. Generally, a license plate location system has to solve problems: where a license plate located and how long it is. Usually, the candidate position of characters in the license plate is determined later. There are many challenges in license plate location in an open environment, such as various observation angles from cameras, differently sized license plates and poor image quality from uneven lighting conditions [6].

The rest of the paper is organized as follows: Section II describes the related work; Section III presents the proposed work; Section IV depicts experimental analysis of the proposed algorithm and atlast concludes in Section V.

II. Related Work

License plate recognition [7] is a significant study in the video analysis process. Several researches have been carried out to predict the vehicle type like scooter, truck, scooter or motorcycle. Generally, the sobel filter is used for predicting the edge of vehicles. The concept of contourlet transforms and support vector machine are also used for finding the vehicle model. The author in [8] studied this concept using 70 images. Their framework was sufficient in real-time video stream process. Similarly, the author in [9] studied in monocular images for vehicle recognition systems. The canny edge detection algorithm was also used for detecting the presence of the vehicle. The author in [10] framed Maximum Average Correlation Height (MACH) which intelligently recognizes the vehicle types irrespective of the scale and rotation of the vehicles. The author in [11] suggested an enhanced MACH which used filtering technique to find targeted objects. Similarly, log r-theta mapping is also used for creating in-plane rotation and the variance of the scale.

The author in [12] studied about the Optical Character Recognition (OCR) that transforms the scanned images into machine coded text. Feed-forward network is used for estimating the non-overlapping character of the image sets. The study was further extended to the Artificial Neural Networks (ANN) [13] which wisely applied to pattern recognition model. Similarly, the work done by [14] studied the feature extraction and binary pixels value to categorize the neural networks. Usually, the neural networks help to achieve better performance results even in difficult scenario. The extraction of features from the set of resources is a quite daunting task. Similar methods are present which use extra procedures during the training stage or after obtaining the results of neural network to handle difficult characters that belong to the set of ambiguous characters.

In multi-image based SR approaches used multiple low resolution images is assumed same size images while in LPR case [15], there are different sizes of LR images because a license plate is usually captured when the vehicle is moving. Hence, images captured at different time instances may provide different perspectives because they were captured at different angles in the field of view. This makes the registration task even more difficult. Another drawback of previous LPR deblurring researches is that the three parts of license plate recognition are not considered, and the plate is cropped manually.

III. Proposed Work

This section depicts the proposed algorithm used for predicting the license number plate. The proposed algorithm is explained via seven modules, namely,

a) *Blur Kernel Method:* Generally, the obtained image is processed into convolution matrix. This matrix further assists to find the blur, sharpness, embossing, detecting the edges etc. Once the above details of image are found, the convolution process of the kernel is also studied. The origin depicts the kernel position of the system.
b) *Gray Scale transformation*: The convoluted image is transformed into gray scale images. The three parameters namely, hue, saturation and brightness are measured from the gray scale images. The hue defines the apparent color shade and the saturation depicts the apparent color intensity. Based on the camera settings, the color of the images varies accordingly.
c) *Fourier Transform*: One of the image processing tools is the Fourier transform that decomposes the image into its relevant sine and cosine components. Generally, the image in spatial domain will not contain the frequencies of the image. The number of frequencies corresponds to the number of pixels in the spatial domain image, i.e. the image in the spatial and Fourier domains are of the same size.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

d) *Radon Transformation*: Radon transformation is the mathematical function that defines the function f over the plane in two-dimensional space. Initially, the function is converted into integral planes with Euclidean distances. It is also known as Penrose transform.

e) *Morphological operation*: It refers the non-linear operations that include the shapes or morphology of features. These are processed over binary images. In some cases, the gray scale images shall also use morphological operations.

f) *Monte Carlo method*: It is the class of computational algorithms that obtain numerical results from the random sampling inputs. It contains three classes, namely, optimization, numerical integration and generating the probabilities.

g) *Deconvolution method*: Deconvolution is an algorithm-based process used to reverse the effects of convolution on recorded data. The concept of deconvolution is widely used in the techniques of signal processing and image processing. Because these techniques are in turn widely used in many scientific and engineering disciplines, deconvolution finds many applications.

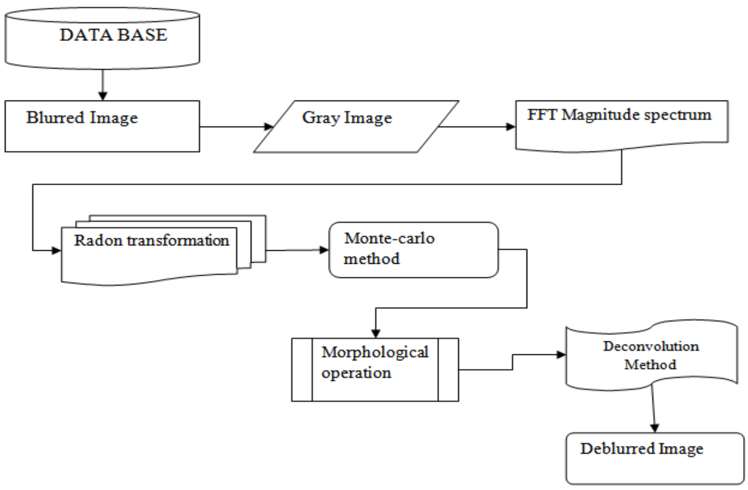

Fig.1. Proposed architecture

IV. EXPERIMENTAL RESULTS

This section depicts the experimental analysis of our proposed algorithm using MATLAB, programming language. Better interfaces are created which shows the efficacy of our proposed algorithm.

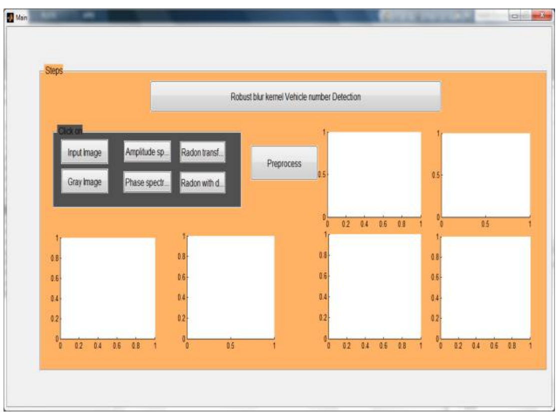

Fig.2. Start page of the vehicle number detection

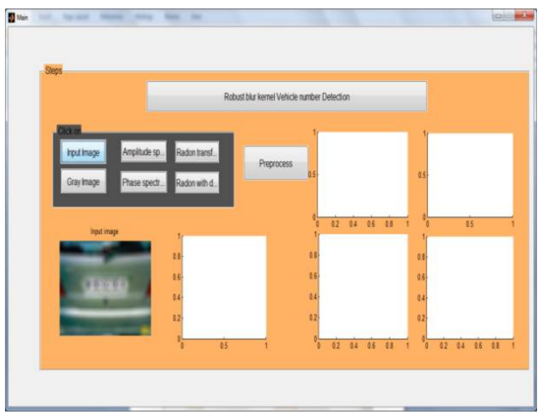

Fig.3. Blur image is taken as the input image.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

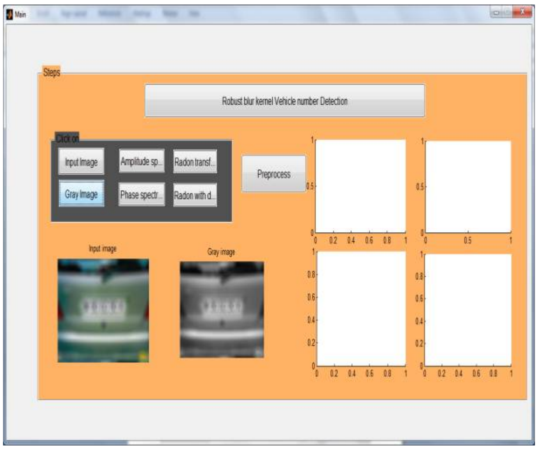

Fig.4. Blur image is converted into gray scale image

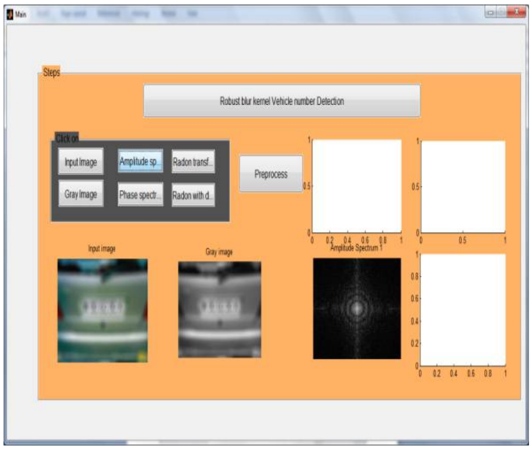

Fig.5. Performing the amplitude spectrum

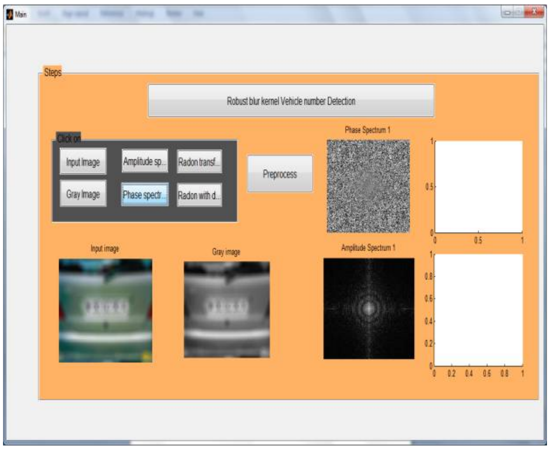

Fig.6. Performing the phase spectrum

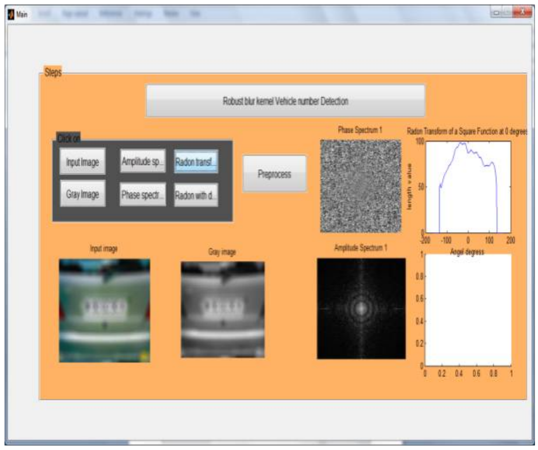

Fig.7. Transforming into radon system

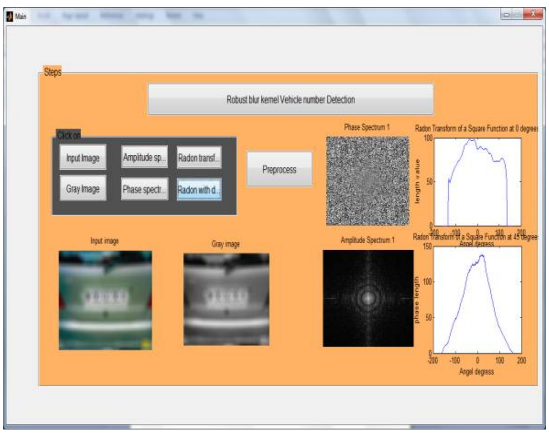

Fig.8. Deconvolution processes from the radon transform

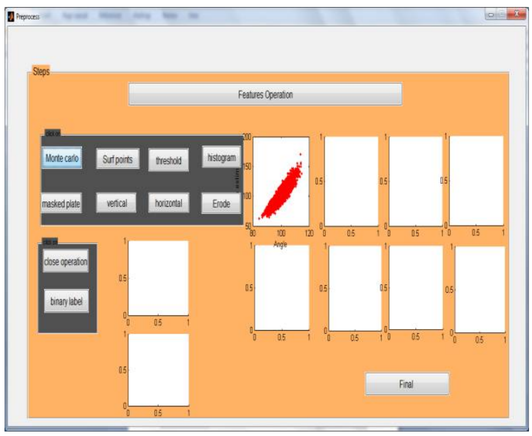

Fig.9. Preprocessing the images into Monte Carlo functions

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

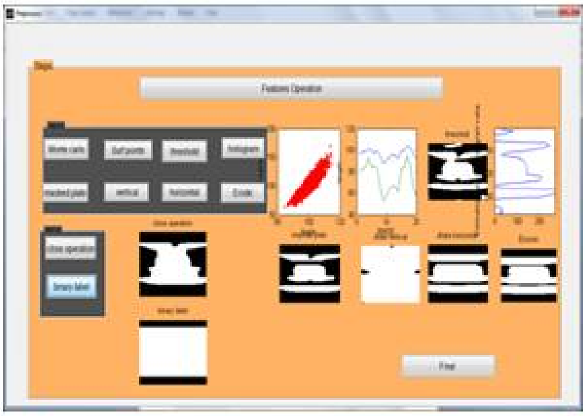

Fig.10. Estimation of Monte carlo, surf points, threshold, histogram, masked plate, vertical, and erode functions are performed

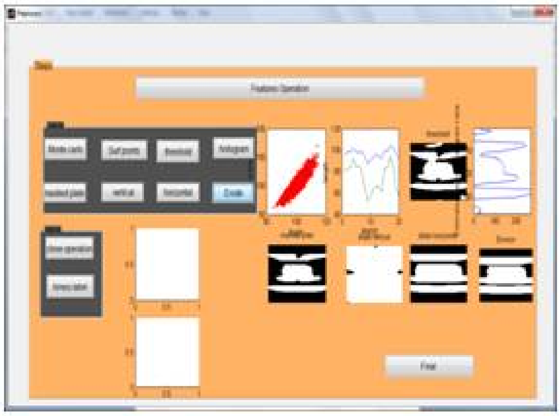

Fig.11. Estimating the binary label and close operation of the transformed images

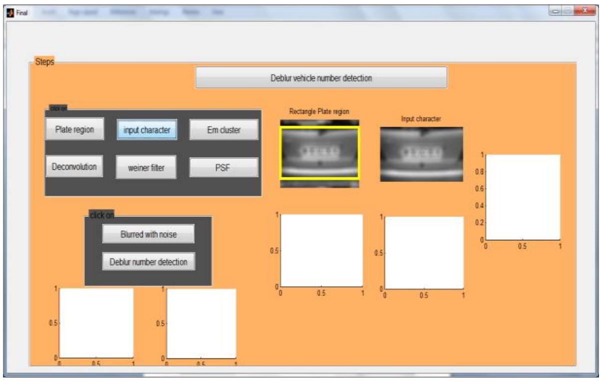

Fig.12. Performing the deblur operations to find the number plate.

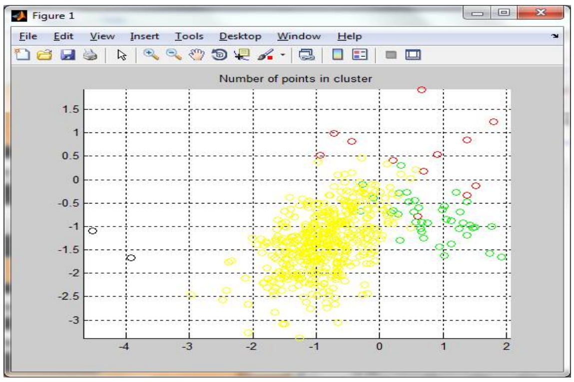

Fig.13. Distinguishing no.of points in clusters.

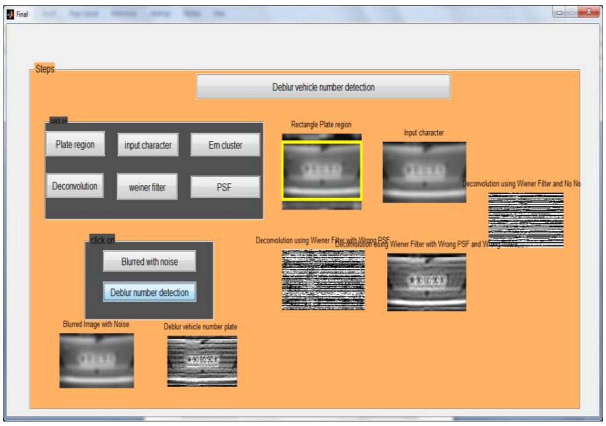

Fig.14. Detecting the vehicle number by performing the functions like plate region, character, EM cluster, deconvolution, weiner filter and PSF.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

V. Conclusion and Future Work

In this paper, we have solved the issue of vehicle number plate detection in an intelligent manner. The database image consists of different blur images. License plate recognition may be complicated by frames that obscure parts of the plate, debris, complex backgrounds, and a wide variety of fonts. Furthermore, license plates are not configured in a standard format; license plates typically vary across issuing states and countries. Recognition systems must also account for rotation in the plane if a license plate is improperly mounted.We have designed an intelligent vehicle number plate recognition system that effectively recognizes and detects the number plate of the vehicle. By estimating the blur and deblur operations, the number plate is detected. Performance analyses in terms of number of points in cluster and kernel length are estimated.

References

1. Qingbo Lu et al, “Robust Blur Kernel Estimation for License Plate Images from Fast Moving Vehicles”, IEEE transactions on image processing, 25 (5), 2016.
2. Vladimir Shapiro et al, “Towards a multinational car license plate recognition system, Machine Vision and Applications (2006) 17:173– 183
3. Christine Evans-Pughe, “A national system of around 3000 automatic number plate recognition cameras, linked to a central database, is designed to drive ‘hot cars’ off Britain’s roads”, Engineering & Technology | July 2006 | www.theiet.org/engtechmag
4. Tian-Ding Chen et al, “License-Plate Recognition Using Dwt And Neural Network”, International Journal of Wavelets, Multi-resolution and Information Processing, 4(4), 2006.
5. ARTHUR GORDON and ROSS WOLF, “License Plate Recognition Technology, Innovation in Law Enforcement Use”, FBI Law Enforcement Bulletin.
6. Thanongsak Sirithinaphong and Kosin Chamnongthai, “The Recognition Of Car License Plate For Automatic Parking System”, Fifth International Symposium on Signal Processing and its Applications, ISSPA '99, Brisbane, Australia, 22-25 August, 1999
7. A.Conci, et al, “A Complete System for Vehicle Plate Localization, Segmentation and Recognition in Real Life Scene”, IEEE LATIN AMERICA TRANSACTIONS, 7 (5), 2009
8. Christos Nikolaos E et al, “A License Plate-Recognition Algorithm for Intelligent Transportation System Applications”, IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, 7(3), 2006.
9. Shyang-Lih Chang et al, “Automatic License Plate Recognition “, IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, 5(1), 2004
10. Hakan Caner et al, “Efficient Embedded Neural-Network-Based License Plate Recognition System”, IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, 57 (5), 2008.
11. Chengpu Yu Mei Xie Jin Qi, “A Novel System Design of License Plate Recognition”, Computational Intelligence and Design, 2008. ISCID '08. International Symposium on, 17- 18 Oct. 2008, Vol. 2, p.114 – 117
12. Xiaojuan Ma, Renlong Pan, Lin Wang, "License Plate Character Recognition Based on Gaussian Hermite Moments," Education Technology and Computer Science, International Workshop on, vol. 3, pp. 11-14, 2010 Second International Workshop on Education Technology and Computer Science, 2010.
13. Xian-Sheng HUA , Xiang-rong Chen , LIU Wenyin , Hong-Jiang ZHANG, Automatic Location of Text in Video Frames, Proceeding of ACM Multimedia 2001 Workshops: Multimedia Information Retrieval (2001)J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.
14. http://www.deskshare.com/amc.aspx
15. http://www.mathworks.com/matlabcentral/fileexchange/802 8-mmread

BIOGRAPHY

Pethaperumal RM is an M.Phil student in the Computer Application Department, Alagappa University, Karaikudi. Tamil Nadu. India. He received B.Sc. Information Technology in 2006 from Alagappa University, Karaikudi, Tamilnadu, India. He received M.Sc. Computer Science degree in 2009 from Alagappa University,Karaikudi, Tamilnadu, India. His research interests are in Image Processing,Data Mining & Warehousing,and its related topics.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

Dr. Palanisamy Vellaiyan obtained his B.Sc. degree in Mathematics from Bharathidasan University in 1987. He also received the M.C.A., and Ph.D Degrees from Alagappa University in 1990 and 2005 respectively. After that working as Lecturer in AVVM Sri Pushpam College, Poondi from 1990 to 1995, He joined Alagappa University as Lecturer in 1995. He is currently working as Associate Professor and Head of Department of Computer Science and Engineering. He also received the M.Tech., Degree from Bharathidasan University in 2009. He has published over 20 journals and conferences and his research interest includes Computer Networks & Security, Data Mining & Warehousing, Mobile Communication and computer algorithms.