

# Recognition of Handwritten Electronic Components and Construction of Standard Circuits using PHOG and Pseudo Zernike Moments

Veena M S, Lakshman Naika R

PG Student, Department of ECE, UBBDT Engineering College, Davangere, India

Associate Professor, Department of ECE, UBBDT Engineering College, Davangere, India

**ABSTRACT:** The Image Segmentation is alluded to as a standout amongst the most essential procedures of image processing. Segmentation is the method of isolating or parceling a image into parts, called segments. It is for the most part valuable for applications like image compression or object recognition, in light of the fact that for these sorts of uses, it is wasteful to handle the entire image. In this way, image Segmentation is utilized to portion the parts from images for further handling. There exist a few image Segmentation methods, which parcel the image into a few sections in light of certain image highlights like pixel force esteem, shading, surface, and so on here a work is presented in this paper that uses PhoG and Pseudo Zernike Movements strategies for the Segmentation of the circuit components from circuit and to supplant them on the fundamental circuit chart. Otsu's strategy is utilized as binarization in this procedure.

**KEYWORDS:** Image segmentation; similarity detection; edge detection; Otsu's thresholding, PhoG and Pseudo Zernike Movement.

## I. INTRODUCTION

Computerized image preparing is the utilization of PC calculations to perform image handling on advanced images. Image Segmentation is an essential and testing procedure of image processing. Image Segmentation method is utilized to segment an image into significant parts having comparable elements and properties. The fundamental point of Segmentation is disentanglement i.e. speaking to an image into significant and effectively analyzable way. Image Segmentation is fundamental initial phase in image investigation. The objective of image Segmentation is to separate an image into a few sections/fragments having comparative components or properties. The fundamental uses of image Segmentation are: Content-based image retrieval, Medical imaging, Object location and Recognition Tasks, Automatic movement control frameworks and Video observation, and so on. The image Segmentation can be grouped into two essential sorts: Local Segmentation (worried with particular part or area of image) and Global Segmentation (worried with dividing the entire image, comprising of vast number of pixels). The image Segmentation methodologies can be classified into two sorts in view of properties of image [01].

Thresholding is the least demanding method for Segmentation. It is done through that edge esteems which are acquired from the histogram of those edges of the first image. The limit esteems are acquired from the edge distinguished image. Segmentation through thresholding has less calculation contrasted with different procedures. Segmentation depends on "his ton". For a specific section there might be set of pixels which is named as "his ton". Roughness measure is trailed by a thresholding technique for image Segmentation. Segmentation is done through versatile thresholding. The dim level focuses where the slope is high, is then added to thresholding surface for Segmentation The downside of this Segmentation strategy is that it is not reasonable for complex images [02].

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 8, August 2017

Thresholding is likely the most of the time utilized procedure to portion an image. The thresholding operation is a dimension remapping operation  $g$  characterized by:

$$g(v) = \begin{cases} 0 & \text{if } v < t \\ 1 & \text{if } v \geq t \end{cases} \quad (1)$$

Where,  $v$  speaks to a grey esteem, and  $t$  is the threshold esteem. Thresholding maps a grey esteemed image to a binary image. After the thresholding operation, the image has been portioned into two sections, recognized by the pixel esteems 0 and 1 separately.

Pseudo-Zernike movements have not been successfully utilized as a part of image processing applications on the grounds that their calculation with present techniques is however more mind boggling and extensive contrasted with customary moments, Legendre moments and even Zernike moment [03]. Furthermore, most specialists concentrated just on calculations for quick calculation of Zernike moment and as a rule, they can't be straightforwardly connected to the calculation of pseudo-Zernike moment. The present strategy for direct calculation of spiral polynomials is just adequate to acquire a solitary pseudo-Zernike snapshot of request  $p$  in a solitary run. For finish calculation of request  $p$ , it needs to experience a similar circle more than once. This approach takes any longer time since it includes the factorial emphases for every spiral polynomial, and may prompt numerical hazards as the request  $p$  increments.

PHOG is one more kind of segmentation module that is utilized for the image segmentation based on the collected features. The work is introduced here that will classify the image segmented blocks from the image utilizing SVM classifier. This classifier will be trained using the features generated by two level algorithms i.e. PHOG and Pseudo Zernike Movement. The upcoming sections will describe the previous work introduced on this same module in literature survey. In methodology section current work is explained and the outcomes of final work are explained in the results section.

## II. LITERATURE SURVEY

Author Jordi Pont-Tuset et.al, [04] introduced a work on image Segmentation. Here various levelled based images are utilized for the Segmentation reason. Author initially builds up a quick standardized cuts calculation. Creator at that point proposes an elite various leveled segmenter that makes viable utilization of multiscale data. At long last, a gathering procedure that joins multiscale districts into very exact protest proposition by investigating proficiently their combinatorial space is finished.

Author Volker Fischer et.al, [05] adjusted the idea of adversarial cases to the errand of semantic Segmentation and demonstrated that current ways to deal with produce ill-disposed cases for characterization can be effortlessly exchanged to this assignment. We demonstrated that there exist subtle ill-disposed bothers that shroud all pixels of an objective class while leaving alternate classes over the image about unaltered. Many open themes stay, for example, use of more performing systems, correlation of various system structures, more advanced techniques to quantify the viability of antagonistic cases for semantic Segmentation, can these ill-disposed illustrations be connected in the physical world.

Author Yang Bai et.al, [06] proposed a novel element extraction strategy in view of PHOG elements for smile acknowledgment. The PHOG highlights with a much lower number of measurements were extricated from the mouth range in face images and expanded the commitments of mouth movements to the smile acknowledgment. In the correlation with the Gabor highlights utilizing an openly accessible dataset, it accomplished as high an acknowledgment rate as the Gabor highlights did. What's more, the methodology of highlight choice by AdaBoost was not required to accomplish an adequate execution when utilizing the PHOG highlights and the SVM classifier, which demonstrates less preparing endeavors will be included. Besides, we joined the Gabor and PHOG include extraction strategies before the order, and got enhanced acknowledgment rates. As indicated by the exploratory outcomes, it has demonstrated that the cross breed PHOG and Gabor highlights approach has accomplished promising execution for

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 8, August 2017

smile acknowledgment, and we expect that it will likewise has extraordinary potential for other outward appearance acknowledgment assignment, which justifies our future review.

Creator JavadHaddadnia et.al, [07] this paper introduced an effective technique for the acknowledgment of human faces in frontal perspective of facial images. The proposed system uses an adjusted element extraction strategy, which depends on an adaptable face restriction calculation taken after by PZMI. A RBF neural system with the HLA strategy was utilized as a classifier in this acknowledgment framework. The paper presents a few parameters for productive and hearty element extraction method and in addition the RBF neural system learning calculation. These incorporate FCT, ACR, and choice of the PZMI orders and the HLA strategy. Comprehensive experimentation was done to research the impact of changing these parameters on the acknowledgment rate..Author has demonstrated that high request PZMI contains extremely helpful data about the facial images, and that the HLA method influences the learning speed. We have likewise demonstrated the ideal estimations of the FCT and ACR relating to the best acknowledgment comes about on the ORL database. The power of the proposed calculation within the sight of commotion is likewise examined. The most astounding acknowledgment rate of 99.3% with ORL database was acquired utilizing the proposed calculation. Author have executed and tried a portion of the current face acknowledgment procedures on the same ORL database. This near review shows the handiness and the utility of the proposed strategy.

### III. IMPLEMENTATION

We separate the proposed framework into two stages called testing and training. Circuit images are taken as information. A pre-preparing strategy in light of image shading change i.e. conversion of image and image resize is utilized. The images are fragmented and the elements are extricated in light of fix handling, PHOG and Pseudo Zernike Moments calculation lastly wind up with highlight vector. In training phase previously train the samples of Component images and stored in knowledge based. These features are matched with knowledge based using SVM Classifier. We prepare the classifier utilizing 'training set', tune the parameters utilizing 'validation set' and afterward test the execution of your classifier on inconspicuous 'test set'. A critical indicate note is that amid preparing the classifier just the preparation or potentially approval set is accessible. The test set must not be utilized amid preparing the classifier. The test set might be accessible during testing the classifier. The Figure 1 depicts the architectural block diagram of the work

#### A. Pre-handling:

This pre-handling module incorporates the image shading weight changing and resizing of an image. The color change is occurred here from RGB to gray scale. RGB is the shading image that comprises of data in the image by consolidating the data of these individual planes in particular, R, G and B planes. This RGB image is changed over to gray scale. The color change will be taken by fundamental strategy. It implies that we need to diminish the commitment of red shading, and increment the commitment of the green shading, and put blue shading commitment in the middle of these two.

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 8, August 2017

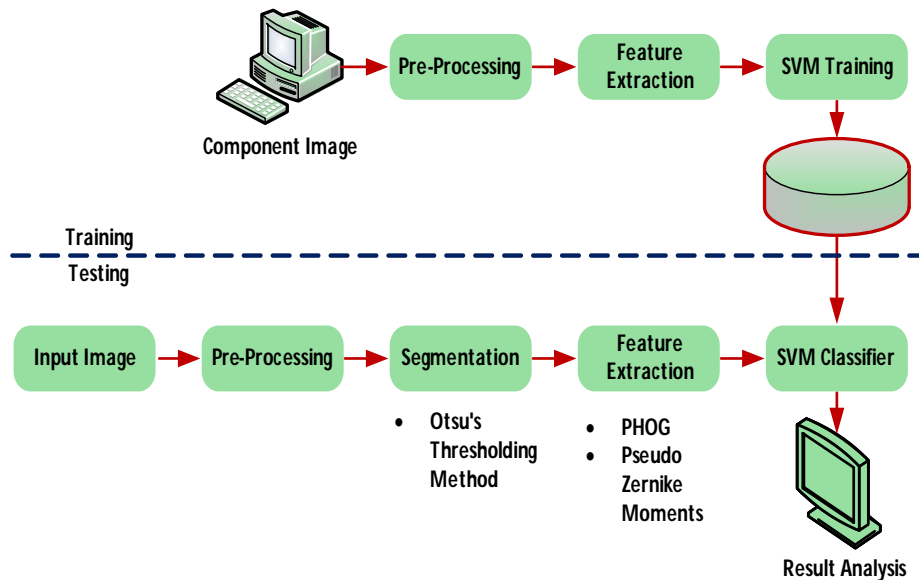


Figure 1 Architectural Block Diagram of Proposed Work.

---

## Algorithm: Otsu's Algorithm

---

*Step1:* Compute histogram and probabilities of each intensity level

*Step2:* Set up initial  $\omega_n(0)$  and  $\mu_n(0)$

*Step3:* Step through all possible thresholds  $t = 1, \dots$  maximum intensity

- Update  $\omega_n(0)$  and  $\mu_n(0)$
- Compute  $\sigma_b^2(t)$

*Step4:* Desired threshold corresponds to the maximum  $\sigma_b^2(t)$  |

---

Figure 2 Algorithmic Flow of Otsu's Method

So the new condition that structures is given in Eq. [02]:

$$grayimage = ((0.3 * R) + (0.59 * G) + (0.11 * B)) \quad (02)$$

As per this condition, Red has contribute 30%, Green has contributed 59% which is more prominent in each of the three hues and Blue has contributed 11%.

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 8, August 2017

## B. Otsu's Method

In image processing, segmentation is much of the time the underlying stride to pre-get ready images to think objects of energy for further examination. Segmentation procedures can be generally orchestrated into two frameworks, edge-based and region based philosophies. As a division framework, Otsu's system is for the most part used as a piece of illustration affirmation, reportbinarization, and PC vision [08].

## C. PHOG:

The features of image are collected using PHoG which is the histogram based weights of the image pixels are calculated. The overall work is represented in the form of flow chart, that will give the step wise execution of the workhere. It is depicted in the Figure 3. The working of the capacity can be given by the accompanying strides [09].

Step1: Input parameters settled at the Phog work those will be utilized as a part of this capacity.

Step2: add up to number of data in the twofold image will be figured i.e. number of ones in the general image.

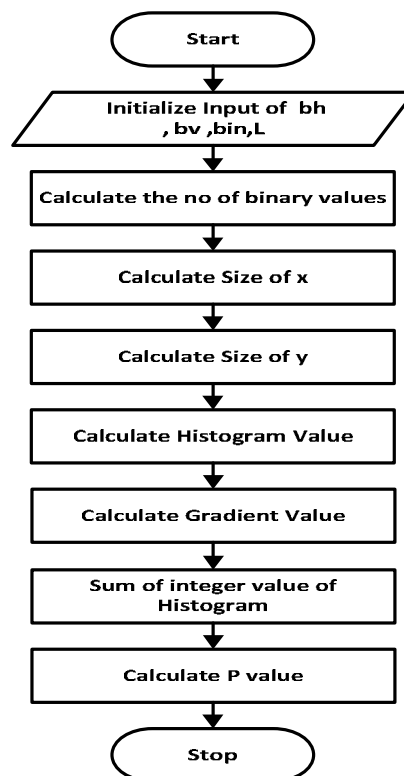


Figure 3 Flow-Chart of Phog Descriptor Function.

Step3: size of x and y are to be figured i.e. the quantity of lines and sections.

Step4: the parallel image with high data images histogram will be dissected now with these figuring angles weights is additionally fluctuated at the stage.

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 8, August 2017

Step5: last total of the histogram esteems will be measured and gone as the elements of the image for the further computations.

### D. Pseudo-Zernike Moment (PZM):

Pseudo-Zernike developments are used as a piece of a couple case affirmation applications as highlight descriptors of the image shape, and have wound up being superior to other minute limits, for instance, Zernike minute to the extent their component depiction limits and power in the proximity of image quantization mistake and commotion [4]. Pseudo-Zernike minutes offer more component vectors than Zernike development since pseudo-Zernike polynomial contains  $(p + 1)^2$  straightly free polynomials of demand  $<p$ , however Zernike polynomial contains so to *speak*  $1/2(p + 1)(p + 2)$  directly self-sufficient polynomials because of condition of  $p - q = \text{even}$ . Teh et al. have moreover exhibited that pseudo-Zernike minutes are less delicate to image upheaval than are the standard Zernike minutes in Advance, their orthogonality property of the polynomials helps in achieving a near zero estimation of abundance measure in a game plan of moment limits, so that depictions of assorted solicitations identify with self-sufficient characteristics of the photo . Pseudo-Zernike minutes have better component depiction capacities and are heartier to image tumult than the customary Zernike minute [10].

## IV. RESULTS

As shown in the Figure 4. The input image is RGB image that has electronic components into it. This image converted to gray scale image before generating the binary matrix for it. The generated binary information is depicted in figure series (b). From the binary image we will get to know the location of the components in the image. This image will be then passed for segmentation work; here the components segmented are shown. Finally segmented components are replaced by the classifier as shown in the figure 4 (d). One more case of results is shown in Figure 5.

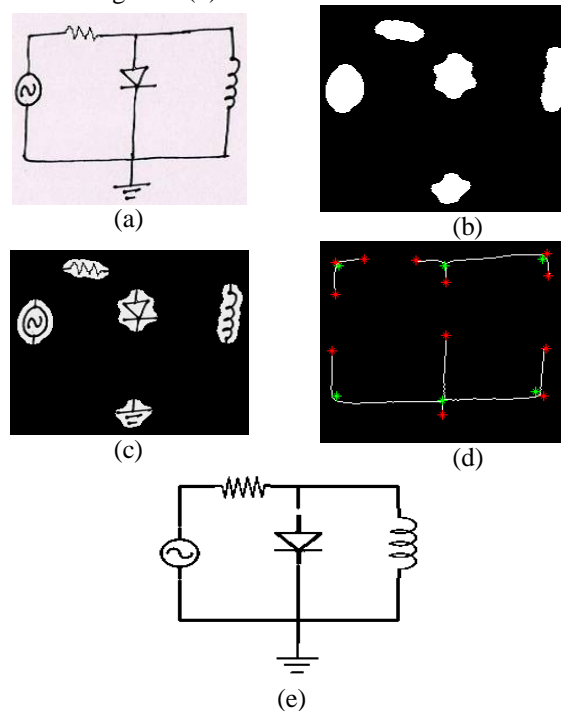


Figure 4 Results of Proposed Work, (a) Input Image, (b) Binary Image, (c) Segmented Image and (d) Point Detected Image and (e) Replaced Image.

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 8, August 2017

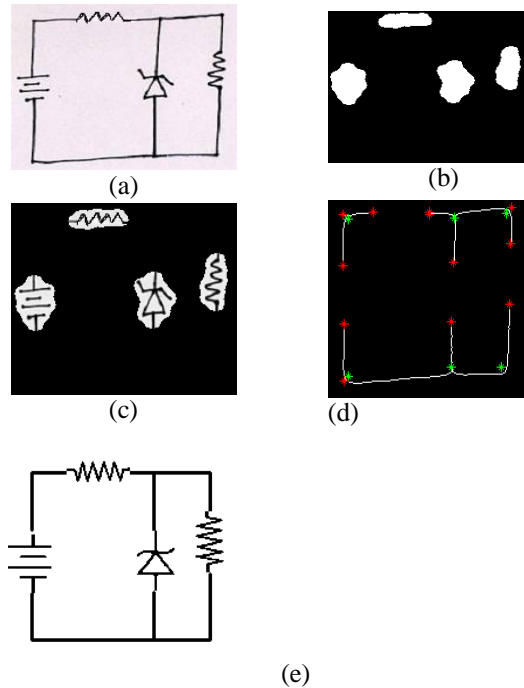


Figure 5 Results of Proposed Work, (a) Input Image, (b) Binary Image, (c) Segmented Image, (d) Point Detected Image and (e) Replaced Image.

## V. CONCLUSION

The image segmentation is performed in the work. PHoG based features and SVM based classification has given the better enhanced results in the proposed work. The elements of the circuit are extracted and segmented out with great efficiency. Extracted elements are segmented with help of classification module.

## REFERENCES

- [1] Dilpreet Kaur and Yadwinder Kaur, "Various Image Segmentation Techniques: A Review", International Journal of Computer Science and Mobile Computing, Vol.3 Issue.5, May- 2014
- [2] <http://www.cs.uu.nl/docs/vakken/ibv/reader/chapter10.pdf>
- [3] Chong, Chee-Way, R.Mukundan and P.Raveendran, "An Efficient Algorithm for Fast Computation of Pseudo-Zernike Moments", International Journal of Pattern Recognition and Artificial Intelligence, vol. 17, issue 06, 2013.
- [4] Jordi Pont-Tuset, Pablo Arbelaez, Jonathan T. Barron, Ferran Marques, Jitendra Malik, "Multiscale Combinatorial Grouping for Image Segmentation and Object Proposal Generation", 2016.
- [5] Volker Fischer, Mummadi Chaithanya Kumar, Jan Hendrik Metzen and Thomas Brox, "Adversarial Examples for Semantic Image Segmentation", 2017.
- [6] Yang Bai, LihuaGuo, LianwenJin+, Qinghua Huang, "A Novel Feature Extraction Method Using Pyramid Histogram of Orientation Gradients For Smile Recognition", 2014.
- [7] JavadHaddadnia and Majid Ahmadi, "An Efficient Feature ExtractionMethod with Pseudo-Zernike Moment in RBFNeural Network-Based Human Face Recognition System".
- [8] Senthilkumaran N1and Vaithegi S, "Image Segmentation By Using ThresholdingTechniques For Medical Images", Computer Science & Engineering: An International Journal (CSEIJ), Vol.6, No.1, February 2016.
- [9] Yang Bai, LihuaGuo, LianwenJin+, Qinghua Huang, "A Novel Feature Extraction Method Using Pyramid Histogram ofOrientation Gradients For Smile Recognition".
- [10] Chong, Chee-Way, R.Mukundan and P.Raveendran, "An Efficient Algorithm for Fast Computation ofPseudo-Zernike Moments".