International Journal of Research Studies in Science, Engineering and Technology
Volume 3, Issue 1, January 2016, PP 6-14
ISSN 2349-4751 (Print) & ISSN 2349-476X (Online)

Salient Region Detection for Remote Sensing Image Based on Frequency Domain Analysis

[1]D.Daniyelu, [2]S.Sekhar Babu, [3]P.Prasanna Murali Krishna

[1](M.Tech), Department of ECE, DR.SGIT, Markapur, India
[2]Associate Professor, Department of ECE, DR.SGIT, Markapur, India
[3]H.O.D Department of ECE, DR.SGIT, Markapur, India

Abstract: *A region of interest (often abbreviated ROI), could be a designated set of samples at intervals a dataset known for a specific purpose. The concept of associate degree ROI is often employed in several application areas. as an example, in medical imaging, the boundaries of a tumour is also outlined on a picture or in a very volume, for the aim of measurement its size. The endocardial border is also outlined on a picture, maybe throughout totally different phases of the oscillation, as an example end-systole and end-diastole, for the aim of assessing viscus perform. In geographical data systems (GIS), associate degree ROI will be taken virtually as a two-dimensional figure choice from a second map. Previous works for ROI detection in remote sensing pictures square measure inaccurate and prohibitively computationally advanced. thence we tend to propose region-of-interest extraction technique supported frequency domain analysis and salient region detection (FDA-SRD) technique for ROI extraction. For this, the photographs square measure regenerate from RGB to HIS as preprocessing. The prominence driven image ensuing scale area generally preserves or perhaps enhances semantically vital structures like edges, lines, or flow-like structures within the foreground, and inhibits and smoothest muddle within the background. The image is reconstructed victimisation fusion supported the initial image, the image at the ultimate scale at that the diffusion method converges, and therefore the image at a midscale. Our algorithmic program emphasizes the foreground options, that square measure vital for image classification. The background image regions, whether or not thought-about as contexts of the foreground or noise to the foreground, will be globally handled by fusing data from totally different scales.*

1. Introduction

Region-of-interest (ROI) detection technology, which is represented by the visual attention mechanism, has been introduced into the remote sensing image analysis field, and it has become an important technical approach for improving the time required and analysis accuracy in mass-data image processing. After providing a potential ROI, the viewer can search for specific objects in the region. The computing resources can be reasonably allocated to enhance the operating efficiency of an image processing system.

2. Literature Survey

2.1. Learning to Detect a Salient Object

Authors : T. Liu, Z. Yuan, J. Sun, J. Wang, N. Zheng, X. Tang, et al.,

Year: 2011

In this paper, we tend to study the salient object detection drawback for pictures. We tend to formulate this drawback as a binary labeling task wherever we tend to separate the salient object from the background. We tend to propose a group of novel options, as well as multiscale distinction, center-surround bar graph, and color spacial distribution, to explain a salient object regionally, regionally, and globally. A conditional random field is learned to effectively mix these options for salient object detection. Further, we tend to extend the planned approach to discover a salient object from consecutive pictures by introducing the dynamic salient options.

Advantages:

From the image given, the object and backgrounds are separated, that means the foreground and backgrounds are separated, so it makes easy to determine the features of the object.

Disadvantages:

The background is taken as noise in many cases except some cases. And then the single level is not providing the object alone. We have to collected a large image database containing tens of thousands of carefully labeled images

2.2. Efficient and Reliable Schemes for Nonlinear Diffusion Filtering

Authors: J. Weickert, B. Romeny, and M. A. Viergever,

Year: 1998

Nonlinear diffusion filtering in image processing is typically performed with specific schemes. They're only stable for terribly little time steps, that ends up in poor potency and limits their practical use. Supported a distinct nonlinear diffusion scale-space framework we tend to gift semi-implicit schemes that ar stable for all time steps. These novel schemes use AN additive operator rending (AOS), that guarantees equal treatment of all coordinate axes. they will be enforced simply in impulsive dimensions, have sensible motion changelessness and reveal a procedure quality and memory demand that is linear within the variety of pixels. Examples demonstrate that, underneath typical accuracy needs, AOS schemes ar a minimum of 10 times a lot of economical than the wide used specific schemes

Advantages:

The novel schemes use an additive operator splitting (AOS), which guarantees equal treatment of all coordinate axes.

Disadvantages:

They are only stable for very small time steps, which leads to poor efficiency and limits their practical use.

2.3. A Multi-Scale Non-Linear Vessel Enhancement Technique

Authors: B. Abdollahi, A. El-Baz, and A. A. Amini

Year: 2011

It presents associate enhancement technique supported nonlinear diffusion filter and applied mathematics intensity approaches for smoothing and extracting three-D system from resonance angiography (MRA) knowledge. Our technique distinguishes and enhances the vessels from the opposite embedded tissues. The Expectation Maximization (EM) technique is utilized with non-linear diffusion so as to seek out the optimum distinction for enhancing vessels; so, smoothing whereas dimming the embedded tissues round the vessels and brightening the vessels. The non-linear diffusion filter smooths the homogenized regions whereas conserving edges. The EM technique finds the optimum applied mathematics parameters supported the likelihood distribution of the categories to discriminate the tissues within the image. Our enhancement technique has been applied to four three-D MRA-TOF datasets consisting of around three hundred pictures and has been compared to the regularised Perona and leader filter. Our experimental results show that the planned technique enhances the image, keeping solely the vessels whereas eliminating the signal from different tissues.

Advantages:

The non-linear diffusion filter smooths the homogeneous regions while preserving edges.

Disadvantages:

The conventional non-linear diffusion filter keeps unwanted tissues in addition to the vessels.

2.4. On Feature Combination for Multiclass Object Classification

Authors: P. Gehler and S. Nowozin

Year: 2009

In this paper we address the problem of object category classification by combining multiple diverse feature types. For a given test image the learned classifier has to decide which class the image belongs to. This problem is challenging because the instances belonging to the same class usually have high intraclass variability. To overcome the problem of variability, one strategy is to design feature descriptors which are highly invariant to the variations present within the classes. Invariance is an improvement, but it is clear that none of the feature descriptors will have the same discriminative power for all classes. For example, features based on color information might perform well when classifying leopards or zebras, whereas a classifier for cars should be invariant to the actual color of the car. Therefore it is widely accepted that, instead of using a single feature type for all classes it is better to adaptively combine a set of diverse and complementary features – such as features based on color, shape and texture information – in order to discriminate each class best from all other classes.

Finding these feature combinations is a recent trend in class-level object recognition and image classification. One popular method in computer vision is Multiple Kernel Learning (MKL), originally proposed in. In the application of MKL to object classification, the approach can be seen to linearly combine similarity functions between images such that the combined similarity function yields improved classification performance.

Advantages:

To overcome the problem of variability, one strategy is to style feature descriptors that are extremely invariant to the variations present at intervals the categories. Invariance is an improvement,

Disadvantages:

Here address the problem of object class classification by combining multiple numerous feature varieties. For a given test image the learned categoryifier has got to decide that class the image belongs to. This problem is difficult as a result of the instances belonging to constant category typically have high intraclass variability.

3. EXISTING SYSTEM

A region that draws attention is defined as a focus of attention (FOA), which is considered an ROI or a target. Several computational models have been developed to simulate the human visual system (HVS). In previous works related to this ROI extractions are Saliency and gist features for target detection in satellite images, A model of saliency-based visual attention for rapid scene analysis, and Shifts in selective visual attention: towards the underlying neural circuitry are proposed based on a model using a biologically plausible architecture and the basis for visual attention. In another work called ‘Satellite image classification via two-layer sparse coding with biased image representation’ presented a method involving visual attention into the satellite image classification. A faster, more efficient ROI detection algorithm based on an adaptive spatial subsampling visual attention model was proposed ‘Detection of regions of interest in a high-spatial-resolution remote sensing image based on an adaptive spatial subsampling visual attention model’. These all method processed and performed to simulate the visual attention mechanism based on the HVS biological construction. Apart from this works, still there are more works developed related to this and they presented a frequency-tuned approach for computing saliency in images using low level color and luminance features and it generates full-resolution saliency maps. By analyzing the log-spectrum of an input image, extracted the spectral residual for an image in the spectral domain and proposed a fast method for constructing a corresponding saliency map in the spatial domain. Unsupervised saliency detection usually starts with features of image structures known to be salient for the human visual system (HVS). These structure features include the intensity of salient regions, and the orientation, position and color of edges. Goferman method summarized the following three principles for saliency detection by the HVS. Local structures should be salient with respect to their surroundings frequently occurring features should be suppressed. The salient pixels should be grouped together, rather than scattered across the image. The characteristic of Goferman’s method is that the regions that are close to the foci of attention are explored significantly more than far-away regions. As a result, some background regions near to the salient structures are included in the saliency map, but foreground regions are rarely incorrectly classified as background regions. The limitation of Goferman’s method is that it often produces high values of saliency at the edges of an object but lower saliency within the object. Cheng et al. proposed a histogram-based contrast method to measure saliency. Their algorithm separates a large object from its surroundings, and enables the assignment of similar saliency values to homogenous object regions, and highlights entire objects.

Disadvantages

- In ROI extraction, Remote sensing images are inaccurate in many cases as in previous works.
- The extracted information was not relevant to image expected.
- So this kind of Recognitionyields less accurate result than using the foreground feature alone.
- And these methods are prohibitively computationally complex.

4. PROPOSED SYSTEM

Remote sensing pictures comprise high amounts of information. The biological models will simulate the HVS well; however they usually lead to prohibitory machine complexness and not take into account the characteristics in frequency domain. Further, human visual attention doesn't essentially mirror actual concern in a very remote sensing image. Further researchers in several disciplines calculate ROI quickly; however they solely take into account the options of the image itself. It's simple to cause false or missing detection. To overcome the weaknesses within the existing visual attention models in order that they're additional appropriate for process remote sensing pictures, we tend to specialize in2 aspects: accuracy and low computation. The salient regions ought to be detected and well described. Thus, we tend to propose a FDA-SRD model. This model is proposed to boost machine potency and accuracy in ROI detection of remote sensing pictures. When the HSI remodel, a unique frequency domain strategy supported4 Fourier remodel is been accustomed generate a prominence map, which is time-saving and economical. Additionally, associate accommodative threshold segmentation algorithmic program supported Gaussian Pyramids is employed to get additional correct form info of ROIs. A factor of 2 twice to reduce the amount of data and is preprocessed using the HSI transform. A novel frequency domain Experimental results show that the planned model is time efficient and correct. The input image is subsampled by strategy is employed to generate a saliency map. Finally, the detected regions are formed through an adaptive threshold segmentation algorithm.

This supervised saliency detection wants a awfully massive well-labeled image information, that isn't straightforward to get. Unsupervised saliency detection typically starts with options of image structures known to be salient for the human visual system (HVS). These structure options include the intensity of salient regions, and also the orientation, position and color of edges. Local structures ought to be salient with reference to their surroundings often occurring options ought to be suppressed. The salient pixels should be grouped together, rather than scattered across the image. The characteristic of this saliency method is that the regions that are close to the foci of attention are explored significantly more than far-away regions. As a result, some background regions near to the salient structures are included in the saliency map, but foreground regions are rarely incorrectly classified as background regions. Before the main process, the Image used is converted from RGB to HIS channel. Then followed by Saliency, Binarization, Fusion and Masking techniques were applied.

Advantages

- The proposed work provides better visualization than the previous systems.
- The segmentation accuracy will be improved.
- By this proposed method, ROI extraction process is efficient by processing HSI channels.
- Most extracted regions are related to the object while comparing with previous methods.

5. MODULES AND MODULE DESCRIPTION

5.1. Modules

- HSI transformation
- Saliency Map
- Threshold Segmentation
- Binarization
- Masking

5.2. Module Description

HSI Transformation

The HSI color area is incredibly necessary and attractive color model for image process applications as a result of it represents color s equally however the human eye senses colours. The HSI color model represents each color with 3 components: hue (H), saturation (S), intensity (I). To formula that converts from RGB to HSI or back is additional difficult than with alternative color models.

HSI common in pc vision applications, makes an attempt to balance the benefits and drawbacks of the opposite 2 systems. Whereas generally consistent, these definitions aren't standardized, and therefore the abbreviations are conversationally interchangeable for any of those 3 or many alternative connected cylindrical models. Note conjointly that whereas "hue" in HSL and HSV refers to constant attribute, their definitions of "saturation" differ dramatically. (For technical definitions of those terms,

Both of those representations are used wide in tricks, however both are also criticized for not adequately separating color-making attributes, and for his or her lack of sensory activity uniformity. this suggests that the colour displayed on one monitor for a given HSV value is unlikely to {precisely} match the colour seen on another monitor unless the 2 are precisely adjusted to absolute color areas.

Other, additional computationally intensive models, like CIELAB or CIECAM02 are same to raised attain the goal of correct and uniform color display, however their adoption has been slow. HSL and HSV were wide adopted as a standard alternative to RGB within the period of time of color computers as a result of their low time interval necessities, and their similarity to ancient artist's color theory. Even within the case of digital artists, who usually come back to acknowledge the flaws of HSL/HSV systems fairly quickly, it's less complicated to find out to figure round the flaws of a well-known system of color illustration than to learn their entire manner of brooding about color by adapting to the less intuitive RGB system of color mix. Thus, in spite of their flaws, HSL and HSV have proved troublesome to interchange.

Hue and chroma

In every of our models, we have a tendency to calculate both hue and what this article can call color property, when Joblove and Joseph Greenberg, within the same manner – that's, the hue of a color has constant numerical values altogether of those models, as will its color property. If we have a tendency to take our tilted RGB cube, and project it onto the "chromaticity plane" perpendicular to the neutral axis, our projection takes the form of a polygon, with red, yellow, green, cyan, blue, and magenta at its corners .Hue is roughly the angle of the vector to some extent within the projection, with red at 0°, whereas color property is roughly the space of the purpose from the origin.

More exactly, each hue and color property during this model ar outlined with regard to the hexagonal} shape of the projection. The color property is that the proportion of the space from the origin to the sting of the polygon. Within the lower a part of the diagram to the correct, this is often the magnitude relation of lengths OP/OP′, or alternately the magnitude relation of the radii of the 2 hexagons. This magnitude relation is that the distinction between the biggest and smallest values among R, G, or B in a very color. To form our definitions easier to write, we’ll outline these most and minimum element values as M and m, severally.

To understand why color property are often written as $M - m$, notice that any neutral color, with $R = G = B$, comes onto the origin and then has zero color property. so if we have a tendency to add or cypher constant quantity from all 3 of R, G, and B, we have a tendency to move vertically inside our atilt cube, and don't modification the projection. Therefore, the 2 colours (R, G, B) and $(R - m, G - m, B - m)$ project on constant purpose, and have constant color property. The color property of a color with one in every of its parts capable zero ($m = 0$) is solely the utmost of the opposite 2 parts. This color property is M within the specific case of a color with a zero element, and $M - m$ normally.

The hue is that the proportion of the space round the fringe of the polygon that passes through the projected purpose, originally measured on the vary [0, 1) however currently generally measured in degrees [0°, 360°). For points that project onto the origin within the color property plane (i.e., grays), hue is indefinable. Mathematically, this definition of hue is written piecewise:

Sometimes, neutral colours (i.e. with $C = 0$) are appointed a hue of 0° for convenience of illustration.

These definitions quantity to a geometrical deformation of polygons into circles: both sides of the hexagon is mapped linearly onto a 60° arc of the circle. When such a change, hue is exactly the angle round the origin and color property the space from the origin: the angle and magnitude of the vector inform to a color.

Sometimes for image analysis applications, this hexagon-to-circle transformation is skipped, and hue and color property (we'll denote these H2 and C2) are outlined by the standard cartesian-to-polar coordinate transformations (fig. 11). the simplest thanks to derive those is via a try of philosopher color property coordinates that we'll decision α and β:

Notice that these 2 definitions of hue (H and H2) nearly coincide, with a most distinction between them for any color of regarding one.12° – that happens at twelve specific hues, for example H = thirteen.38°, H2 = 12.26° – and with H = H2 for each multiple of 30°. the 2 definitions of color property (C and C2) disagree additional substantially: they're equal at the corners of our polygon, however at points halfway between 2 corners, like H = H2 = 30°, we've got C = one, however C2 = √¾ ≈ zero.866, a distinction of regarding thirteen.4%.

Saturation: If we have a tendency to write in code colours in a very hue/lightness/chroma or hue/value/chroma model (using the definitions from the previous 2 sections), not all mixtures of lightness (or value) and color property ar meaningful: that's, 1/2 the colours we will describe exploitation $H\in [0°, 360°)$, $C\in [0, 1]$, and $V\in [0, 1]$ fall outside the RGB gamut (the grey elements of the slices in figure 14). The creators of those models thought-about this a tangle for a few uses. as an example, in a very color choice interface with 2 of the size in a very parallelogram and therefore the third on a slider, 1/2 that parallelogram is formed of unused house. Currently imagine we've got a slider for lightness: the user's intent once adjusting this slider is doubtless ambiguous: however ought to the software system cope with out-of-gamut colors? Or conversely, If the user has hand-picked as colourful as attainable a dark purple so shifts the lightness slider upward, what ought to be done: would the user value more highly to see a lighter purple still as colourful as attainable for the given hue and lightness or a lighter purple of precisely the same color property because the original color

Saliency map

The salience map was designed as input to the management mechanism for covert selective attention. That contribute to attentive choice of a input (color, orientation, movement etc) are combined into one single topographically homeward map. The salience map that integrates the normalized info from the individual feature maps into one international live of conspicuity.

The salience Map may be a topographically organized map that represents visual salience of a corresponding visual scene.

Motivation

One of the foremost severe issues of perception is info overload. Peripheral sensors generate sensory signals additional or less endlessly and it might be computationally pricey to method all this incoming info all the time. Thus, it's necessary for the system to form choices on that a part of the obtainable info is to be hand-picked for more, additional elaborate process, and that elements ar to be discarded. What is more, the chosen stimuli got to be prioritized, with the foremost relevant being processed initial and therefore the lower ones later, so resulting in a successive treatment of various elements of the visual scene. This choice and ordering method is termed selective attention. Among several alternative functions, attention to a input has been needed for it to be perceived consciously (see Attention and Consciousness and Visual Awareness; however see bacteriologist and Tsuchiya (2007) for a special viewpoint).

What determines that stimuli ar hand-picked by the {attentional|basic cognitive method} process and which can be discarded? Several interacting factors contribute to the present call. It's proved helpful to tell apart between bottom-up and top-down factors. the previous ar all people who rely solely on the fast sensory input, while not taking into consideration the inner state of the organism. Top-down management, on the opposite hand, will take into consideration the inner state, like goals the organisms has at now, personal history and experiences, etc. A dramatic example of a input that draws attention exploitation bottom-up mechanisms may be a fire-cracker going off suddenly whereas associate degree example of top-down attention is that the focusing onto difficult-to-find food things by associate degree animal that's hungry, ignoring additional "salient" stimuli.

Definition

Given the issue of accurately mensuration or perhaps quantifying the inner states of associate degree organism, those aspects of basic cognitive process management that ar freelance of those, i.e., bottom-up attention, ar easier to grasp than people who ar influenced by internal states. Probably the foremost prestigious try at understanding bottom-up attention and therefore the underlying neural mechanisms was created by Christof bacteriologist and Shimon Ullman (Koch and Ullman, 1985). They projected that the various visual options that contribute to attentive choice of a input (color, orientation, movement etc) are combined into one single topographically homeward map, the salience map that integrates the normalized info from the individual feature maps into one international live of conspicuity. In analogy to the center-surround representations of elementary visual options, bottom-up salience is so determined by however completely different a input is from its surround, in several submodalities and at several scales. To quote from bacteriologist and Ullman, 1985 (p. 221), salience at a given location is decided primarily by however completely different this location is from its surround in color, orientation, motion, depth etc. The salience map was designed as input to the management mechanism for covert selective attention. Bacteriologist and Ullman (1985) posited that the foremost salient location (in the sense outlined above) in a very visual scene would be a decent candidate for basic cognitive process choice. Once a geographics map of salience is established, this location is obtained by computing the position of the utmost during this map by a Winner-Take-All mechanism. When the choice is formed, suppression of activity at the chosen location (which could correspond to the psychophysically determined "inhibition of return" mechanism) ends up in choice of following location at the situation of the second-highest price within the salience map and a succession of those events generates a successive scan of the visual scene. This role of the salience map within the management of that locations within the visual scene ar attended is near that of the "master map" postulated within the "Feature Integration Theory" projected by Treisman and Gelade (1980).

The bacteriologist and Ullman study was strictly abstract. The primary actual implementation of a salience map was delineated by Niebur and bacteriologist (1996). They applied their salience map model that created use of color, intensity, orientation and motion cues each to simplified visual input (as is often utilized in psychophysical experiments) and to complicated natural scenes and that they incontestible successive scanning of the visual scene so as of decreasing strikingness (see #Applications below). Later work refined the model (Itti et al, 1998; Itti and bacteriologist 2001).

Bottom-up mechanisms (and so the salience map) don't utterly verify basic cognitive process choice. In several cases, top-down influences play a crucial role and may override bottom-up salience cues, as within the example mentioned at the tip of the #Motivation section (see conjointly undergrowth et al, 2006). Numerous mechanisms are projected to integrate top-down influences within the salience map, beginning with its terribly initial implementation by Niebur and bacteriologist (1996) United Nations agency projected that abstraction selective attention (as in a very Posner task; Posner 1980) would result from spatially outlined additions to the salience map.

Applications

Beyond the initial application of the salience map because the stage of an impression system for covert attention, it's found use in alternative, connected areas. Maybe the foremost immediate extension is to predict eye movements ("overt attention"; e.g., Parkhurst et al, 2002, undergrowth et al, 2006). There ar varied technical applications within which the salience map is often accustomed prioritise choice, e.g. to spot the foremost necessary info in visual input streams and to use this to enhance performance in generating or transmittal visual information (review: Parkhurst and Niebur 2002). Even associate degree "inverse" salience map has been used, to alter salient image regions and to direct attention to alternative regions (Su et al 2004). Another original application of salience maps is to come up with artificial vision for simulated actors in virtual environments (Courty and Marchand 2003). Salience maps have conjointly been integrated in a very VLSI hardware model of visual selective attention (Indiveri 2000).

Threshold Segmentation

Thresholding is that the simplest methodology of image segmentation. From a grey scale image, Thresholding are often accustomed produce binary pictures. Color pictures also can be threshold. One approach is to designate a separate threshold for every of the colour parts of the image so mix them with associate degree AND operation.

This reflects the manner the camera works and the way the info is hold on within the laptop, however it doesn't correspond to the manner that folks acknowledge color.

Therefore, the HSL and HSV color models ar additional typically used; note that since hue may be a circular amount it needs circular Thresholding.

Otsu's methodology is employed to mechanically perform clustering-based image thresholding, or, the reduction of a graylevel image to a binary image. The algorithmic program assumes that the image contains 2 categories of pixels following bi-modal bar chart (foreground pixels and background pixels), it then calculates the optimum threshold separating the 2 categories in order that their combined unfold (intra-class variance) is marginal.

In Otsu's methodology we have a tendency to thoroughly look for the edge that minimizes the intra-class variance (the variance inside the class), outlined as a weighted total of variances of the 2 classes:

Weights are the possibilities of the 2 categories separated by a threshold and variances of those categories. Otsu shows that minimizing the intra-class variance is that the same as maximising inter-class variance: which is expressed in terms of sophistication chances.

Algorithm

- Compute histogram and probabilities of each intensity level
- Set up initial $\omega_i(0)$and $\mu_i(0)$
- Step through all possible thresholds $t = 1 \ldots$ maximum intensity
  - Update $\omega_i$and μ_i
  - Compute $\sigma_b^2(t)$
- Desired threshold corresponds to the maximum $\sigma_b^2(t)$
- You can compute two maxima (and two corresponding thresholds). $\sigma_{b1}^2(t)$is the greater max and $\sigma_{b2}^2(t)$is the greater or equal maximum
- Desired threshold = $\frac{\text{threshold}_1 + \text{threshold}_2}{2}$

System Architecture:

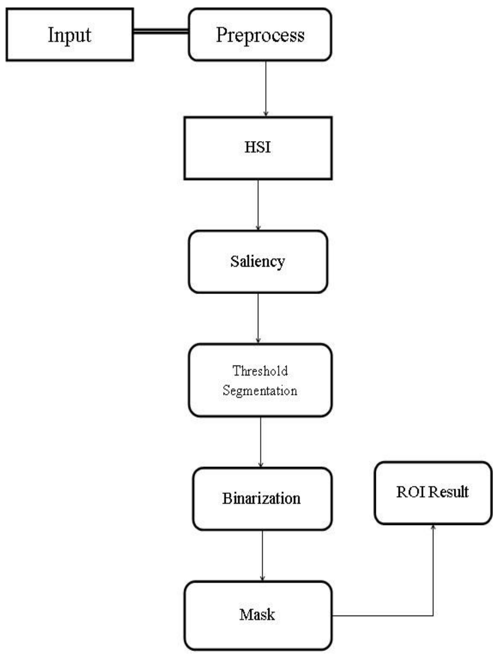

Fig. *System architecture*

6. Conclusion And Future Enhancement

The object of the image is detected exactly. The detection of ROI imageand the retrieval is very useful in many of the processes. The process starts from HIS transformation. The reason by HSI channel transformations are visually provides enhanced region for Saliency. So we preprocessed the image as HSI transformation and then we convert the image into Salient view. The saliency of the image provides the object in front position as lightening effect. The remaining backgrounds became dark. The followed by Thresholding, Binarization and finally by masking with original image we obtained the ROI extracted from the image. The performance of the proposed system is high compared to the techniques that are used to identify the ROIRegions in images. The process can be further developed by recognizing method and classification methods. The features used can be further changed which recognizes the persons in a better way. For feature extraction additional features such as various thresholding methods can be used. For this analysis and simulation we have used Matlab 13a.

References

[1] Z. Li and L. Itti, “Saliency and gist features for target detection in satelliteimages,” IEEE Trans. Image Process., vol. 20, pp. 2017–2029, Jul. 2011.

[2] L. Itti, C. Koch, and E. Niebur, “A model of saliency-based visual attentionfor rapid scene analysis,”IEEE Trans. Pattern Anal. Mach. Intell., vol. 20,no. 11, pp. 1254–1259, Nov. 1998.

[3] C. Koch and S. Ullman, “Shifts in selective visual attention: towards theunderlying neural circuitry,” Human Neurobiol., vol. 4, no. 4, p. 219, 1985.

[4] D. Dai and W. Yang, “Satellite image classification via two-layer sparsecoding with biased image representation,” IEEEGeosci. Remote Sens.Lett., vol. 8, no. 1, pp. 173–176, Jan. 2011.

[5] L. Zhang, H. Li, P. Wang, and X. Yu, “Detection of regions of interest in ahigh-spatial-resolution remote sensing image based on an adaptive spatialsubsampling visual attention model,” GISci.Remote Sens., vol. 50, no. 1,pp. 112–132, 2013.

[6] R. Achanta, S. Hemami, F. Estrada, and S. Susstrunk, “Frequency-tunedsalient region detection,” inProc. IEEE Conf. CVPR, 2009, pp. 1597–1604.

[7] X. Hou and L. Zhang, “Saliency detection: A spectral residual approach,” in Proc. IEEE Conf. CVPR, 2007, pp. 1–8.

[8] C. Guo and L. Zhang, “A novel multiresolution spatiotemporal saliency detection model and its applications in image and video compression,” IEEE Trans. Image Process., vol. 19, no. 1, pp. 185–198, Jan. 2010.

[9] S. Rahmani, M. Strait, D. Merkurjev, M. Moeller, and T. Wittman, “Anadaptive IHS pan-sharpening method,” IEEEGeosci. Remote Sens. Lett.,vol. 7, no. 4, pp. 746–750, Oct. 2010.

[10] T. A. Ell, “Quaternion-Fourier transforms for analysis of two-dimensionallinear time-invariant partial differential systems,” in Proc. 32nd IEEEConf. Decision Control, 1993, pp. 1830–1841.

[11] S. J. Sangwine, “Fourier transforms of colour images using quaternion orhypercomplex, numbers,”Electron. Lett., vol. 32, no. 21, pp. 1979–1980,Oct. 1996.

[12] A. V. Oppenheim and J. S. Lim, “The importance of phase in signals,”Proc. IEEE, vol. 69, no. 5, pp. 529–541, May 1981.

[13] P. Burt and E. Adelson, “The Laplacian pyramid as a compact imagecode,” IEEE Trans. Commun., vol. COM-31, pp. 532–540, Apr. 1983.