IJCSET – Volume 4, Issue 10 OCTOBER 2018. ISSN: 2455-9091 Pages: 1-5

International Journal of Computer Science Engineering & Technology
Approved by
National Science Library (NSL)
National Institute of Science Communication and Information Resources (NISCAIR)
Council of Scientific and Industrial Research (CSIR)- New Delhi, India.
ISSN :2455-9091

ANALYSIS OF FEATURE LEARNING AND IMAGE SEGMENTATION

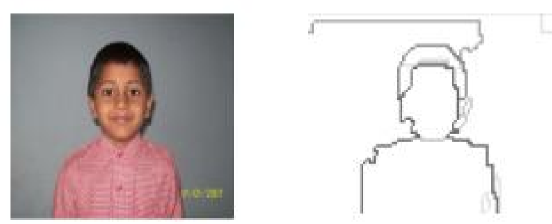
[1] M.Pushpalatha, [2] M.Yuvarani,
[1] Assistant Professor, 2 M.Phil Research Scholar,
[1,2] Department of Computer Science & Applications,
[1,2] Padmavani arts and Science college for women, Salem-11.

ABSTRACT- Feature extraction is the most important step in image classification. It helps in extracting the feature of an image as ideal as possible. Feature extraction techniques are applied to get the feature that will be useful in classifying and recognizing the images. Low-level feature extractions are based on finding the points, lines, edge, etc while high level feature extraction methods use the low level feature to provide more significant information for further processing of Image analysis. This paper discussed about feature learning, image segmentation, edge detection for image segmentation, learning applied image analyses and some parameters.

Keywords- [Image Segmentation, Edge Detection, Parameters, Feature Analyst.]

1. INTRODUCTION

Segmentation is the process of partitioning a digital image into its constituent parts or objects or regions. These regions share common characteristics based on color, intensity, texture, etc. The first step in image analysis is to segment an image based on discontinuity detection technique (Edge-based) or similarity detection technique (Region-based). In discontinuity detection technique, one approach is to partition an image based on abrupt changes in intensity near the edges and it is known as Edge-based segmentation. In Similarity detection technique, region based segmentation partitions an image into regions that are similar according to a set of predefined criteria. Figure 1 represented into Region-based segmentation looks for uniformity within a sub-region, based on a desired property, e.g., intensity, color, and texture.



Original Image Region Based Segmentation

Figure 1: Region Based Segmentation

High-resolution satellite imaging of the earth and its environment represents an important new technology for the creation and maintenance of geographic information systems databases. Geographic features such as road networks, building footprints, vegetation, etc. form the backbone of GIS mapping services for military intelligence, telecommunications, agriculture, land-use planning, and many other vertical market applications. Keeping geographic features current and up-to-date, however, represents a major bottleneck in the exploitation of high-resolution satellite imagery. Image segmentation is the foundation of object recognition and computer vision. In general, image noise should be eliminated through image preprocessing. And there is some specifically given work (such as region extraction and image marking) to do after the main operation of image segmentation for the sake of getting better visual effect. Two major computer vision problems, image segmentation and object recognition, have been traditionally dealt with using a strict, bottom-up ordering. Image segmentation is the process of partitioning/subdividing a digital image into multiple meaningful regions or sets of pixels regions with respect to a particular application. The segmentation is based on measurements taken from the image and might be grey level, colour, texture, depth or motion. The result of image segmentation is a set of segments that collectively cover the entire image. All the pixels in region are similar with respect to some characteristic or computed property, such as color, intensity, or texture. Adjacent regions differ with respect to same characteristics. Edge detection is one of the frequently used techniques in digital image processing. Object recognition is the task of finding a given object in an image or video sequence. For any object in an image, there are many 'features' which are interesting points on the object that can be extracted to provide a "feature" description of the object. This description extracted from a training image can then be used to identify the object when attempting to locate the object in a test image containing many other objects.

The Feature Analyst software provides users with a powerful toolset for extracting object-specific, geographic features from high-resolution panchromatic and multi-spectral imagery. The result is a tremendous cost savings in labor and a new workflow process for maintaining the temporal currency of geographic data. Until recently there were two approaches for identifying and extracting objects of interest in remotely sensed images: manual and task-specific automated. The manual approach involves the use of trained image analysts, who manually identify features of interest using various image analysis and digitizing tools. Features are hand-digitized, attributed and validated during geospatial, data-production workflows. Although this is still the predominant approach, it falls short of meeting government and commercial sector needs for three key reasons: (1) the lack of available trained analysts; (2) the laborious, time-consuming nature of manual feature collection; and (3) the high-labor costs involved in manual production methods.

2. EDGE DETECTION FOR IMAGE SEGMENTATION

Active contours are popular technique for image segmentation. An advantage of active contours as image segmentation methods is that they partition an image into sub-regions with continuous boundaries. There are two kinds of active contour models: Edge-based active contours use an edge detector, usually based on the image gradient, to find the boundaries of sub-regions and to attract the contours to the detected boundaries. Region-based active contours use the statistical information of image intensity within each subset instead of searching geometrical boundaries. The difference between Region-based segmentation and edge-based segmentation is shown in Table 1.

Region-based segmentation	Edge based segmentation
Closed boundaries	Boundaries formed not necessarily closed
Multi-spectral images improve segmentation	No significant improvement for multi-spectral images
Computation based on similarity	Computation based on difference

Table 1: Differences between Region-based segmentation and edge-based segmentation

An Edge in an image is a significant local change in the image intensity, usually associated with a discontinuity in either the image intensity or the first derivative of the image intensity. The three steps in Edge detection process is a) Filtering b) Enhancement and c) Detection.

3. LEARNING APPLIED TO IMAGE ANALYSIS

An inductive learner is a system that learns from a set of labeled examples. A teacher provides the output for each example, and the set of labeled examples given to a learner is called a training set. The task of inductive learning is to generate from the training set a concept description that correctly predicts the output of all future examples, not just those from the training set. Many inductive-learning algorithms have been previously studied. These algorithms differ both in their concept-representation language, and in their method (or bias) of constructing a concept within this language. These differences are important because they determine the concepts that a classifier induces. Nearly all modern vision systems rely on hand-crafted determinations of which operators work best for an image and what parameter settings work best for those operators. Such operators not only vary across the desired object to be recognized, but also across resolutions of the same image. Learning in object recognition tasks works by (a) acquiring task-specific knowledge by watching a user perform the tasks and (b) then refining the existing knowledge based on feedback provided by the user. In this approach, the parameters for these objects are tuned by the learning algorithm "on-the-fly" during the deployment of the algorithm. It is not surprising, therefore, that visual learning can greatly increase the accuracy of a visual system. In addition to increasing overall accuracy, visual learning can yield object-recognition systems that are much easier and faster to develop for a particular problem and resolution. A model can be trained for one task, and then used to "seed" the development of a similar problem. This supports the immediate deployment of a new problem with the ability to fine-tune and improve itself though experience. By having a learning system at the core of the object recognition task, one can easily transfer pertinent knowledge from one problem to another, even though that knowledge may be far from perfect. This approach overcomes prior research on visual learning that primarily consisted of hard-coded, problem-specific programs. Feature Analyst is based on an inductive learning approach to object recognition and feature extraction. Feature Analyst was developed as a plug-in toolset for established GIS and remote sensing software packages in order to integrate the AFE workflow into traditional map production environments. In the Feature Analyst system, the image analyst creates feature extraction models by simply classifying on the computer screen the objects of interest in a small subset of the image or images. This approach leverages the natural ability of humans to recognize complex objects in an image. Users with little computational knowledge can effectively create object-oriented models for the tasks under consideration. In addition, users can focus on different features of interest, with the system dynamically learning these features. Feature Analyst provides a paradigm shift and distinguishes itself from other learning and AFE approaches in that it: (a) incorporates advanced machine learning techniques to provide unparalleled levels of accuracy, (b) utilizes spectral, spatial, temporal, and ancillary information to model the feature extraction process, (c) provides the ability to remove clutter, (d) provides an exceedingly simple interface for feature extraction, (e) automatically generates scripts of each interactive learning process, which can be applied to a large set of images, and (f) provides a set of clean-up and attribution tools to provide end-to-end workflows for geospatial data production.

4. PARAMETER PERFORMANCES USING IMAGE SEGMENTATION

The results are analyzed and evaluated in terms of (i) Accuracy, (ii) Specificity, (iii)

Sensitivity, (iv) Precision & Recall. The accuracy, sensitivity and specificity of the classifier is measured. The accuracy represents the efficiency of the process. The sensitivity shows how the algorithm gives correct classification. The specificity shows how the algorithm rejects the wrongly classification.

4.1 Accuracy

Accuracy of a classifier is termed as the competence of correctness in classifier. A quantity of a classification technique emulates the equivalent number of times that the model is correct when it is applied to data. It is also mentioned as the ratio of true correct assessment and all assessment.

$$\text{Accuracy} = \frac{TN + TP}{TN + TP + FN + FP}$$

$$= \frac{\text{Sum of true positive rate and true negative rate}}{\text{All assessment}}$$

4.2 Specificity

Specificity of a classifier describes the the ratio of respective true negative and the sum of corresponding true negative and false positive. It is otherwise termed as true negative rate.

$$\text{Specificity \%} = \frac{\text{TN}}{\text{No of TN+No of FP}}$$

4.3. Sensitivity

Sensitivity is defined as the ratio of the true positive and the number of true positive and the false negative.it is also called as true positive rate.

$$\textbf{Sensitivity \%} = \frac{\text{TP}}{\text{No of FN+No of TP}}$$

4.4. Precision and Recall

Precision is explained as the ratio of true positive and the sum of true positive and false positive it is called as true positive rate. Recall is described as the ratio of true positive and sum of true positive and false negative rate.

Precision and Recall Calculation

$$P = \frac{\text{TP}}{\text{TP+FP}}$$

CONCLUSION

This paper shows that when feature extraction technique are applied for the image analysis region based shape feature are more robust as these methods extract all the shape information. Feature Analyst provides a comprehensive machine learning based system for assisted and automated feature extraction using earth imagery in commercial GIS, image processing and software. Analyzed and evaluated segmentation in terms of Accuracy, Classification rate, Time and memory consumption, Precision recall, trust under dimension and over-all trust score evaluation.

REFERENCES

[1]. Dong ping Tian, “A Review on Image Feature Extraction and Representation Techniques”, International Journal of Multimedia and Ubiquitous Engineering Vol. 8, No. 4, July, 2013,pp 385-396.

[2]. Revathi, R., & Hemalatha, M. An Emerging Trend of Feature Extraction Method In Video Processing. Cs & It-Cscp, 2012 69–80.

[3]. Jauregi, E., Lazkano, E., & Sierra, B. (2010). Object recognition using region detection and feature extraction. Towards Autonomous Robotic Systems, 1, 104–111.

[4] P. X. Huang, B. J. Boom, and R. B. Fisher, "Hierarchical classification with reject option for live fish recognition," Machine Vision and Applications, vol. 26, pp. 89-102, 2015.

[5] P. X. Huang, B. J. Boom, and R. B. Fisher, "Underwater live fish recognition using a balanceguaranteed optimized tree," in Asian Conference on Computer Vision, 2012, pp. 422-433.

[6] M.-C. Chuang, J.-N. Hwang, K. Williams, and R. Towler, "Tracking live fish from low-contrast and low-frame-rate stereo videos," IEEE Transactions on Circuits and Systems for Video Technology, vol. 25, pp. 167-179, 2015.

[7] J. Ren, X. Jiang, and J. Yuan, "Noise-resistant local binary pattern with an embedded error-correction mechanism," IEEE

Transactions on Image Processing, vol. 22, pp. 4049-4060, 2013.

[8] M.-C. Chuang, J.-N. Hwang, K. Williams, and R. Towler, "Multiple fish tracking via Viterbi data association for low-frame-rate underwater camera systems," in Circuits and Systems (ISCAS), 2013 IEEE International Symposium on, 2013, pp. 2400- 2403.

[9] C.-T. Chu, J.-N. Hwang, H.-I. Pai, and K.-M. Lan, "Tracking human under occlusion based on adaptive multiple kernels with projected gradients," IEEE Transactions on Multimedia, vol. 15, pp. 1602-1615, 2013.

[10] E. Gavves, B. Fernando, C. G. Snoek, A. W. Smeulders, and T. Tuytelaars, "Fine-grained categorization by alignments," in Proceedings of the IEEE International Conference on Computer Vision, 2013, pp. 1713-1720.

e, vol. 9, p. e96028, 2014.

[11] K. Terayama, K. Hongo, H. Habe, and M.-a. Sakagami, "Appearance-based multiple fish tracking for collective motion analysis," in Pattern Recognition (ACPR), 2015 3rd IAPR Asian Conference on, 2015, pp. 361-365.

[12] Z.-M. Qian, X. E. Cheng, and Y. Q. Chen, "Automatically detect and track multiple fish swimming in shallow water with frequent occlusion," PloS one, vol. 9, p. e106506, 2014.

[13] S. J. Pittman, M. E. Monaco, A. M. Friedlander, B. Legare, R. S. Nemeth, M. S. Kendall, et al., "Fish with chips: Tracking reef fish movements to evaluate size and connectivity of Caribbean marine protected areas," PloS on