AN OVERVIEW ON IMAGE CLASSIFICATION METHODS IN IMAGE PROCESSING

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Abstract
Classification is based on the description, texture or similarity of items or things. Image classification considers two approaches - supervised classification and unsupervised classification. Pixels are the unit represented in an image. Image classification groups the pixels in different classes. The image classification includes - image acquisition, image pre-processing, image segmentation. The image classification methods are-Support Vector Machine (SVM), Artificial Neural Network (ANN) and Decision Tree (DT).Index Terms: Image Processing, Support Vector Machine (SVM), Artificial Neural Network (ANN) and Decision Tree (DT).

I. INTRODUCTION

The image classification includes image pre -processing, image sensors, object detection, object segmentation, feature extraction and object classification. The Image Classification system consist of a database that contain predefined patterns that compare with an object to classify to suitable category. Image Classification is an vital task in various fields such as remote sensing, biometry, biomedical images, and robot navigation.

A typical classification system comprises of a camera fixed high on the interested zone, where images are captured and accordingly processed.

In Supervised classification, some pixels are known grouped and gives the label to classes. This process is known as training. After that classifier uses trained pixels for classify other images

In Unsupervised classification, pixels are grouped with the help of their properties. This process is known as clustering and groups are known as a cluster. In this user decide how many clusters he wants to implement. The unsupervised classification is used when no trained pixels are available.

In Image classification different methods are used: Decision Tree, Artificial Neural Net work (ANN) and Support Vector Machine (SVM).

II. RELATED WORK

The paper by Jianxin Wu et al. [1], the challenge of image classification from a big dataset is the subject of the recent research work. The support vector machine (SVM) classifier show to be very useful in image classification.
The paper by Fuliang Wang And Feng Wang et al. [2] explains, Artificial Neural Network is efficiently managing the noisy data and this method capable of representing AND, OR and NOT.
Similarly, Monica Bianchini et al. [3] also discusses the artificial neural network classification technique.
The paper by Serafeim Moustakidis et al. [5] explains about the novel fuzzy decision tree where the node discriminations are implemented via binary SVMs.
Lizhen Lu et al. [6], Decision Tree classifier calculate the class membership by partitioning the input into categories.

Cheng-HsuanLi et al. [7] discuss, A Spatial–Contextual Support Vector Machine for Remotely Sensed Image Classification.

Diverse image classification methods have their advantages and some disadvantages. Some methods are the combination of another classifiers in image classification.

A classifier is considering more capable if they can predict correctly. Image Classification is significant to extract the pattern or feature from the available input datasets.

III. IMAGE CLASSIFICATION STEPS

Image Classification includes following steps:

a. Image Acquisition: acquire the images for image processing.

b. Image Pre-Processing: In preprocessing image transformation, noise removal, at morphemically correction techniques are used.

c. Feature Extraction: Extracting the important characteristics of the image.

Classification: The images are classified based on the extracted characteristics into predefined categories by using suitable methods that evaluate the image pattern with images which inside the database.

IV. IMAGE CLASSIFICATION METHODS

The Image Classification methods are:

1) Support Vector Machine : This method constructs a set of hyperplanes in a high dimensional space, which is use for classification or regression. The good separation achieved by the hyperplane. SVM uses non -parametric with binary classifier approach and handles more input data efficiently. Accuracy depends on hyperplane selection.

The Structure of the SVM algorithm is more complicated than other methods. This gives the low result transparency.

2) Artificial Neural Network (ANN): Artificial neural network is a type of artificial intelligence that emits some functions of the human mind. An ANN is having a sequence of layers. Each layer of neural network system consist of a set of neurons. Neurons of all layers are linked by weighted connections to all neurons of the preceding and succeeding layers. The accuracy depends on the number of input and structure of the network. ANN is non-parametric approach.

In this method, the classification of the input is very fast, but the training process is slow. Choosing correct architecture is tough.

3) Decision Tree: Decision tree is a tree-like graph of decisions. Each branch represent the decisions to be made graphically. It is a non-parametric supervised approach. It partition input into uniform classes. This method permit the acceptation and rejection of class label at each intermediate stage. This method gives the set of rules after classification that should be understood

V. COMPARSION OF IMAGE CLASSIFICATION METHODS

The table shows the advantages and disadvantages of the image classification methods.

Method	Advantages	Disadvantages
1.Support Vector Machine (SVM)	• Deliver unique solution. • Very capable than other methods. • evade over-fitting	• High algorithm complexity • Run slowly
2. Artificial Neural Network (ANN)	• Robust to noisy training dataset • Very efficient for large dataset	• High computational cost • Lazy learner
3.Decision Tree (DT)	• Require little hard work from users • Easy to interpret and explain	• Splits are very sensitive to training data set • High classification error rate

Table 1: Advantages and Disadvantages of image classification methods

VI. CONCLUSION

This paper gives the concise knowledge on some supervised classification methods used in Image Classification. The most common approach for image classification is non -parametric. This survey provides the some diverse classification method with their some limitations.

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