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EVOLUTIONARY METHODS FOR IMAGE CLASSIFICATION: A REVIEW

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ABSTRACT

Image classification has earned enormous attention due to the advent of modern day applications involving image base information and now an extensive research has been carried out in this field. It is important to study earlier research and work done to know the basic knowledge and techniques used for classification of images. This paper comprises brief review of work done by researchers and scientist in the field of image classification.

KEYWORDS: Features, Genetic, optimization

INTRODUCTION

Image classification methods

Farzaneh Keyvanfard *et al.*, (2013) performed specificity enhancement in classification of breast MRI lesion based on multi-classifier. They applied GA and forward selection for searching of significant input features. For classification of database, they combined together three different classifiers that produce the best results among a number of classifiers. This improved the performance of classification. In their work they classified a total of 112 histopathologically verified breast lesions as benign and malignant groups. They considered several neural networks classifiers like MLP, PNN, GRNN, and RBF and also support vector machine for their experiment. When the same results have been achieved from two of the classifiers, final detection as malignant or benign has been evaluated for each lesion. According to the experimental results the proposed method is capable of selecting significant features with improved classification accuracy.

Chih-Fong Tsai *et al.*, (2013) performed feature selection and instance selection based on genetic algorithms using different priorities to examine the classification performances over different domain datasets. . They conducted experiments to find out the performance differences when both feature and instance selection are performed and when only one method from feature and instance selection are applied over different domain datasets. According to the experimental results, performing both feature and instance selection usually make the classifiers perform slightly poorer but largely reduces the computational effort of training the classifiers as opposed to performing feature and instance selection individually. They proposed that performing feature selection first and instance selection second is the optimal solution for data preprocessing in data mining.

S. Rajesh *et al.*, (2013) proposed a Genetic Algorithm based Feature Subset Selection Method for Land Cover/ Land Use Mapping Using Wavelet Packet Transform. The feature set is combination of Wavelet Packet Statistical and Wavelet Packet Co-occurrence textural feature. To reduce the complexity and increase the accuracy of classification, a multi-objective GA is used for feature subset selection. Classification of the LISS IV satellite images is done using neural networks. . The accuracy of the classified data is assessed on the basis of four indices - user's accuracy, producer's accuracy, overall accuracy and kappa co-efficient. Experimental results show that the proposed Genetic Algorithm approach with lesser number of optimal features produces comparable results with that of our earlier approach using more features.

Pedergnana, M. *et al.*, (2013) developed a novel Technique for Optimal Feature Selection in Attribute Profiles for classification of remote sensing data. In this technique GA is used to automatically optimize the selection of the optimal features from the profiles. They divide the filtered images that compose the profile into three classes based upon their

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discriminative power during classification. A random forest classifier is used to allocate a rank to each feature to measure its importance and then division of images into classes is done corresponding to high, medium, and low importance. The set of images with the lowest importance are removed from the profile. The set of images with the highest importance is preserved for classification. And the set of images with medium importance is selected for applying the proposed technique. According to the experimental results, the proposed technique achieves significantly high classification accuracy values while employed to classify three hyperspectral data sets.

Mohanty, *et al.*, (2013) proposed a novel image mining technique for classification of mammograms using hybrid feature selection. They experimented on a mammogram image dataset which contain total of 26 features including histogram intensity features and gray-level co-occurrence matrix features. To reduce the dimensionality they make use of branch and bound algorithm which approximately reduces 75% of the features. For classification, they have used decision tree classifier. They also tested their results on dataset of 300 images taken from MIAS of different types. According to the experiments conducted, classification accuracy of approximately 97.7% is achieved.

Azizi, N *et al.*, (2014) proposed a new hybrid method combining genetic algorithm and support vector machine classifier. This is an application to CAD (Computer-Assisted Diagnosis) systems to help specialists in their clinical interpretation of mammograms. They used a number of different features in their work like texture features based on co-occurrence matrix and shape features based on Hu moments and central moments characterizing the extracted masses. To reduce dimensionality and optimize classification process, genetic algorithm is used for feature subset selection and SVM classifier with Gaussian kernel function is used as a classifier. Experimental results show the effectiveness of the proposed approach.

Ling Wang, *et al.*, (2014) introduced a feature selection method based on meta-heuristics for biomedicine. In biomedical problems, the dimensionality is very high i.e. the number of features is usually more than hundreds, thousands and even ten thousands which is a challenge for feature selection methods. In this paper, six meta-heuristics, that is, MBDE, DBHS, GA, DBPSO, BACO and QEA are introduced into feature selection and the performance of the algorithms is analyzed and compared with each other for solving feature selection in biomedicine more effectively. Experiments conducted on a set of feature selection benchmark problems that are designed and yielded for the performance test and comparison. Experimental results demonstrate that it is essential to carefully choose a proper meta-heuristic for feature selection in practical biomedical problems with high dimensionality. However, on low-dimensional feature selection problems all the meta-heuristics are powerful enough to achieve the ideal results.

CONCLUSION

This paper gives a brief overview about methods for Image Classification. Advancements are going on in this specific domain of image classification. Continuous evolution in this area has added various dimensions in base atoms of concerned area. This study will be helpful for those working in the area of Methods for Image Classification.

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