ABSTRACT

IMAGE CATEGORIZATION USING STATE-OF-THE-ART METHODS

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The number of textile pictures containing textile patterns has increased very much with rapid progression of the textile industry. Thus, the automatic classification of the textile image is necessary. In this study, some systems were developed to provide automatic classification of a large number of textile pictures. These systems were designed with Support Vector Machine, Multilayer Perceptron, K-Nearest Neighbor and Naive Bayes classification methods. We have used two datasets for training and testing stage. There are seven textile design classes as "Flowery", "Spotted", "Horizontal Striped", "Vertical Striped", "Plaided", "45 Degree Striped" and "135 Degrees Striped" in the training and testing datasets. The systems in this study are composed of preprocessing, feature extraction, training and testing of the system phases. All textile pictures are converted to black-and-white images in the preprocessing stage. Edge detection process of textile pictures is made by the edge detection filters as Prewitt, Sobel, LoG and Zero-Cross. In addition, the thinning (skeletonization) process is also applied. In the feature extraction stage, the frequencies of 2x2, 3x3 and 4x4 kernel matrices in the image are calculated for each textile pictures and normalized by dividing the total frequencies of the picture. Thus, the attribute vectors of each textile image are obtained. In the training phase according to the methods, the models representing each classes are composed by training all attribute vectors in each class. In the testing phase, the success of the system is calculated by using textile patterns in testing datasets and the class models developed in the training phase. Accuracy and F-Measure values are used for computing the success of the systems. The most successful system has been determined by comparing the developed systems.

Keywords: Textile Image, K-Nearest Neighbor, Multi-layer Perceptron, Support Vector Machines, Naive Bayes