

# IMAGE RECOGNITION USING UNSUPERVISED LEARNING BASED AUTOMATIC FUZZY CLUSTERING ALGORITHM

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## ABSTRACT

This article proposes a novel techniques for unsupervised learning in image recognition using automatic fuzzy clustering algorithm (AFCA) for discrete data. There are two main stages in order to recognize images in this study. First of all, new technique is shown to extract sixty four textural features from  $n$  images represented by a matrix  $n \times 64$ . Afterwards, we use the proposed method based on Hausdorff distance to simultaneously determine the appropriate number of clusters. At the end of the unsupervised clustering process, discrete data belonging to the same cluster converge to the same position, which represents the cluster's center. After determining number of cluster, we have probability of assigning objects to the established clusters. The simulation result built by Matlab program shows the effectiveness of the proposed method using the corrected rand, the partition entropy, and the partition coefficients index. The experimental outcomes illustrate that the proposed method is better than the existing ones as Fuzzy C-mean. As a result, we believe that the proposed method is filled with a potential possibility which [can be applied](#) in practical realization.

**Key words:** *automatic algorithm, Hausdorff distance, image recognition, fuzzy, unsupervised clustering*

## 1. INTRODUCTION

In recent years, unsupervised learning techniques [have made](#) a great contribution to machine learning that is used to find the common natural cluster structure of an unlabeled data set. The conventional supervised learning methods utilized in many fields, containing as data analysis, [require](#) a supervisor to guide the machine, labeling inputs with the outputs we want the machine to learn from. Nevertheless, this labeling process is complex stage, especially when a number of data to label are being created up to the billions of items every day, such as data images on the Internet. As a result, unsupervised learning techniques are required to solve this limitation. In unsupervised learning, unsupervised clustering is an important data mining technique, used to divide data points into groups. Such those objects in the same group will have a high degree of similarity while objects belonging to the other ones will have a high degree of dissimilarity. It has been widely used in many applications such as data analysis, pattern recognition and image processing. [1, 2]

Unsupervised item recognition plays a vital role in many fields such as artificial intelligence, architecture, and engineering. Although it has been concerned by many scientists in many areas for a