



A ROBUST FUZZY CLUSTERING APPROACH AND ITS APPLICATION TO PRINCIPAL COMPONENT ANALYSIS

YING-KUEI YANG¹, CHIEN-NAN LEE² AND HORNG-LIN SHIEH³

*¹Dept. of Electrical Engineering
National Taiwan University of Science & Technology
Taipei, TAIWAN*

e-mail: ykyang@mouse.ee.ntust.edu.tw

*²Dept. of Electronic Engineering
Oriental Institute of Technology
Taipei, TAIWAN*

*³Dept. of Electrical Engineering
Saint John's University
Taipei, TAIWAN*

ABSTRACT—A robust fuzzy clustering approach is proposed to simplify the task of principal component analysis (PCA) by reducing the data complexity of an image. This approach performs well on function curves and character images that not only have loops, sharp corners and intersections but also include data with noise and outliers. The proposed approach is composed of two phases: firstly, input data are clustered using the proposed distance analysis to get good and reasonable number of clusters; secondly, the input data are further re-clustered by the proposed robust fuzzy c-means (RFCM) to mitigate the influence of noise and outlier data so that a good result of principal components can be found. Experimental results have shown the approach works well on PCA for both curves and images despite their input data sets include loops, corners, intersections, noise and outliers.