Time & Location: March 27, 2017 at 11:00 AM in HEC 113
Title: HIGH PERFORMANCE IMAGE RECOGNITION TECHNIQUES APPLIED TO FACE RECOGNITION

In the field of computer vision, pattern recognition, and image processing, face recognition has become a popular research topic. This is due to its widespread applications in security and control, which allow the identified individual to access secure areas, personal information, etc. The identification of the individuals using face recognition techniques is a challenging task. This is due to the variations resulting from facial expressions, makeup, rotations, illuminations, gestures, etc. In addition, facial images contain a great deal of redundant information, which negatively affects the performance of the recognition system. The performance of any recognition system depends on three factors: the storage requirements, the computational complexity, and the recognition rates.

Novel recognition systems are presented and developed in this dissertation. Each system contains three main steps, namely, preprocessing, feature extraction, and classification. Several preprocessing steps, such as cropping or facial detection, dividing the facial image into sub-images, etc. are applied to the facial images. This reduces the effect of the irrelevant information (background) and improves the system performance. Each face recognition system employs different integrated tools in the feature extraction step. These tools, Two Dimensional Discrete Multiwavelet Transform (2D DMWT), 2D Radon Transform (2D RT), 2D or 3D DWT, Fast Independent Component Analysis (FastICA), etc. are applied to the processed facial images to reduce the dimensionality of the database and to obtain discriminating features. Each proposed system produces a unique representation, and achieves better performance than the state-of-the-art methods. In this dissertation, either a Neural Network based classifier or Euclidean distance is used for classification purposes.

Five widely used databases, namely, ORL, YALE, FERET, FEI, and LFW, each containing different facial variations, such as light condition, rotations, facial expressions, facial details, etc. are used to evaluate the proposed systems. The experimental results of the proposed systems are analyzed using K-folds Cross Validation (CV). The experimental results confirm the improvements in the computational complexity, the storage requirements, as well as the recognition rates as compared to some recently reported methods.

Major: Electrical Engineering

Educational Career:
Bachelor's of Electrical Engineering, BS, 2004, University of Babylon-Iraq
Master's of Electrical Engineering, MS, 2006, University of Technology-Iraq

Committee in Charge:
Wasfy B. Mikhael, Chair, Electrical & Computer Engineering
George Atia, Co-Chair, Electrical & Computer Engineering
W. Linwood Jones, Electrical & Computer Engineering
Lei Wei, Electrical & Computer Engineering
Ahmad Elshennawy, Industrial Engineering & Management Systems

Approved for distribution by Wasfy B. Mikhael, Committee Chair, on March 3, 2017.

The public is welcome to attend.