Announcing the Final Examination of Waleed Alrasheed for the degree of Doctor of Philosophy

Time & Location: October 16, 2013 at 1:00 PM in HEC 450
Title: Time and Space Efficient Techniques for Facial Recognition

In recent years, there has been an increasing interest in face recognition. As a result, many new facial recognition techniques have been introduced. Recent developments in the field of face recognition have led to an increase in the number of available face recognition commercial products. However, Face recognition techniques are currently constrained by three main factors: recognition accuracy, computational complexity, and storage requirements. The problem is that most of the current face recognition techniques succeed in improving one or two of these factors at the expense of the others.

In this dissertation, three novel face recognition techniques that improve the storage and computational requirements of face recognition systems are presented and analyzed.

Two of the three novel face recognition techniques to be introduced, namely, Quantized/truncated Transform Domain (QTD) and Frequency Domain Thresholding and Quantization (FD-TQ). Both techniques utilize the Two-dimensional Discrete Cosine Transform (DCT-II), which reduces the dimensionality of facial feature images, thereby reducing the computational complexity. The third novel face recognition technique is introduced, namely, the Normalized Histogram Intensity (NHI). It is based on utilizing the statistical histogram calculations of possessubimages, which reduces the computational complexity and the needed storage requirements.

Various simulation experiments using MATLAB were conducted to test the proposed methods. For the purpose of benchmarking the performance of the proposed methods, the simulation experiments were performed using current state-of-the-art face recognition techniques, namely, Two Dimensional Principal Component Analysis (2DPCA,) Two-Directional Two-Dimensional Principal Component Analysis ((2D)^2PCA,) and Transform Domain Two Dimensional Principal Component Analysis (TD2DPCA). The experiments were applied to the ORL, Yale, and FERET databases.

The experimental results for the proposed techniques confirm that the use of any of the three novel techniques examined in this study results in a significant reduction in computational complexity and storage requirements compared to the state-of-the-art techniques without sacrificing the recognition accuracy.

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Approved for distribution by Wasfy B. Mikhael, Committee Chair, on October 1, 2013.

The public is welcome to attend.