

Title: A Novel Triangular DCT Feature Extraction for Enhanced Face Recognition

Name: SHILPASHREE RAO

Affiliation: UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CA 90089 USA

INTRODUCTION:

Face Recognition is the process of identification of people in images or videos by comparing the features using various algorithms and computer vision techniques. The algorithms extract essential facial features and compare them to a database to locate the best match and generate the face recognition rate. These are operated to their level best when the images are pre-processed and devoid from unwanted noise. Elimination of noise and frequencies is performed using appropriate combination of various filters and transforms resulting in an improved and suitable image for further computations.

AIM:

To implement the novel face recognition algorithm for enhanced face recognition

MATERIALS AND METHODS:

The sequence of operations for face recognition comprises of the pre-processing techniques, feature extraction, selection and classification for accurate identification and complete substantiation of subject images. Initially, the face images are processed by Gaussian of Laplacian blurring with Median and Weiner filters for the removal of undesirable noise and frequencies, a unique approach in advancing the pre-processing techniques. The pre-processed images are applied to feature extraction transformations, namely, the Discrete Wavelet Transform (DWT) coupled with Slope-form Triangular Discrete Cosine Transform (STDCT) to generate critical essential features from the images. Primarily the feature vector space is searched for optimal selection of feature subset utilizing the Binary Particle Swarm Optimization (BPSO) search algorithm based on mutual behavior of bird flocking or fish schooling. Evaluation of the subset by the Euclidean Classifier produces reliable face recognition rate.

RESULTS:

The system dependability is attained by processing with standard databases like, the Color Facial Recognition Technology (FERET), Olivetti Research Laboratory (ORL) and Japanese Female Facial Expression (JAFPE). Induction of MATLAB to analyze the imaging methodologies with standard databases, demonstrates computation of slope of the hypotenuse of a right triangle in STDCT for reduced feature extraction. This novel technology transcends prevailing face recognition systems by generating enhanced face recognition rate with optimum selected features, on execution with multiple iterations, establishing propriety of the proposed system during the process of validation.

CONCLUSIONS:

The distinctive techniques of the pre-processing unit together with an innovative mathematical model for triangular feature extraction using STDCT and BPSO algorithm for feature selection has induced novelty in the face recognition system. Execution with FERET, ORL and JAFFE databases validates and enhances reliability of the techniques as the method probes solutions for face images with varying illuminations and expressions.

KEYWORDS:

Face recognition; Pre-processing; Slope-form Triangular Discrete Cosine Transform (STDCT); Binary Particle Swarm Optimization (BPSO)

BIOGRAPHY:

Ms. Shilpashree Rao is presently pursuing Masters in Electrical Engineering at University of Southern California, Los Angeles, CA. Secured selection on merit, as a Research Assistant to undertake current challenges in Deep Learning and Image Processing under the guidance of Prof. Jay. Kuo, USC, CA at the Media Communications Lab. Research interests include Machine Learning, Artificial Intelligence, Deep Learning and Image Processing. Contributed innovative concepts through projects, an IEEE research publication and couple of National publications.