

Pradeep Kakkar

Face Recognition for Real Time Application

Master's Thesis

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FACE RECOGNITION FOR REAL TIME APPLICATION

A Thesis

*Submitted in Partial Fulfilment of the
Requirements for the Award of the Degree
Of*

**MASTER OF TECHNOLOGY
IN
ELECTRONICS AND COMMUNICATION ENGINEERING**

**SUBMITTED BY
PRADEEP KAKKAR**

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Finally, I wish to dedicate Thesis to my family.

Abstract

Images containing faces are essential to intelligent vision-based human computer interaction, and research efforts in face processing include face recognition, face tracking, pose estimation, and expression recognition. The rapidly expanding research in face processing is based on the premise that information about a user's identity, state, and intent can be extracted from images and that computers can then react accordingly, e.g., by knowing person's identity, person may be authenticated to utilize a particular service or not. A first step of any face processing system is registering the locations in images where faces are present.

The local binary pattern is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a binary number. The LBP method can be seen as a unifying approach to the traditionally divergent statistical and structural models of texture analysis. Perhaps the most important property of the LBP operator in real-world applications is its invariance against monotonic gray level changes caused, e.g., by illumination variations. Another equally important is its computational simplicity, which makes it possible to analyze images in challenging real-time settings.

The success of LBP in face description is due to the discriminative power and computational simplicity of the LBP operator, and the robustness of LBP to mono-tonic gray scale changes caused by, for example, illumination variations. The use of histograms as features also makes the LBP approach robust to face misalignment and pose variations. For these reasons, the LBP methodology has already attained an established position in face analysis research.

Because finding an efficient spatiotemporal representation for face analysis from videos is challenging, most of the existing works limit the scope of the problem by discarding the facial dynamics and only considering the structure. Motivated by the psychophysical findings which indicate that facial movements can provide valuable information to face analysis, spatiotemporal LBP approaches for face, facial expression and gender recognition from videos were described. The extensive experimental analysis clearly assessed the excellent performance of the LBP based spatiotemporal representations for describing and analysing faces in videos. The efficiency

of the proposed approaches can be explained by the local nature of the spatiotemporal LBP descriptions, combined with the use of boosting for selecting the optimal features.

The conclusion was that LBP-based methods are an excellent election if one needs real-time operation as well as high recognition rates.

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