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Face recognition using illumination-invariant local patches (Conference Paper)

Shafie, A.A.[a], Hafiz, F.[b], Mustafah, Y.M.[a]

[a]Faculty of Engineering, International Islamic University, Jalan Gombak, 53100 Kuala Lumpur, Malaysia
[b]Faculty of Electrical Engineering, University of Technology MARA, Shah Alam, 40450 Selangor, Malaysia

Abstract

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Illumination variation that span globally and locally across the facial surface is one of the most important aspect in designing a robust face recognition system. The illumination variations due to changes in lighting conditions could produce different shape of shading on the face thus deforming the facial features. The effect of these variations is simply more severe in the presence of single-sample constraint since there would be many variables with very limited observations. Illumination variations have been modelled in literature as a series of undetermined multiplicative and additive noise, hence it is more convenient to eliminate or reduce the effect rather than computing them. In this paper, we present an illumination-invariant method where we use local features as basis for face classification which is obtained from partitioning histogram-equalized faces into smaller overlapping local patches (LPs). We can achieve illumination-invariance for these LPs by subtracting the vectors with local average illumination and then these vectors are logarithmically normalized to enhance the local contrast. The degree of invariance is controlled by a weight connected to the average intensity component. We have tested this method in single sample face recognition setting on AR Database and Extended YALE B Database. Recognition results show that the proposed method is suitable for robust face recognition since it achieve good performance in both even illumination and uneven illumination cases.

Indexed keywords

Engineering controlled terms:

- Additive noise
- Face classification
- Face recognition systems
- Illumination invariance
- Illumination invariant
- Illumination variation
- Lighting conditions
- Limited observations
- Uneven illuminations