

## LOCAL DIRECTIONAL PATTERN (LDP) FOR FACE RECOGNITION

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**ABSTRACT.** *This paper presents a novel local feature descriptor, the Local Directional Pattern (LDP), for recognizing human face. In the proposed feature, different edge responses around each pixel are meticulously encoded to distinguish all kinds of textures available in facial images. The LDP code is also robust enough to provide consistent representation in the presence of random noise and non-monotonic illumination variation. An LDP feature is obtained by computing the edge response values in all eight directions at each pixel position and generating a code from the relative strength magnitude. Each face is divided into small regions, from where LDP histograms are extracted and concatenated into a single feature vector to efficiently represent the facial image. The recognition is performed by template matching in accordance with CSU face identification evaluation system and evaluated with well studied FERET database. The recognition performance demonstrates the robustness of proposed LDP descriptor for representing appearance of facial image over other existing approaches including Local Binary Pattern (LBP).*

**Keywords:** Facial image representation, Local directional pattern, Texture feature, Face recognition, Local binary pattern

**1. Introduction.** Recent advancement in software and hardware technology has created more demand for personalized interaction with consumer products. Popular method for achieving this is done by identifying the users through human face recognition and enabling appropriate services. There are various services which can be enabled through this kind of recognition system, such as personalized TV program [1, 2], intelligent digital photography [3], smart home [4] and many more. In addition, face recognition does not require the cooperation of the individuals to be recognized. Therefore, it is a more acceptable tool [5] despite the existence of other biometric recognition approaches such as iris scans and fingerprint analysis. A recent survey on face recognition [6] explicates the significance and progress of this research domain [7]. However, robust face recognition system in uncontrolled environment is still a major challenge. The most critical aspect in any face recognition system is to find efficient facial features which can be used to represent the face appearance in changed environment. Any facial feature must meet some constraints to be considered as an efficient one. In short, a good facial feature should have properties like (i) it can discriminate different classes well while tolerating within class variation, (ii) it can be easily extracted from the raw face image to ensure fast processing and (iii) it can be described in a low dimensional feature space to ensure computational speed during classification step. It is not that obvious to find features which concurrently meet all these requirements [8] because the appearance of a face may encounter a large