
# Dynamic Texture Recognition With Video Set Based Collaborative Representation

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PII: S0262-8856(16)30032-4
DOI: doi: 10.1016/j.imavis.2016.03.006
Reference: IMAVIS 3473

To appear in: *Image and Vision Computing*

Received date: 15 September 2015
Revised date: 23 February 2016
Accepted date: 23 March 2016

Please cite this article as: Jin Xie, Yi Fang, Dynamic Texture Recognition With Video Set Based Collaborative Representation, *Image and Vision Computing* (2016), doi: 10.1016/j.imavis.2016.03.006

# Dynamic Texture Recognition With Video Set Based Collaborative Representation

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**Abstract**

Efficient feature description and classification of dynamic texture (DT) is an important problem in computer vision and pattern recognition. Recently, the local binary pattern (LBP) based dynamic texture descriptor has been proposed to classify DTs by extending the LBP operator used in static texture analysis to the temporal domain. However, the extended LBP operator cannot characterize the intrinsic motion of dynamic texture well. In this paper, we propose a novel video set based collaborative representation dynamic texture classification method. First, we divide the dynamic texture sequence into subsequences along the temporal axis to form the video set. For each DT, we extract the video set based LBP histogram to describe it. We then propose a regularized collaborative representation model to code the LBP histograms of the query video sets over the LBP histograms of the training video sets. Finally, with the coding coefficients, the distance between the query video set and the training video sets can be calculated for classification. Experimental results on the benchmark dynamic texture datasets demonstrate that the proposed method can yield good performance in terms of both classification accuracy and efficiency.

*Keywords:* Dynamic texture classification, local binary pattern, texture feature extraction, collaborative representation

## 1. Introduction

Dynamic textures (DT) are textures with motion [1]. They are video sequences of moving scenes, which vary not only on the spatial distributions of intensity, but also on the dynamics over time. There are such video sequences in the real word, for example, the sequences of forest fire, waterfall, swarm of birds and humans in crowds, etc. In recent years, the study of DT has been receiving considerable attention, including DT modeling, synthesis, segmentation and classification. Effective feature extraction is a key step for DT classification. It is desirable that effective DT feature can characterize texture appearance and motion well. Also, the extracted DT feature can also be applied to video understanding. For example, the DT feature can be used to characterize appearance and motion of human for human action recognition [2, 3, 4, 5].

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