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# Generalized Symmetric Pair Model for Action Classification in Still Images

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## Abstract

In many visual classification tasks finding semantically meaningful regions has been confirmed as an effective solution. This paper aims to improve the performance of action classification in still images by introducing a discriminative region selection method. We observed that humans have certain periodic or symmetric pairs and they are critical for recognition. We also demonstrate that in action classification semantically meaningful regions are close to their periodic or symmetric parts and propose a model called a Generalized Symmetric Pair Model. By learning a max margin classifier, this method could identify regions around periodic or symmetric pairs without detection techniques. The method utilizes both the characteristics of actions and knowledge regarding periodism and symmetry to improve the popular bag-of-words (BoW) framework. We evaluate our method on five challenging action classification datasets. Experiments show that our method outperforms the state-of-the-art on four datasets. Qualitative visualization also demonstrate that the proposed method indeed identify semantically meaningful regions.

*Keywords:* generalized symmetry, action classification, semantically meaningful regions, generalized symmetric pair model, improved BoW framework

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## 1. Introduction

Action classification, which aims to identify the action of human in still images, is a major emerging problem in computer vision with many applications, such as video surveillance, image and video analysis and human-computer interaction etc.

5 For action classification, the bag-of-words (BoW) framework [1] is the most popular framework.

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