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# Human Pose Search using Deep Networks

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## Abstract

Human pose as a query modality is an alternative and rich experience for image and video retrieval. It has interesting retrieval applications in domains such as sports and dance databases. In this work we propose two novel ways for representing the image of a person striking a pose, one looking for parts and other looking at the whole image. These representations are then used for retrieval. Both the representations are obtained using deep learning methods.

In the first method, we make the following contributions: (a) We introduce ‘deep poselets’ for pose-sensitive detection of various body parts, built on convolutional neural network (CNN) features. These deep poselets significantly outperform previous instantiations of Berkeley poselets [6], and (b) Using these detector responses, we construct a pose representation that is suitable for pose search, and show that pose retrieval performance is on par with the previous methods. In the second method, we make the following contributions: (a) We design an optimized neural network which maps the input image to a very low dimensional space where similar poses are close by and dissimilar poses are farther away, and (b) We show that pose retrieval system using these low dimensional representation is on par with the deep poselet representation and is on par with the previous methods.

The previous works with which the above two methods are compared include Bag of visual words [44], Berkeley poselets [6] and Human pose estimation algorithms [52]. All the methods are quantitatively evaluated on a large dataset of images built from a number of standard benchmarks together with frames from Hollywood movies.

*Keywords:* Pose retrieval, Pose estimation, Video and Image retrieval, Deep networks

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## 1. Introduction

Pose is an atomic unit of gesture and action, and an important aspect of human communication. Accordingly it has been the focus of many works [15, 21, 25, 31, 39, 42, 51, 52] in the recent past. With the exponential growth of videos and images online, it has become very critical to develop interfaces which allow easy access to human pose. Text queries as an interface for image and video search will gradually become untenable with massive growth in

videos and images on the Internet. With computer vision improving, content based retrieval is becoming a reality. Pose is one such content, and human pose retrieval is of great interest as it indicates action and gesture. Real-life applications of human pose retrieval include baseball or cricket shot retrieval from a sports database and a dance pose retrieval from say a ballet collection. Thus a gesture and pose as a query modality gives an alternative and rich experience for search.

Figure 1 illustrates an example pose retrieval. As shown in the figure, a pose search system aims to retrieve people in a similar pose to the query irrespective of the gender of

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