November 3, 2015

INTERDISCIPLINARY PROJECT

Descriptors for human whole body actions based on motion coordination

Problem description:

It is common practice in computer vision to introduce descriptors in order to represent and recognize objects in the scene. In human motion analysis, finding descriptors for an efficient recognition and interpretation of motion is an open and not deeply-investigated problem. In general, the state-of-the-art approaches for motion interpretation analyze the involved degrees of freedom separately. In this work, a different point of view is proposed: the motion is interpreted by considering not only the features (e.g velocity and amplitude) of each DOF trajectory, but also the coordination among the different DOFs involved in whole-body actions. Research in biomechanics and neuromechanics, in fact, confirm that humans execute actions with an high degree of coordination among the involved degrees of freedom [1]. In the current interpretation methods, such a feature is not explicitly taken into account. The main idea of this work is the definition of novel descriptors which include information of the key Degrees of Freedoms involved in an action and the coordination among them. In order to show the performance of the developed descriptors for the recognition of pre-segmented actions, analysis will be carried out by leveraging the HDM5 motion database [2]. In particular the following performance index will be considered: (i)recognition rate of the same actions performed by the same user, (ii) recognition rate of the same action performed by different users, (iii) capability to distinguish different but similar actions that involve the same degrees of freedom.

Work schedule:

- Literature research on whole body action representation and interpretation
- Development of a coordination-based descriptor for action recognition
- Performance analysis leveraging the HDM05 motion data base

[1] Nikolaj A Bernstein. The co-ordination and regulation of movements. 1967.
[2] M. Müller, T. Röder, M. Clausen, B. Eberhardt, B. Krüger, and A. Weber. Documentation mocap database hdm05. Technical Report CG-2007-2, Universität Bonn, June 2007.

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