Error-Correcting Output Codes and Graph Cuts Optimization for Human Segmentation in Still Images

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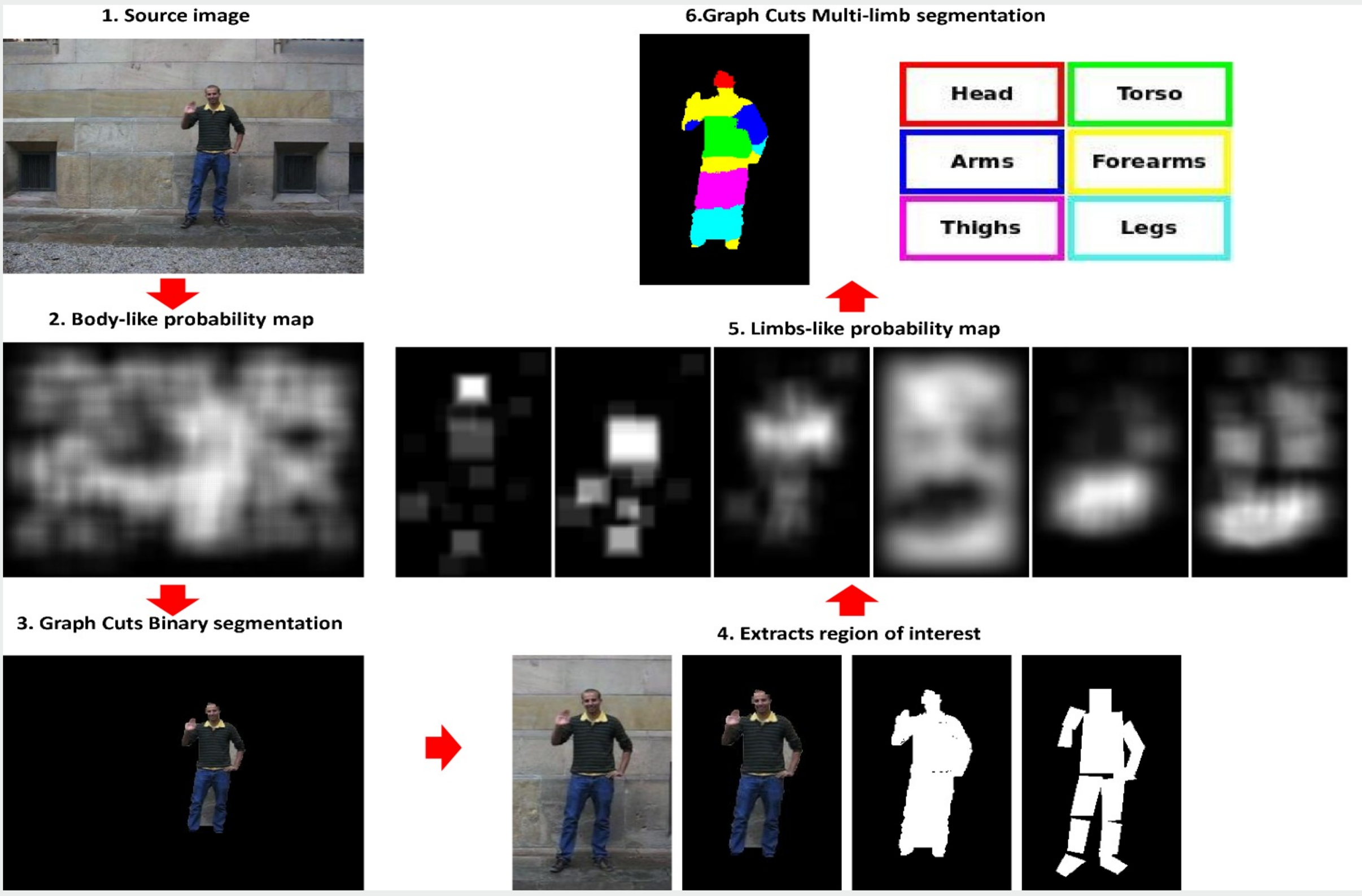
Abstract

Recovering human pose in still images is a hard task because of the high variability in appearance produced by changes in the point of view, lighting conditions, and number of articulations of the human body. Even so, it has become one of main interest area of research because of its capabilities in final applications. Actually, state of the art approaches like [1] have achieved very good results for person detection and [2] human pose estimation (detecting articulations). We propose a two-level approach for the segmentation of the human body. In a first step, a set of human limbs were trained to be split in a tree-structure way and trained using a cascade of Adaboost classifiers with Haar-like features [3]. Then, it was included in a ternary Error-Correcting Output Codes (ECOC) [4] framework to improve classification performance by correcting errors of individual classifiers. This first classification step was applied in a windowing way on a new test image, defining a body-like probability map, which was used in a Graph Cuts optimization procedure. The proposed methodology is tested in a novel limb-labeled data set [5]. As present work, we follow the pipeline mentioned before by including a two-level refinement approach in order to segment human limbs. As a first step, we split in a tree-structure without background a set of 6 human limbs categories. Then, this tree-structure splitting is trained using SVM classifiers with HOG features and included in a ECOC framework. In order to perform multi-limb classification, we apply sliding windows on a new test image, defining in this case a set of limb-like probability maps which are used in a multi-limb human segmentation stage by means of alpha-beta swap Graph Cuts optimization [6]. The obtained results show that we are able to segment the human body limbs with high overlapping scores.



Biography

Daniel Sánchez received his Bachelor degree in Computer Science at Universitat de Barcelona (UB) in 2012. He is currently studying his Master degree in Artificial Intelligence at UPC (Universitat Politècnica de Catalunya), UB and URV. He is mainly interested in computer vision applied to human pose recovery and behavior analysis.

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