Online human pose estimation utilizing relation matrix for medical applications

Oral Presentation

1Ramin Toosi * ; 1Pouya Narimani; 1Mohammad Javad Barikbin; 2Mohammad Ali Akhaee

[1]Adak Vira Iranian Rahjoo (AVIR)(info@avir.co.com)

[2]Faculty of Electrical and Computer Engineering, Campus of the Faculty of Engineering, University of Tehran, Tehran, Iran

Abstract

Introduction: In this paper we propose a method to detect human 2D joints in colored images. This method assists physiotherapist to compare the patient's movements with the ground truth and guide them to improve movements.

Methods: Our method extracts body joints in 2D space; therefore, no 3D reconstruction is required. To reach this, we proposed an algorithm that extracts two different patterns from input image. The first one aims to find the position of important points of human body and the other one recognizes the relation between these points to generate the corresponding graph of each body. Both algorithms utilize a bottom-to-up approach that could perform online on videos with high accuracy.

Results: The pipeline of the method is based on three deep neural networks: 1) preprocessing network, 2) joint detection network, and 3) relation detection network. Preprocessing network learns to extract features that would be sufficient in next layers. The two other networks work alongside each other. Thus, the proposed network would simultaneously extract the main points and their relations, and then these outputs would be combined to show the body gesture of a specific person. The proposed method was trained and evaluated on MPII dataset and compared to other existing methods. We have reported Mean Average Precision (MAP) and run time for each image and used this metric to compare our method with other existing ones. MAP was reported for different parts of body including head, shoulder, elbow, wrist, waist, knee, and ankle.

Conclusion: Our results demonstrate the proposed method clearly outperforms other existing methods.

Keywords

2D Pose Estimation- Online Pose Estimation- Physio Medical

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