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INFLUENCE OF BACK MUSCLE ACTIVATION IN PATHOLOGICAL POSTURE ASSESSMENT BASED ON THERMAL IMAGING

Keywords: thermovision, image processing, physiotherapy, scoliosis, posture diagnostics

Posture disorder affects more and more people in every age and social group, causing a huge drop in energy (tiredness, depression) or even nerve compression. The early assessment allows introducing therapy that minimizes the influence on everyday life. Most of the described therapy techniques require specialized equipment and large financial outlay. Thermal imaging seems to be a promising method, allowing muscles activity analysis. In the presented approach authors focused on the analysis of thermal images of patient's back. The research group consists of 101 people, but only 69 were selected for further analysis (24 in the pathological group and 45 described as normative). Appropriate clothing for women turns out to be a very important element of the protocol. Each patient was photographed 3 times by FLIR A300 thermovision camera (before, immediately after and 10 minutes after exercises), which allowed observation of temperature changes during muscle parts activating. The distance between the patient and the camera was 2 m. The picture was taken on a uniform background (plain wall). Using a proprietary algorithm the patient's body (back) was divided into 10 ROI. Most of the key points for ROIs determining are placed on the body edge. The points were searched independently for the left and right body half. For each ROI segment mean value was estimated as segment descriptor. Input dataset was consist of the average temperature values from all 10 areas of the body. The cross-validation kNN classifier was used to divide the subject into appropriate categories -- normative or pathological. On the basis of the temperature data, the matched-pair t-test shows the significant statistical difference before and after exercise for all ROI in both normative and pathological group. Classification result based on after exercise data is 72.1% in contrary to 57.4% obtained from data before exercise. This allow assuming that simple screening test based on thermal imaging and including adequate muscle activation would be able to correctly distinguish between normative and pathological posture. Results show that certain muscle parts work differently according to the posture type. It is therefore essential to select the right exercises to activate specific muscle groups each time.