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Body Weight Estimation Using Virtual Anthropometric Measurements From a Single Image

By

Sui, J (Sui, Jin)^{[1], [2], [3]}; Bu, CG (Bu, Chunguang)^{[2], [3]}; Zhao, XA (Zhao, Xingang)^{[2], [3]}; Liu, C (Liu, Chang)^{[4], [5]}; Ren, L (Ren, Lei)^{[6], [7]}; Qian, ZH (Qian, Zhihui)^{[6], [8]}

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Abstract

Direct estimation of body weight through noncontact methods is crucial for applications such as health monitoring, surveillance, and robot-assisted casualty rescue. Existing methods for body weight estimation from images are often affected by various factors, such as camera distance, human orientation, and body posture, which ignore the fact that bodies typically inhabit 3-D space. To address the problem, we propose an approach for estimating body weight based on virtual anthropometric measurements and deep features instead of estimating by reasoning pixels. Specifically, we develop a three-branch framework that includes face feature extraction, body feature extraction, and deep feature extraction and maps all features with a regressor. The developed method adds 3-D shape reconstruction to explicitly reason about virtual anthropometric measurements. To enable this, our model is trained to robustly compute anthropometric measurements in various orientations and postures. Furthermore, we evaluate our method on a public dataset and Image-VM-BMI, a new dataset of 6740 images, including body mass index (BMI) labels and virtual anthropometric measurement labels with paired 3-D reconstruction. Extensive experimental results demonstrate that the proposed method outperforms pixel-based analysis approaches on BMI estimation.

Keywords

Author Keywords: Feature extraction; Three-dimensional displays; Image reconstruction; Faces; Weight measurement; Facial features; Extraterrestrial measurements; Body weight analysis; Image-VM-BMI dataset; virtual anthropometric measurement; visual analysis of body mass index (BMI)
Keywords Plus: CLASSIFICATION; PREDICTION; OBESITY; MODEL

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Author Information

Corresponding Address: Qian, Zhihui (corresponding author)

▼ Jilin Univ, Minist Educ, Key Lab Engn Bion, Changchun 130025, Peoples R China

Corresponding Address: Qian, Zhihui (corresponding author)

▼ Liaoning Acad Mat, Shenyang 110167, Peoples R China

Addresses :

▼ 1 Jilin Univ, Key Lab Engn B, Minist Educ, Changchun 130025, Peoples R China

▼ 2 Shenyang Inst Automation, Chinese Acad Sci, State Key Lab Robot, Shenyang 110016, Peoples R China

▼ 3 Chinese Acad Sci, Inst Robot & Intelligent Mfg, Shenyang 110169, Peoples R China

▼ 4 Tianjin Univ Technol, Sch Mech Engr, Tianjin Key Lab Adv Mechatron Syst Design & Intell, Tianjin 300384, Peoples R China

▼ 5 Tianjin Univ Technol, Sch Mech Engr, Natl Demonstrat Ctr Expt Mech & Elect Engr Educ, Tianjin 300384, Peoples R China

...more addresses

E-mail Addresses : sui jin@sia.cn; zhqian@jlu.edu.cn

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