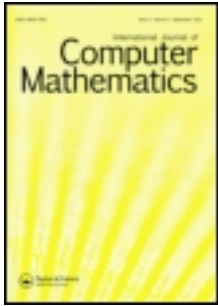


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A novel approach for dynamic hand gesture recognition using contour-based similarity images

Saeed Nasri^a, Alireza Behrad^b & Farbod Razzazi^a

^a Department of Electrical and Computer Engineering, Science and Research Branch, Islamic Azad University, Tehran, Iran

^b Electrical and Electronic Engineering Department, Faculty of Engineering, Shahed University, Tehran, Iran

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A novel approach for dynamic hand gesture recognition using contour-based similarity images

Saeed Nasri^{a*}, Alireza Behrad^b and Farbod Razzazi^a

^aDepartment of Electrical and Computer Engineering, Science and Research Branch, Islamic Azad University, Tehran, Iran; ^bElectrical and Electronic Engineering Department, Faculty of Engineering, Shahed University, Tehran, Iran

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A novel approach is proposed for the recognition of moving hand gestures based on the representation of hand motions as contour-based similarity images (CBSIs). The CBSI was constructed by calculating the similarity between hand contours in different frames. The input CBSI was then matched with CBSIs in the database to recognize the hand gesture. The proposed continuous hand gesture recognition algorithm can simultaneously divide the continuous gestures into disjointed gestures and recognize them. No restrictive assumptions were considered for the motion of the hand between the disjointed gestures. The proposed algorithm was tested using hand gestures from American Sign Language and the results showed a recognition rate of 91.3% for disjointed gestures and 90.4% for continuous gestures. The experimental results illustrate the efficiency of the algorithm for noisy videos.

Keywords: hand gesture recognition; scale-invariant feature transform; contour-based similarity image; American Sign Language

2010 AMS Subject Classifications: 68T45; 62H35; 68T10

1. Introduction

The emergence of new applications, such as virtual reality environments, requires more perfect interfaces for human–computer interaction. In these applications, new tools are required for users to interact with computers without the 2D limitations of the mouse or keyboard [8]. Sensors and video cameras are two sample tools proposed for this purpose. Sensor outputs require filtering stages to eliminate temperature, pressure and other noise effects. The lower accuracy, higher cost and limited flexibility of sensors put them out of reach for general use. Webcams are inexpensive and widespread and can be used for gesture recognition and human–computer interaction with the application of video and image processing algorithms.

Gestures can be static or dynamic. A static gesture is an object pose that is represented by a single image. A dynamic gesture is a moving gesture where the pose of the object changes during the sequence of images. Vision-based recognition of dynamic gestures requires the extraction and classification of both temporal and spatial features. In real-world applications, dynamic gestures are composed of a sequence of disjointed gestures called continuous gestures. Continuous gesture

*Corresponding author. Email: s_nasri@iaun.ac.ir