

## Accepted Manuscript

A convolutional neural network with feature fusion for real-time hand posture recognition

Sérgio F. Chevtchenko, Rafaella F. Vale, Valmir Macario, Filipe R. Cordeiro



PII: S1568-4946(18)30527-1  
DOI: <https://doi.org/10.1016/j.asoc.2018.09.010>  
Reference: ASOC 5089

To appear in: *Applied Soft Computing Journal*

Received date: 2 February 2018  
Revised date: 2 September 2018  
Accepted date: 12 September 2018

Please cite this article as: S.F. Chevtchenko, et al., A convolutional neural network with feature fusion for real-time hand posture recognition, *Applied Soft Computing Journal* (2018), <https://doi.org/10.1016/j.asoc.2018.09.010>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# A Convolutional Neural Network with Feature Fusion for Real-Time Hand Posture Recognition

Sérgio F. Chevtchenko<sup>a,\*</sup>, Rafaella F. Vale<sup>b</sup>, Valmir Macario<sup>a</sup>, Filipe R. Cordeiro<sup>a</sup>

<sup>a</sup>*Departamento de Computação, Universidade Federal Rural de Pernambuco, Rua Dom Manoel de Medeiros, s/n, Dois Irmãos, 52171-900, Brazil*

<sup>b</sup>*Centro de Informática, Universidade Federal de Pernambuco, Av. Jornalista Aníbal Fernandes, s/n, Cidade Universitária, 50740-560, Brazil*

---

## Abstract

Gesture based human-computer interaction is both intuitive and versatile, with diverse applications such as in smart houses, operating theaters and vehicle infotainment systems. This paper presents a novel architecture, combining a convolutional neural network (CNN) and traditional feature extractors, capable of accurate and real-time hand posture recognition. The proposed architecture is evaluated on three distinct benchmark datasets and compared with the state-of-the-art convolutional neural networks. Extensive experimentation is conducted using binary, grayscale and depth data, as well as two different validation techniques. The proposed feature fusion-based convolutional neural network (FFCNN) is shown to perform better across combinations of validation techniques and image representation. The recognition rate of FFCNN on binary images is equivalent to grayscale and depth when the aspect ratio of gestures is preserved. A real-time recognition system is presented with a demonstration video.

*Keywords:* hand postures, convolutional neural networks, deep learning, hyperparameter selection.

---

<sup>\*</sup>This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

<sup>\*</sup>Corresponding author. Tel.: +55 81 3320-6491

*Email addresses:* sergio.chevtchenko@ufrpe.br (Sérgio F. Chevtchenko), rfv@ci.ufpe.br (Rafaella F. Vale), valmir.macario@ufrpe.br (Valmir Macario), filipe.roim@ufrpe.br (Filipe R. Cordeiro)

Download English Version:

<https://daneshyari.com/en/article/11031602>

Download Persian Version:

<https://daneshyari.com/article/11031602>

[Daneshyari.com](https://daneshyari.com)