## Medical gesture recognition using dynamic arc length warping

J. Cifuentes Quintero; M.T. Pham; R. Moreau; P. Boulanger; F. Prieto

## Abstract-

Hand gesture recognition is a promising research area often used in applications of human–computer interactions in the medical field. In this paper, we present a novel approach to differentiate gestures based on an arc-length parametrization and a curvature analysis of 3D trajectories. This new method called dynamic arc length warping (DALW) can outperform classic multi dimensional-dynamic time warping (MD-DTW) algorithm as it is invariant to sensor location and more tolerant to temporal distortions. Experimental validation of the algorithm is presented using different gestures and sensors in biomedical applications: an exoskeleton apparatus, surgical gestures captured by an instrumented laparoscopic device and finally, a birth simulator with an instrumented forceps. A basic perceptron multilayer neural network was implemented in order to perform the classification. Results involve an average increase of 7.14% in the classification rates by using DALW distance, compared to the classical MD-DTW.

Index Terms- Gesture classification; Curvature analysis; Dynamic arc length warping; Hand motion tracking

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

Request full paper to the authors

If you institution has a electronic subscription to Biomedical Signal Processing and Control, you can download the paper from the journal website: <u>Access to the Journal website</u>

## **Citation:**

Cifuentes, J.; Pham, M.T.; Moreau, R.; Boulanger, P.; Prieto, F. "Medical gesture recognition using dynamic arc length warping", Biomedical Signal Processing and Control, vol.52, pp.162-170, July, 2019.