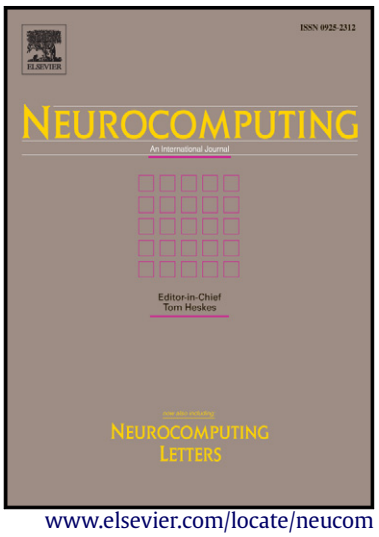

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Hybrid BF-PSO and fuzzy support vector machine for diagnosis of fatigue status using EMG signal features

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Abstract-

In this study, a novel BF-PSO-FSVCM model has been proposed to identify the fatigue status of the electromyography (EMG) signal. To improve the classifier accuracy of fuzzy support vector classification machine (FSVCM), a hybrid Bacterial Foraging (BF) and particle swarm optimization (PSO) is proposed to optimize the unknown parameters of the classifier. In the proposed method, the EMG signals are firstly decomposed by discrete wavelet transform (DWT), Fast Fourier Transformation (FFT) and Ensemble Empirical Mode Decomposition (EEMD)-Hilbert transform (HT), and then a set of combined features were extracted from different types of fatigue or normal EMG signals. The optimal fatigue vectors of static, local and dynamic fatigue are also provided in this study. The obtained results obviously indicate that further significant enhancements in terms of classification accuracy can be achieved by the proposed BF-PSO-FSVCM classification system. BF-PSO-FSVCM is developed as an efficient tool so that various support vector classification machines (SVCMs) can be used conveniently as the core of BF-PSO-FSVCM for diagnosis of fatigue status.

Keywords: Bacterial Foraging; fuzzy support vector classifier machine; EMG signal; fatigue

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