Vortragsankündigung

Seminar Regelungssysteme LV 0430L654

Freitag, 14. November 2014, 14:00 Uhr
Vortragsort: EN 223

Prof. J. Zhang
Department of Automation,
East China University of Science and Technology

“Multi-level Recognition of Momentary Mental Workload Using Laplacian-Eigenmap-based Feature Reduction and Ensemble Support Vector Machines”

The identification of human operator mental workload (MWL) variation is crucial to prevent potential accidents in human-machine collaborative systems. The aim of our work is to reveal the relationship between human operator performance and neurophysiological features by means of multi-level MWL classification based on a combination of data clustering, feature reduction, and ensemble classification techniques. The psychophysiological data acquisition experiments were performed under a series of simulated human-machine collaborative process control tasks. Five or four target levels of MWL were first determined by using three different performance indices and a Gaussian mixture model. By using Laplacian-eigenmap-based feature reduction technique, a few most representative EEG features were extracted and combined with heart rate as input features of the MWL classifier. Then, multiple support vector machines were combined to form a classifier ensemble to recognize the MWL levels via majority voting approach. Finally, the data-based MWL classification results were compared with those of several existing approaches.