

基于核函数的在线序列 ELM 算法的姿态识别

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摘要: 姿态识别是许多应用的基础(医学、运动、游戏、安全). 传统的识别算法采用批学习的方式去训练网络, 但是数据量庞大且数据不会一次性获取, 这会导致这类算法花费大量的学习时间且网络权重也不能在线更新. 对此利用一种基于核函数的在线序列极限学习机 OS-KELM(Online Sequential Kernel Extreme Learning Machine)算法实现人体姿态的分类识别. 为降低学习难度和提高学习效率, 使用了基于 Fisher 准则和特征聚类的方法进行特征选择. 用手机的三轴加速度计和陀螺仪数据识别别人走路、下楼、上楼、站立、坐和躺下的姿态, 平均识别精度达到 91.89%.

关键词: 在线序列 ELM; 核函数; 人类姿态识别; 模式识别; Fisher 准则; 特征聚类

Activity Recognition Based on Online Sequential

Kernel Extreme Learning Machine

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Abstract: Activity recognition (AR) is the basis for many applications concerning health care, sports, security and gaming industry. Traditionally, batching learning recognition algorithms is adopted to train network. However, the amount of data is considerable and not all training data arrives instantly, the learning procedure is time-consuming and the network weights cannot be updated online. In this paper, Classification of the human activities is performed with Online Sequential Kernel Extreme Learning Machine (OS-KELM). The method of feature selection based on Fisher criterion and feature clustering has been adopted to reduce difficulty and improve efficiency of learning. A tri-axial accelerometer and gyros data from a user's smart phone are used to recognize walking, waling downstairs, walking upstairs, standing, sitting and laying. Experimental results with an average accuracy of 91.89% are achieved.

Key words: online sequential ELM; kernel function; human activity recognition; pattern recognition; Fisher criterion; feature clustering

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