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基于Kinect数据主成分分析的人体动作识别

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Human action recognition based on Kinect data principal component analysis

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摘要

为了提高家庭环境下人体动作识别的效率和精度,提出并实现了基于Kinect数据主成分分析的动作识别方法。首先,通过Kinect采集人体动作特征描述的时间序列数据,并构造人体姿态描述向量;然后,运用主成分分析方法分析不同时间点的特征值的差异,获得重构的特征值,使得不同类型的动作之间有明显区别。同时减少了冗余和噪声,有利于动作的判断和识别。最后,依据重构的特征和最近邻原则,进行动作的识别分类。实验结果表明,该方法对简单的人体动作识别精度可达80%以上,单个样本识别时间分别是1.67 ms和3.93 ms,基本满足对人体动作识别的精度、抗干扰能力和实时性等要求。

关键词 ： 机器人, Kinect数据, 动作识别, 主成分分析(PCA)

Abstract :

To improve the efficiency and accuracy of human action recognition in the home environment, a method of action recognition based on Principal Component Analysis(PCA) of Kinect data was proposed and realized. Firstly, the time series data of human action feature description was collected by Kinect, and human pose description vector was constructed. Then, the PCA method was used to analyze the difference between the feature values at different time points and to obtain the recons-tructed eigenvalues, by which the distinction between different types of actions can be more obvious. Moreover, the action discription feature of the redundancy was filtered to reduce the redundancy and noise, which was conducive to the judgment and recognition for the human action. Finally, the recognition and classification of the action were performed based on the features of the reconstruction and the nearest neighbor principle. The experimental results show that the accuracy of this method is more than 80% for the simple human motion recognition. The identification time of a single sample is 1.67 ms and 3.93 ms, respectively. It can satisfy the human action recognition requirements for higher precision, strong anti-interference ability and real-time recognition.

Key words ： robot   Kinect data   action recognition   Principal Component Analysis(PCA)

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引用本文:

刘志强, 尹建芹, 张玲, 魏军, 刘小丽. 基于Kinect数据主成分分析的人体动作识别[J]. 光学精密工程, 2015, 23(10z): 702-711. LIU Zhi-qiang, YIN Jian-qin, ZHANG Ling, WEI Jun, LIU Xiao-li. Human action recognition based on Kinect data principal component analysis. Editorial Office of Optics and Precision Engineering, 2015, 23(10z): 702-711.

链接本文:

http://www.eope.net/CN/10.3788/OPE.20152313.0703   或   http://www.eope.net/CN/Y2015/V23/I10z/702

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