论文与报告

基于人体行为3D模型的2D行为识别

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摘要
针对行为识别中行为者朝向变化带来的问题, 提出了一种基于人体行为3D模型的2D行为识别算法. 在学习行为分类器时, 以3D占据网格表示行为样本, 提取人体3D关节点作为描述行为的特征, 为每一类行为训练一个基于范例的隐马尔可夫模型(Exemplar-based hidden Markov model, EHMM), 同时从3D行为样本中选取若干帧作为3D关键姿势集, 这个集合是连接2D观测样本和人体3D关节点特征的桥梁. 在识别2D行为时, 2D观测样本序列可以由一个或多个非标定的摄像机采集. 首先在3D关键姿势集中为每一帧2D观测样本寻找与之最匹配的3D关键姿势帧, 之后由行为分类器对2D观测样本序列对应的3D关键姿势序列进行识别. 该算法在训练行为分类器时要进行行为者的3D重构和人体3D关节点的提取, 而在识别2D行为时不再需要进行3D重构. 通过在3个数据库上的实验, 证明该算法可以有效识别行为者在任意朝向下的行为, 并可以适应不同的行为采集环境.

关键词　行为识别　3D模型　基于范例的隐马尔可夫模型　置信加权

分类号

Human 3D Model-based 2D Action Recognition

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Abstract
A new human 3D model-based 2D action recognition algorithm is presented in this paper for adapting to the actor's variable orientates. The actor is represented by 3D occupancy grids and the human joints extracted from the 3D actor are used as the feature of action. We learn separate exemplar-based hidden Markov models (EHMM) for each action class. In addition, some frames of the 3D actors' samples are chosen as the 3D key pose set. This set is a bridge linking 2D observation action with 3D human joints feature. The 3D reconstruction is not required during the 2D action recognition phase. 2D observation sequences are collected from single/multiple un-calibrated cameras. Firstly, a 3D key pose sequence, which is the most similar to the 2D observation sequence, is selected from the 3D key pose set. Then, the 3D key pose sequence is classified using the action classifier. The effectiveness of the proposed algorithm is demonstrated with experiments on three action datasets. The results prove robustness of the proposed method with respect to the actor's orientates and camera configurations.

Key words　Action recognition　3D model　exemplar-based hidden Markov model (EHMM)　confidence weight

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