

论文与报告

视线追踪系统中眼睛跟踪方法研究

张闯, 迟健男, 张朝晖, 王志良

1. 北京科技大学信息工程学院 北京 100083

2. 北京科技大学钢铁流程先进控制教育部重点实验室 北京 100083

收稿日期 2009-7-24 修回日期 2010-1-18 网络版发布日期 接受日期

摘要

为解决视线追踪系统中红外图像瞳孔跟踪鲁棒性差的问题, 提出一种基于伪彩色图的粒子滤波瞳孔跟踪算法. 利用亮暗瞳现象, 提出三通道伪彩色图(Triple-channel pseudo-color map, TCPCM)的概念, 并将其引入瞳孔跟踪过程. TCPCM充分利用了各通道信息, 瞳孔区域的色彩明显与人脸其他部位不同, 提高了跟踪的稳定性与精确性. 采用了直方图相似性度量与几何相似性度量相结合的二次更新的瞳孔感知模型, 提高了粒子权重的可信性. 针对实时性要求, 引入快速特征提取步骤, 减少特征提取的时间, 提高特征提取的可靠性. 实验结果表明, 该算法在瞳孔目标检测效果、跟踪稳定性和运行时间方面都有良好的性能.

关键词 [视线追踪](#) [瞳孔定位](#) [瞳孔跟踪](#) [粒子滤波](#) [瞳孔--角膜反射技术](#)

分类号

The Research on Eye Tracking for Gaze Tracking System

ZHANG Chuang, CHI Jian-Nan, ZHANG Zhao-Hui, WANG Zhi-Liang

1. School of Information Engineering, University of Science and Technology Beijing, Beijing 100083

2. Key Laboratory for Advanced Control of Iron and Steel Process (Ministry of Education), University of Science and Technology Beijing, Beijing 100083

Abstract

To address the problem of poor robustness of pupil tracking in infrared images for gaze tracking systems, this paper presents a particle filter algorithm for pupil tracking based on pseudo-color map. This paper also presents a concept of triple-channel pseudo-color map (TCPCM) by use of the phenomena of bright and dark pupil and leads it into pupil tracking. TCPCM makes full use of the information of each channel. The color of pupil zone is distinct from that of other regions of face obviously, which will improve the stability and accuracy of tracking. A two-phase-updating method based on similarity measurements of histogram and geometry is adopted to improve the credibility of the particle weights. Fast feature extraction is introduced to improve system real-time performance, which not only increases the computational efficiency, but also enhances the robustness of the system. Results from an extensive experiment show a significant improvement of the proposed algorithm over existing eye tracking techniques for gaze tracking systems.

Key words [Gaze tracking](#) [pupil location](#) [pupil tracking](#) [particle filter](#) [pupil center](#) [cornea reflection \(PCCR\) technique](#)

DOI: 10.3724/SP.J.1004.2010.01051

通讯作者 迟健男 sy_jnchi@126.com

作者个人主页 张闯; 迟健男; 张朝晖; 王志良

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(6483KB\)](#)

▶ [\[HTML全文\]\(OKB\)](#)

▶ [参考文献\[PDF\]](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

相关信息

▶ [本刊中 包含“视线追踪”的 相关文章](#)

▶ 本文作者相关文章

· [张闯](#)

· [迟健男](#)

· [张朝晖](#)

· [王志良](#)