自动化人体动作分析与合成

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2025 年 6 月

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北京理工大学

中图分类号：TQ028.1
UDC 分类号：540

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一 级 学 科	计算机科学与技术
学位授予单位	北京理工大学
论文答辩日期	2025 年 6 月

Automated Human Motion Analysis and Synthesis

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School or Department:	Computer Science and Technology
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Degree Applied:	Doctor of Engineering
Major:	Computer Science and Technology
Degree by:	Beijing Institute of Technology
The Date of Defence:	June, 2025

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摘要

人体动作分析与合成在众多计算机视觉应用中具有核心地位，涵盖了从自动驾驶到体育动作分析等多个领域。本文围绕该研究方向，重点探讨了在不同视角下实现高精度三维姿态估计的问题，以确保时序上的一致性与准确性。在此基础上，我们进一步研究了动作预测任务，即在给定历史动作序列的前提下，预测未来的人体动作变化趋势。最后，本文还探讨了面向具体应用的研究问题，致力于为实际场景中的动作理解与反馈提供有效支持。

在任何人体动作分析框架中，首要步骤都是准确获取……

关键词：动作分析；动作合成；姿态估计；动作预测；运动评估。

Abstract

Human motion analysis and synthesis is integral to many computer vision applications, from autonomous driving to sports analysis. In this thesis, we address several problems in this next viewpoint of the camera so that we obtain accurate 3D pose estimations across time. Afterwards we considermotion prediction, which is the task of predicting future human motion sequences given past ones. Finally, we address the application-based problem of providing.

For any human motion analysis framework, it is necessary to first obtain...

Key Words: motion analysis; motion synthesis; pose estimation; motion prediction; exercise analysis

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BIT	北京理工大学的英文缩写
LaTeX	一个很棒的排版系统
LaTeX 2_ε	一个很棒的排版系统的最新稳定版
ctex	成套的中文 LaTeX 解决方案，由一帮天才们开发
$e^{\pi i} + 1 = 0$	一个集自然界五大常数一体的炫酷方程

Chapter 1 Introduction

It has become increasingly popular to develop computer vision applications which are either directly or indirectly focused on human motion. In many cases, detecting and analyzing human motion is the main objective, as in sports analysis[1,2], or surveillance[3]. In many other applications, analyzing human motions is not the main task, but a crucial component of the application. For instance, the main focus of self-driving cars is to draw a safe path for the car to navigate within traffic. However in order to avoid dangerous situations, it is imperative for the vehicle to have a sense of whether there are pedestrians around, what they are doing, and where they will go next. In all of such computer vision applications, careful design of human motion algorithms is key.

Our work in this thesis...

1.1 Motivation and Applications

Human motion analysis and synthesis plays a key role in many real-world applications. For many developing technologies, such as autonomous driving, accurate analysis of human motion is integral to the feasibility of bringing...[1,3]

Chapter 2 Literature Review

We focus on several related problems under the domain of human motion analysis and synthesis. In this section, we will consider the related works on these problems. We will first start with active human pose estimation and introduce works which focus on pose estimation while taking the camera placement into account. Afterwards, we discuss works on human motion prediction and introduce the deep learning architectures that are primarily being used. Finally, we discuss the physical exercise analysis field, for which we first introduce the more general field of action recognition, then focus on works that primarily target sports applications.

2.1 Active Human Pose Estimation

Most recent approaches to 3D pose estimation rely on deep networks that regress pose from...

Conclusions and Future Work

We have addressed several problems in the field of human motion analysis and synthesis, namely active viewpoint selection for human pose estimation, human motion prediction, and physical exercise feedback and analysis. We summarize our findings in this chapter, and discuss directions for future research.

1 Summary

Human motion analysis and synthesis is an important research direction for many computer vision applications in fields such as autonomous driving, healthcare, and entertainment. We tackle several problems in this domain.

In Chapter 3, we address...

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