

Preface

Action recognition is an enabling technology for many real-world applications, such as human–computer interface, surveillance, video retrieval, senior home monitoring, and robotics. In the past decade, it has drawn a great amount of interests in the research community. Recently, the commoditization of depth sensors has generated much excitement in action recognition from depth sensors. The new depth sensor has enabled many applications that were not feasible before. On one hand, action recognition becomes a lot easier with the depth sensor. On the other hand, people want to recognize more complex actions which present new challenges.

One crucial aspect of action recognition is to extract discriminative features. The depth maps have completely different characteristics from the RGB images. Directly applying features designed for RGB images does not work.

Complex actions usually involve complicated temporal structures, human-object interactions, and person–person contacts. New machine learning algorithms need to be developed to learn these complex structures.

The goal of this book is to bring the readers quickly to the research front in depth sensor-based action recognition, and help the readers to gain deeper understandings of some of the recently developed techniques. We hope this book is useful for both researchers and practitioners who are interested in human action recognition with depth sensors.

This book focuses on the feature representation and machine learning algorithms for action recognition from depth sensors. After presenting a comprehensive overview of the state of the art in action recognition from depth data, the authors provide in-depth descriptions of their recently developed feature representations and machine learning techniques including lower level depth and skeleton features, higher level representations to model the temporal structures and human-object interactions, and feature selection techniques for occlusion handling.

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