

Preface

This book addresses 3D video production technologies and applications developed by our laboratory in Kyoto University, Japan, over the past ten years and more. In 1996, we started the Cooperative Distributed Vision project, where a group of network connected active cameras monitor a 3D real world scene to cooperatively detect and track people in real time. At the last stage of the project in 1999, we applied the system to synchronized multi-view video data capture to measure full 3D human shape and motion, which was then followed by the development of texture mapping methods to generate full 3D video around 2000.

Since then, we have been conducting successively work to improve multi-view video capture systems in both image resolution and object movable space, implement parallel processing methods to reconstruct 3D shape and motion in real time using a PC cluster system, develop accurate 3D shape and motion reconstruction algorithms as well as high fidelity texture mapping and lighting environment estimation methods. With these 3D video production technologies, in 2002, we started to explore applications of 3D video including interactive 3D visualization, 3D content editing, and data compression methods to cultivate the world of 3D video.

This book gives a comprehensive view of the state-of-the-art of 3D video production technologies and applications we developed, as well as related contemporary visual information media technologies which will help graduate students and young researchers to understand the world of 3D video. Since the employed technologies include a very wide range of technical disciplines covering real time synchronized multi-view video capture, object tracking with a group of active cameras, geometric and photometric camera calibration, parallel processing by a PC cluster system, 2D image and video processing, 3D shape and motion reconstruction, texture mapping and image rendering, lighting environment estimation, attractive 3D visualization, visual contents analysis and editing, 3D body action analysis, and data compression, we put as references books and technical survey papers on these fundamental technical areas for readers to understand background knowledge of 3D video.

Although we have established technical skills and know-how for implementing multi-view video capture systems, and the quality of generated 3D video has been significantly improved with advanced technologies, a high fidelity 3D video produc-

tion system and its casual usages in everyday life environments are still our future research targets. We hope this book will promote further explorations of the world of 3D video.

Takashi Matsuyama
Shohei Nobuhara
Takeshi Takai
Tony Tung

3D Video and Its Applications

Matsuyama, T.; Nobuhara, S.; Takai, T.; Tung, T.

2012, XV, 346 p., Hardcover

ISBN: 978-1-4471-4119-8