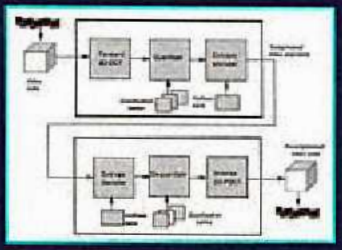
# REAL-TIME VIDEO COMPRESSION

## Techniques and Algorithms

Raymond Westwater
Borko Furht



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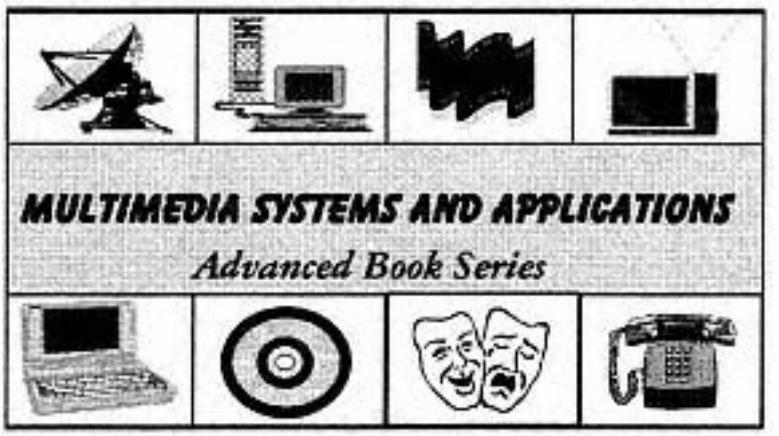

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## Contents

## Preface

This book is on real-time video compression. Specifically, the book introduces the XYZ video compression technique, that operates in three dimensions, eliminating the overhead of motion estimation. First, video compression standards, MPEG and H.261/H.263, are described. They both use asymmetric compression algorithms, based on motion estimation. Their encoders are much more complex than decoders. The XYZ technique uses a symmetric algorithm, based on the Three-Dimensional Discrete Cosine Transform (3D-DCT). 3D-DCT was originally suggested for compression about twenty years ago, however at that time the computational complexity of the algorithm was to high, it required large buffer memory, and was not as effective as motion estimation. We have resurrected the 3D-DCT based video compression algorithm by developing several enhancements to the original algorithm. These enhancements made the algorithm feasible for real-time video compression in applications such as video-on-demand, interactive multimedia, and videoconferencing. The demonstrated results, presented in the book, suggest that the XYZ video compression technique is not only a fast algorithm, but also provides superior compression ratios and high quality of the video compared to existing standard techniques, such as MPEG and H.261/H.263. The elegance of the XYZ technique is in its simplicity, which leads to inexpensive VLSI implementation of a XYZ codec.

We would like to thank Jim Prince for conducting experiments in developing visually weighted quantizers for the XYZ algorithm, as well as a number of students from Florida Atlantic University, who participated in these experiments. We also want to thank Drs. Roy Levow, K. Genesan, and Matthew Evett, professors from Florida Atlantic University, Dr. Steve Rosenbaum from Cylex Systems, and Joshua Greenberg for constructive discussions during this project.

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