

# Preface

Motion Estimation (ME) and compensation techniques, which can eliminate temporal redundancy between adjacent frames effectively, have been widely applied to popular video compression coding standards such as MPEG-2 and MPEG-4.

The communication area has been widely benefited by the developments in signal processing, which enabled variety of services in video sector.

With the increasing popularity of technologies such as Internet streaming video and video conferencing, video compression has become an essential component of broadcast and entertainment media. Video signal processing means: to compress the video frame; to encode the compressed frame; and then transmit the same. At the receiving end the video is displayed by decoding of an arriving signal. The aim of the video signal processing should be to compress maximum data in a minimum possible bandwidth. There are number of techniques to accomplish this process with their respective advantages and disadvantages.

This book incorporates comprehensive account of techniques suggested by different people for achievement of a more faithful transmission and reproduction of videos using limited bandwidth. The author has attempted to present different techniques starting with most initial to most advanced and effective, so that the student will be able to learn them with ease.

Our goal for this book is to provide an extensive development of a methodology to estimate the motion field between two frames pertaining to video coding applications.

Block matching techniques are generally used for motion estimation in video coding. In this context, the best solution from the quality point of view is represented by a full search algorithm that considers every possible detail while requiring however an enormous computational complexity. Different suboptimal solutions have been proposed in the literature. This book proposes an exhaustive study of the motion estimation process in the framework of a general video coder.

This work presents a novel method named as Modified Orthogonal Search Algorithm (MOSA) for the block-based motion estimation. We introduced the center-biased search point pattern for the estimation of small motions and a half way stop technique to reduce the computational complexity.

Algorithmic analysis shows that motion estimation is the most complex module in the video encoder. This is mainly due to the involvement of great number of calculations for motion estimation. Having this in mind, this book presents an innovative algorithm, for a further complexity reduction of the motion estimation (ME) module of video coder, by employing motion detection prior to motion estimation. Simulation results of the proposed technique reported a very good improvement in reducing the computations. An early detection of blocks due to zero motion vector, leads to cut redundant computation significantly, which speeds up the coding of video sequences.

The overall structure of this book takes the form of five chapters.

[Chapter 1](#) provides a concise introduction to the video compression techniques. It explains the main motivation for the research described in this book.

A theoretical and practical framework for the existing block matching algorithms is described in [Chap. 2](#). The chapter also highlights modification suggested in the existing algorithm. This chapter also covers the video sequences used in this work for the analysis and simulation.

[Chapter 3](#) presents a novel method named as Modified Orthogonal Search Algorithm (MOSA) for the block-based motion estimation. The advantage of the center-biased search point pattern for the estimation of small motions and a halfway-stop technique to reduce the computational complexity is elaborated. Detail analysis of the result is discussed stating its advantages over existing algorithm.

A novel reduced complexity motion estimation technique is introduced in [Chap. 4](#).

[Chapter 5](#) finally concludes this work by giving a brief summary and critique of the findings as well as identifying areas for future research.

Motion Estimation Techniques for Digital Video Coding

Metkar, S.; Talbar, S.

2013, XII, 64 p. 32 illus., Softcover

ISBN: 978-81-322-1096-2