TECHNICAL
REPORT

ISO/IEC
TR
14496-7

Second edition
2004-10-15

Information technology — Coding of audio-visual objects —

Part 7:
Optimized reference software for coding of audio-visual objects

Technologies de l'information — Codage des objets audiovisuels —

Partie 7: Logiciel de référence optimisé pour le codage des objets audiovisuels

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

Contents

Page

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

In exceptional circumstances, the joint technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC TR 14496-7, which is a Technical Report of type 3, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 14496-7:2002) which has been technically revised.

ISO/IEC TR 14496 consists of the following parts, under the general title *Information technology — Coding of audio-visual objects*:

— *Part 1: Systems*

— *Part 2: Visual*

— *Part 3: Audio*

— *Part 4: Conformance testing*

— *Part 5: Reference software*

— *Part 6: Delivery Multimedia Integration Framework (DMIF)*

— *Part 7: Optimized reference software for coding of audio-visual objects [Technical Report]*

— *Part 8: Carriage of ISO/IEC 14496 contents over IP networks*

— *Part 9: Reference hardware description [Technical Report]*

— *Part 10: Advanced Video Coding*

— *Part 11: Scene description and application engine*

— *Part 12: ISO base media file format*

— *Part 13: Intellectual Property Management and Protection (IPMP) extensions*

— *Part 14: MP4 file format*

— *Part 15: Advanced Video Coding (AVC) file format*

— *Part 16: Animation Framework eXtension (AFX)*

— *Part 17: Streaming text format*

— *Part 18: Font compression and streaming*

— *Part 19: Synthesized texture stream*

Introduction

Purpose

This part of ISO/IEC 14496 was developed in response to the growing need for optimized reference software that provides both improved visual quality and faster execution while compliance is preserved. The goal is to provide non-normative tools that are essential for implementations of the normative parts of the ISO/IEC 14496 specifications. For example, Part 5 of the ISO/IEC 14496 specifications uses a full search motion estimation which is theoretical optimum in coding efficiency but impractical for commercial implementation. In the past, the industry needs to create its own encoding tools for its target products. In this part, we provide a well-tested set of encoding tools that can enhance the performance but should not be standardized. The following recommended tools would be up to the individual organization to decide if it wishes to adopt or adapt these tools for its specific needs. This part provides significant reduction in the time-to-market and provides a reference benchmark for commercial ISO/IEC 14496 compliant products.

Information technology — Coding of audio-visual objects —

Part 7:
Optimized reference software for coding of audio-visual objects

1   Scope

This part of ISO/IEC 14496 specifies the encoding tools that enhance both the execution and quality for the coding of visual objects as defined in ISO/IEC 14496-2. The tool set is not limited to visual objects but at this point all the recommended tools are visual encoding tools. There are four tools that have been described in this technical report.

- Fast Motion Estimation
- Fast Global Motion Estimation
- Fast and Robust Sprite Generation
- Fast Variable Length Decoder Using Hierarchical Table Lookup

These tools have been demonstrated as robust tools with source codes for both MoMusys and Microsoft implementations. In the current implementations, there is single software that includes all tools existed in the ISO/IEC 14496-2. This is obviously inefficient in terms of code size and execution speed. To address this issue, the optimized reference software has compilation switches such that only selected tools as defined by the profiles and levels are included. Such level of optimization is performed at high level programming language. The platform specific optimization is currently not addressed by this part.