UNIVERSITI PUTRA MALAYSIA

FAST ADAPTIVE MOTION ESTIMATION SEARCH ALGORITHM FOR H.264 ENCODER

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FSKTM 2012 3

FAST ADAPTIVE MOTION ESTIMATION SEARCH ALGORITHM FOR H.264 ENCODER

By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirement for Degree of Master of Science

July 2012

DEDICATION

"Dedicated to my parents"

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Abstract of this thesis presented to the Senate of the Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

FAST ADAPTIVE MOTION ESTIMATION SEARCH ALGORITHM FOR H.264 ENCODER

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July 2012

Chair : Professor Mohamed Othman, PhD

Faculty : Faculty of Computer Science and Information Technology

The latest H.264/AVC encoder adopted more advanced techniques such as multiple reference-frame motion estimation, 4 x 4 integers Discrete Cosine Transform (DCT), intra prediction, de-blocking filter, quarter pixel Motion Estimation (ME) with variable block size and novel entropy. Motion estimation is a technique of video compression and video processing applications; it extracts motion information from the video sequence. Multiple reference-frame motion estimation can gain better compression efficiency of video coding for H.264 than previous video standards (e.g MPEG-2, H.263, JPEG). But it leads to higher computational cost and complexity in coding. In this study we proposed an efficient early termination searching method to reduce the computational complexity and achieve better compression ratio.

Adaptive search strategy is applied to reduce the search point in a search range. Furthermore this study presents an analysis of the performance of the proposed algorithm in terms of motion estimation time, total encoding time, video quality (PSNR), and bit rate. Simulation result shows that as compared to previous research, this

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algorithm achieves up to average 60% reduction in motion estimation time without degrading the video quality.

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Abstraktesis yangdikemukakankepadaSenatUniversiti Putra Malaysia
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ALGORITMA CARIAN ANGGARAN GERAKAN KELAJUAN ADAPTIF UNTUK PENGEKOG H.264

oleh

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Julai 2012

Pengerusi: **Profesor Mohamed Othman, PhD**

Fakulti: **SainsKomputerdanTeknologiMaklumat**

Pengekod H.264/AVC terkinimenggunapakaiteknik-teknik yang lebihmajusepertirangkarujukanpelbagaianggarangerakan, 4 x 4 pengubah integer diskretkosinus (DCT), ramalan intra, penapissekatan, anggarangerakansukupiksel (ME) denganblokbolehubahsaiz, dan novel entropi. Anggarangerakanialahteknikpemampatan video danaplikasipemprosesan video, iamengekstrakmaklumatgerakandariurutan video. Anggarangerakanrangkarujukanberbilangbolehmemperolehikecekapanmampatanpengekodan video yang lebihbaikuntuk H.264 daripadapiawai video yang sebelumnya (contohnya MPEG-2, H.263, JPEG).Tetapiiamembawakepadakospengiraan yang lebihtinggidankerumitandalampengekodan. Dalamkajianini, kami mencadangkansatukaedahcarianpenamatan yang lebihcekapuntukmengurangkankerumitanpengiraandanmencapainisbahmampatan yang lebihbaik.

Strategicarianpenyelesaiandigunakanuntukmengurangkantitikcariandalamjulatcarian.Selainitu, kajianinimembentangkananalisisprestasialgoritma yang dicadangkandarisegimasaanggarangerakan, jumlahmasapengekodan, kualiti video

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(PSNR), dankadar bit. Keputusanmenunjukkansimulasi yang dibandingkandenganpenyelidikandahulu, algoritmainimencapaisehinggapurata 60% penguranganmasaanggaranbergeraktanpamengurangkankualiti video.

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ACKNOWLEDGEMENTS

First and foremost, all grace and thanks belongs to Almighty Allah for giving me the strength in mentally and have patience to complete this study. I am very thankful and grateful to Professor Dr. Mohamed Othman for his careful guidance, valuable advice, support, and his endless recommendations to complete this research successfully and precisely. Once again my heartiest thanks to him that I could have contacted anytime with him wherever he is. My many thanks to my co-supervisor Dr. RohayaLatip, her guidance and advice was very helpful to write this thesis flawlessly.

My sincere thanks to all the staff of Faculty of Computer Science and Information Technology, School of Graduate Studies, Library, and Universiti Putra Malaysia for providing me the rich research environment.

At last, many thanks to parents, brother, sister for their support what was very valuable to me to complete this study. I would like express my heartiest thanks to my dear fellow friends and research lab mate for their support and help in my hard time and trouble.

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DECLARATION

I declare that the thesis is my original work except for quotations and citations, which have been properly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

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MD ANWARUL KAIUM PATWARY

Date: 30th July 2012

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