

論文 / 著書情報
Article / Book Information

題目(和文)	不変特徴を用いたビデオと画像のための電子透かし
Title(English)	Watermarking for Video and Image Based on Invariant Features
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出典(和文)	学位:博士(工学), 学位授与機関:東京工業大学, 報告番号:甲第9883号, 授与年月日:2015年3月26日, 学位の種別:課程博士, 審査員:横田 治夫,尾形 わかは,亀井 宏行,宮崎 純,田中 圭介
Citation(English)	Degree:, Conferring organization: Tokyo Institute of Technology, Report number:甲第9883号, Conferred date:2015/3/26, Degree Type:Course doctor, Examiner:,,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	論文要旨
Type(English)	Summary

(博士課程)
Doctoral Program

論文要旨

THESIS SUMMARY

専攻：	計算工学	専攻
Department of		
学生氏名：	TA MINH THANH	
Student's Name		

申請学位 (専攻分野)：	博士	(工学)
Academic Degree Requested	Doctor of	
指導教員 (主)：	横田 治夫	
Academic Advisor(main)		
指導教員 (副)：	田中 圭介	
Academic Advisor(sub)		

要旨 (英文 800 語程度)

Thesis Summary (approx.800 English Words)

Title: “*Watermarking for Video and Image Based on Invariant Features*”

This thesis is organized from six Chapters. The chapters of this thesis can be summarized as the followings:

Chapter 1 presents the background and the motivations of this thesis. Recently, due to the developments of network and personal computer technology, there has been a great of the amount of multimedia digital contents exchanged via the Internet. However, the advantages of digital content, *i.e.* easy copy, re-distribution, have the security concerns such as copyright protection, owner's right problem, legal user verification. Digital watermarking is a promising technique used for copy control, identification, and traitor tracing. In digital watermarking, the watermark information is embedded into the digital contents without distortion of quality. It can be extracted later by using the predefined algorithm. The overview of related works is given in order to explain the challenging issues of the watermarking techniques. It also points out the original content leakage problem of the digital right management (DRM) systems. Based upon this overview, the solutions and contributions of this thesis are summarized.

Chapter 2 presents the fundamental theories and techniques used in digital watermarking and the criteria to evaluate the results obtained from our experiments.

Chapter 3 proposes to employ the frame-patch matching technique using KAZE feature for robust watermarking method in order to synchronize the embedded positions before the watermark extraction process. By the helping of KAZE matching, our proposed method can restore the distorted frame and then the watermark information can be extracted with high accuracy. Therefore, our proposed method can resist strong attacks such as geometric attacks. This chapter solves the challenging issue that is how to improve the watermarking method robust against the geometric attacks.

Chapter 4 proposes a novel frequency domain for robust watermarking in order to improve the quality of embedded contents. In general, if the robustness of watermark extraction is improved, the quality of embedded content is sacrificed. The purpose of this chapter is to control the quality of the embedded content with keeping the robustness of watermark extraction. Two parameters, Q for controlling the robustness and q for controlling the quality of embedded content, are flexibly used to achieve our purpose, therefore, our proposed method is more effective than existing methods. Based on the proposed frequency domain, the trade-off of the robustness and the quality can be controlled according to the real applications. This chapter solves the challenging issue that is how to improve the quality of copyrighted content with keeping the robustness.

Chapter 5 presents the safe DRM system using our proposed incomplete cryptography. The proposed methods in Chapter 3 and 4 can be applied on the conventional DRM system models. However, such kind of DRM systems has the original content leakage problem that derives the illegal distribution of original content without the permission of producer. To solve this problem, this chapter proposes the concept of incomplete cryptography for composing the decryption and watermarking process of the conventional DRM systems. Based on the incomplete cryptography, the original content is not revealed inside the user's system and the watermark information is embedded into the decoded content simultaneously. This chapter also presents effectively the incomplete cryptography by using the huffman code length feature of JPEG image. Since the proposed embedding method employs the invariant huffman code feature, we can embed the watermark into the JPEG image with keeping the invariant size of processed image files. That makes our method safer than conventional method.

Chapter 6 makes the concluding remarks with a list of the principal results. The main contributions of this thesis are summarized with merit and demerit points. Based on those, the future works are specified.

At the end of this thesis, a list of references is given.

備考：論文要旨は、和文 2000 字と英文 300 語を 1 部ずつ提出するか、もしくは英文 800 語を 1 部提出してください。

Note：Thesis Summary should be submitted in either a copy of 2000 Japanese Characters and 300 Words (English) or 1copy of 800 Words (English).

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