

# A Study on Video Coding Algorithms based on Region Segmentation using Motion Vectors

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# 1995 Fiscal Year Final Research Report Summary

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## A Study on Video Coding Algorithms based on Region Segmentation using Motion Vectors

Research Project

### Project/Area Number

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06650407

### Research Category

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Grant-in-Aid for General Scientific Research (C)

### Allocation Type

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Single-year Grants

### Research Field

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情報通信工学

### Research Institution

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Kanazawa University

### Principal Investigator

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### Project Period (FY)

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1994 – 1995

### Keywords

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Motion vector / Region segmentation / Contour extraction / Subband coding / Inter-band correlation / gain / shape VQ

### Research Abstract

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A video coding algorithm based on region segmentation has been studied. Segmentation coding methods are seemed to be better than the conventional waveform coding ones in points of coding efficiency and coded picture quality at a given coding rate. In our study, moving objects are detected using motion vectors between successive frames, and segmented into different regions. Each object is coded by using the optimally method region by region. Obtained results in this study are as follows.

1. Optimal detection of motion vector

A hierarchical block matching method is applied to subband splitted images in order to obtain motion vectors in high accuracy. Parameters for block matching, for example blocksize, hierarchical stage number, detection thresholds and so on, are optimized. Motion vector detection with a half-pel precision is effective for rapid motion including panning, but block matching in small blocksize is better for fine pictures.

## 2. Segmentation and contour extraction

Two methods extracting moving object's contour are examined.

(1) Motion vectors are detected sequentially by reducing block size from larger one to smaller, and finally obtained in pel-base domain. The discontinuous points of pel-base motion vectors are recognized as moving object's contour.

(2) First, candidate contour blocks which include moving object's contour inside are determined in larger block size matching. Then Chrominance information (Hue) in those blocks is used for detection of exact pel-level contour.

Compared to the former in which noise causes error detection for motion vector, the latter has advantaged in extracting exact contour by employing both temporal and spatial correlation in picture. Coding of contour is performed by applying chain coding etc, but it is left for further study.

## 3. Subband coding

Subband image coding has also been investigated in relation to the hierarchical motion vector detection. Higher frequency components can be selectively coded without overhead information by using inter-subband correlation in images. In another method, gain/shape vector quantization is applied to a small block constituted over subband images, and high performance as well as complexity reduction are attained.▲ Less

# Research Products (8 results)

All Other

All Publications (8 results)

- [Publications] 一原雅幸: "信号電力分布のバンド間相関を利用したサブバンド画像符号化の一手法" テレビジョン学会技術報告. 18. 7-12 (1994) ▼
- [Publications] 冢保具太: "半画素精度動きベクトル検出の特性" テレビジョン学会誌. 49. 1090-1093 (1995) ▼
- [Publications] 一原雅幸: "バンド間相関を利用したサブバンド画像符号化の特性改善" 1995画像符号化シンポジウム(PCSJ95)予稿集. 163-164 (1995) ▼
- [Publications] 小島健史: "画像の局所的性質に基づくサブバンド画像のベクトル量子化に関する検討21GC04:1995画像符号化シンポジウム(PCSJ95)予稿集" 165-166 (1995) ▼
- [Publications] Ichihara, Hashimoto: ""A Study of Subband Image Coding using Inter-band Correlation of Signal Distribution"" ITE Technical Report. Vol.18, No.40. 7-12 (1994) ▼
- [Publications] Ieyasu, Ge Qing, Hashimoto: ""Characteristics of Motion Vector Detection with a Half-pel Accuracy"" The Journal of the Institute of Television Engineers of Japan. Vol.49, No.8. 1090-1093 (1995) ▼
- [Publications] Ichihara, Hashimoto: ""An Improvement of Subband Image Coding using Inter-subband Correlation"" 1995 Picture Coding Symposium in Japan. 8-1. 163-164 (1995) ▼
- [Publications] Kojima, Nobata, Hashimoto, Takebe: ""A Study of Subband Image Coding using Vector Quantization based on Local Texture of Image"" 1995 Picture Coding Symposium in Japan. 8-2. 165-166 (1995) ▼

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