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●研究テーマ (Research theme)

① 並列化シームカービングアルゴリズムの性能評価

(Performance Evaluation of Hardware-Oriented Seam Carving Algorithm)

① 近年盛んに研究されている画像の知的編集技術では、画像中のオブジェクトの視覚的重要度を意識して編集することを可能にしている。代表的な知的編集技術であるシームカービングは汎用性の高いアルゴリズムであるが、実時間処理を要求するアプリケーションにおいては、処理時間が無視できないという問題がある。この問題を解決するために、ハードウェア指向のシームカービングアルゴリズムを提案し、FPGA上にアルゴリズムを実装して性能を評価した。



Fig. 1. Seam carving.

As portable devices spread, electronic visual displays with various display aspect ratios (DARs) are available. When an image is delivered to such a device whose DAR does not fit the original image, the adjustment of the image is needed. In a typical case, scaling with additional black-colored backgrounds is often used in delivering movies to TVs. Although this simple resizing does not distort original images, for portable devices with small displays there are shortcomings that the images become so small.

Seam carving is one of content-aware image resizing algorithms. This algorithm can weed out the pixels of backgrounds from original images without making alteration to objects in the images as shown in Fig. 1, and it can be used as a general operator for various applications. An above mentioned example, display fitting, is one of such an application. However, the computational complexity becomes the bottleneck of the implementation of the algorithm. For example, even when shortening the width of an image by a hundred columns, the real-time processing on a CPU is infeasible.

To overcome the above difficulty, we present a hardware-oriented seam carving algorithm. This algorithm gives a dedicated processor for each pixel in a row/column of an image, and the parallel computation for the pixels can be done. The performance of the algorithm is evaluated on an FPGA board, and it turns out that the algorithm can achieve two thousands of performance as much as that for the original one.

キーワード (Keyword)

専門分野 (Specialized Field)

共同研究可能技術 (Possible Technology of Cooperative research)

関連論文・特許情報 website

(Related articles・patent information)

研究設備 (Research Facility)

研究室URL (Lab. URL)

E-mail

画像処理 (Image Processing)

計算機工学 (Computer Engineering)

画像処理アルゴリズムの設計

(Algorithm Design for Image Processing)

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