SUMMARY OF Ph.D. DISSERTATION

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Title

A study on image processing algorithms composed of local and parallel processing

Abstract

  This dissertation considers algorithms for a local and parallel processing device. Image processing needs huge amount of calculations. Therefore, hardware architecture that processes images in parallel and algorithms for parallel processing has been studied for long time. We take the approach that using the hardware architecture which consists of many small PEs(Processing Elements) and each PE processes images locally in parallel. This architecture enables systems to work with low electric power because each PE can work with low frequency. In this paper, algorithms, which use only local processing, are described.

  This dissertation comprises four chapters.

  Chapter 1 describes the background and destination of this study.

  Chapter 2 describes the algorithm, which extracts character regions from scenery images. The proposed algorithm is intended for support for visual impairment people through a reading service. The proposed algorithm consists of only local calculations. Information of neighbor pixels is used for binarizing, and characters can be extracted under adverse illumination condition. The proposed algorithm repeats simple calculations to extract characters. More than 90% of extraction rate is obtained from the computer simulations.

  The algorithm for pictogram detection is described in chapter 3. A pictogram means "mark". It is intended that assistance for walking of visual impairment people. The pictogram detection algorithm consists of only local and simple calculations as well as that in chapter 2. After the pictogram detection, the proposed algorithm can classify detected pictograms into eleven kinds of pictograms used in the station. The demonstration experiments indicate the usefulness of the proposed algorithm. The proposed algorithm can be specialized to detect particular pictograms.

  Chapter 4 is the conclusion. We conclude results of this paper.