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Title

Study on image recognition using fuzzy inference neural networks

Abstract

Most of the current image recognition systems perform operations by means of given rules or pattern matching. They have advantages in expected situations, however, it is difficult to operate properly in other cases. For achieving flexible and intelligent image recognition, acquisition of a great deal of knowledge and the effective usage are important. Therefore developing sophisticated learning systems for obtaining adequate knowledge is required.

A lot of image recognition researches based on learning systems have been made. On the other hand, few researches focus on an automatic knowledge acquisition and processing have been carried out.

This paper proposes new image recognition systems using fuzzy neural networks (FNNs). Since FNNs can create recognition rules automatically during the learning process, the proposed systems don't require explicit knowledge for recognition.

Chapter 1 is the introduction and describes the research motivation and issues.

In Chapter 2, a new system for image recognition and automatic rule creation is proposed. This system uses fuzzy inference neural networks (FINNs) and they achieve good recognition results for scenery images and provide several interpretive words for them without explicit given knowledge.

In Chapter 3, a new fuzzy neural network model, "adaptive fuzzy inference neural network" (AFINN) is proposed. AFINN has the automatic modeling functions, such as selection of sufficient inputs and determination of proper number of system rules as well as conventional functions of FNNs. Moreover, AFINN can handle high dimensional data because it operates with a new inference algorithm. From experiments, effectiveness of those functions and superior performance are confirmed.

In Chapter 4, a new integrated image recognition system that combines AFINN and an effective pattern-matching algorithm, active search, is proposed. At first, the system carries out active search to find the candidate areas of intended objects quickly and then it examines those areas. We treated in-door scenes for sample recognition task and it is confirmed that the combined system of pattern-matching method and learning method works effectively and shows good performance.

Chapter 5 is the conclusion of this paper.