

Preface

Intelligent information processing methodologies adopt one of the two major approaches: model based or rule based. In the first approach a model is developed from the sufficient training data, the domain knowledge as well as the knowledge of the physical process giving out the data. All the subsequent analysis and decision making is based on the model itself. Hence, though does not cover much wide spectrum, the method developed by this approach is very robust. Second approach develops a rule-base based on extensive and meticulous observation of the system and its outcome as well as reasoning. This approach covers a wide spectrum of situation, but may not be as reliable as the first one.

In the first paper, Joshi and Brady have developed a novel non-parametric mixture model for the histogram of image intensities. This leads to the evolution of level sets in a Bayesian framework, which are applied to region classification and image segmentation problem. The experimental results on medical images demonstrate the effectiveness of the method. The next paper by Chattopadhyay and Mukherjee, describes the level set based curve evolution method for pattern generation in 2D space. The reaction-diffusion and shape optimization models are used to derive constraints for curve evolution. The proposed model is extended successfully to the reconstruction of partially occluded patterns, which is a problem in Computer vision. The problem of instability in curve evolution, while using active contours for object segmentation and tracking, is tackled by Srikrishnan and Chaudhuri in the third paper. They propose the use of an additional tangential component for stability while the shape of the curve remains intact. The next article deals with object tracking, object recognition and object reconstruction using a completely different approach, i.e., general state modeling and estimation. In this work, the method proposed by Derichs, Deutsch, Wenhardt, Niemann and Denzlery here is based on determining the next best view in active state estimation using the concept of mutual information. The problem of 3D

object recognition is tackled by Zografos and Buxton in the fifth article. Their method combines linearly a few 2-dimensional intensity images of the same 3d object taken from vicinity but arbitrary viewpoints to obtain an overall idea about the object. They finally used an evolutionary algorithm for obtaining the 'optimal parameters for linear combination of views. Harit and Bharatia and Chaudhury present an approach for object category identification in video sequences. The proposed approach integrates object model knowledge with the perceptual organization process in human beings. The methods we have presented so far are for object segmentation, tracking and recognition in image or video. Emotion and expression recognition from an image is also an active research area nowadays. The article of Buciu and Pitas is on recognition of six basic facial expressions. The authors have developed a novel way of extracting features using discriminant non-negative matrix factorization algorithm. They successfully demonstrated the superior performance of their methodology over the competing strategies. Another active research area is retrieval of image and video from a large database. Search can be made more efficient and recall can be improved if the duplicate images can be trimmed off. Ghosh, Gelasca, Ramakrishnany and Manjunath tackled the problem of duplicate image detection in very large databases in the next article. They used a 12 dimensional descriptor based on Fourier Mellin transform. The detection of duplicate images is dependant on the dissimilarity measure. Another application of dissimilarity analysis may be found in the change detection problem in satellite images. Patra, Ghosh and Ghosh exploited the properties of self-organized feature map to reach a satisfactory solution to this problem. Another two important aspects of dealing with image and video data are compression and processing time. Liu, Zhu, Bosch and Delp provide an excellent review article describing the recent advances in video compression techniques. They additionally described the latest video coding standard. Compression is an essential tool for efficient storage and transmission of data. Another essential consideration is the processing time required for a given task. Hardware implementation of an algorithm always improves its efficiency in terms of speed. In the next article by Bishnu, Bhowmick, Bhattacharya, Kundu, Murthy and Acharya, a combinatorial approach is described for designing a hardware architecture for the classification each pixel into one of the three classes, namely, crest, valley and slope. The proposed pipeline design can be used to build a fast coprocessor for online finger print analysis. Intelligent information processing system should be able to handle uncertainties. Almost all the methods presented so far have some means of satisfying this criterion. For example, self-organized feature map, which is used in change detection in satellite image, has inherent capability to handle uncertainties to some extent. Rough set and fuzzy set based tools also have similar capabilities.

Maji and Pal propose a roughfuzzy C-medoids algorithm to select most informative bio-bases for amino acid sequence analysis in bioinformatics. The superior performance of the proposed method is demonstrated on different protein datasets. As indicated in the beginning the success of an intelligent information processing system greatly depends on the proper exploitation of domain and process knowledge. In the final article, Pedrycz describes the concept of knowledge reuse in the computational intelligence models. New performance index is defined whose minimization helps in the most effective level of knowledge reuse. The utility of the proposed methodology is demonstrated on fuzzy rule based systems.

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