has been developed. In this system the total FOV is given by the number of channels along one axis multiplied with the sampling angle. In order to increase the image resolution for a fixed FOV the sampling angle is made small. However, depending on the size of the acceptance angle, the FOVs of adjacent channels overlap which causes a reduction of contrast in the overall image. In this work we study the feasibility of using digital post-processing methods for images obtained with a thin compound-eye camera to overcome this reduction in contrast. For testing the Wiener filter with the thin compound-eye camera images we have carried out some simulations and experimental measurements.

6812-24, Session 6

The watermarking attacks in the MPEG-4 AVC domain

S. Duta, M. P. Mitrea, F. PrÃªteux, L. Riffaud, Institut National des TÃ(c)lÃ(c)communications (France)

The explosion of online video distribution and digital television services is possible due to the advances in the video compression standards. While the video content can be successfully protected during its transmission (streaming) by means of encryption techniques, the watermarking techniques are designed to protect the video during its consumption. The present paper is devoted to video watermarking in the MPEGâ€'4 AVC domain. It takes into consideration six types of real life attacks (like Gaussian filtering, 2Â° rotations, and StirMark random bending, for instance) and establishes that time invariant statistical models describing their effects in the MPEGâ€'4 AVC domain exist. The model computation is based on probability estimation with confidence limits; relative errors lower than 10% were considered in each case of practical relevance. Finally, the model is used to evaluate the watermarking capacity, i.e., the largest quantity of information which can be inserted into the AVC stream while obeying prescribed transparency and robustness constraints.

6812-25, Session 6

A fuzzy patches construction method based on the travel depth for protein active site prediction

J. Giard, P. Rondao Alface, B. Macq, Univ. Catholique de Louvain (Belgium)

Active site prediction, well-known for drug design and medical diagnosis, is a major step in the study and prediction of interactions between proteins. The specialized literature provides studies of common physicochemical and geometric properties shared by active sites. Among these properties, this paper focuses on the travel depth which takes a major part in the binding with other molecules. The travel depth of a point on the protein solvent excluded surface (SES) can be defined as the shortest path accessible for a solvent molecule between this point and the protein convex hull. Existing algorithms providing an estimation of this depth are based on the sampling of a bounding box volume surrounding the studied protein. These techniques make use of huge amounts of memory and processing time and result in estimations with precisions that strongly depend on the chosen sampling rate. The contribution of this paper is a surface-based algorithm that only takes samples of the protein SES into account instead of the whole volume. We show this technique allows a more accurate prediction, at least 50 times faster. A validation of this method is also proposed through experiments with a statistical classifier taking as inputs the travel depth and other physicochemical and geometric measures for active site prediction.

6812-26, Session 7

Topological pattern recognition and reconstruction from noise affected boundary patterns

C. J. Hu, Univ. of Colorado at Boulder

Using our recently modified curve-fitting-topological-coding (CFTC) computer program, we can automatically obtain a precise topological code to represent the topological property of a closely reconstructed boundary of a selected object in an edge-detected picture. This topological property is perhaps the most important property to be used for object identification. It is very accurate, yet very robust, because the topological property is independent of geometrical location, shape, size, orientation, and viewing angles. It is very accurate if two different objects to be differentiated or to be identified have different boundary topologies. Patch noise and obscuring noise can also be automatically eliminated as shown in some live experiments.

6812-27, Session 7

An artificial neural network based matching metric for iris identification

R. P. Broussard, L. R. Kennell, R. W. Ives, U.S. Naval Academy

The iris is currently believed to be the most accurate biometric for human identification. The majority of fielded iris identification systems are based on the highly accurate wavelet based Daugman algorithm. Another promising recognition algorithm by Ives et al uses Directional Energy features to create the iris template. Both algorithms use Hamming distance to compare a new template to a stored database. Hamming distance is an extremely fast computation, but weights all regions of the iris equally. Work from multiple authors has shown that different regions of the iris contain varying levels of discriminatory information. This research evaluates four post-processing similarity metrics for accuracy impacts on the Directional Energy and wavelets based algorithms. Each metric builds on the Hamming distance method in an attempt to use the template information in a more salient manner. A similarity metric extracted from the output stage of a feed-forward multi-layer perceptron artificial neural network demonstrated the most promise. Accuracy tables and ROC Curves of tests performed on the publicly available Chinese Academy of Sciences Institute of Automation database show that the neural network based distance achieves greater accuracy than Hamming distance at every operating point, while adding less than one percent computational overhead.

6812-28, Session 7

Toward automatic diagnosis of dermatoscopy images

T. F. Mendonca, A. R. S. Marçal, H. Alonso, Univ. do Porto (Portugal); P. Rocha, Univ. de Aveiro (Portugal)

Dermoscopy (dermatoscopy, skin surface microscopy) is a non-invasive diagnostic technique for the in vivo observation of pigmented skin lesions used in dermatology. This diagnostic tool allows for a better visualization of surface and subsurface structures and allows for the recognition of morphologic structures not visible by the naked eye, thus opening a new dimension of the clinical morphologic features of pigmented skin lesions. In the last few years, significant developments occurred both in dermoscopy and tele-medicine, allowing for improved clinical diagnosis of skin lesions. In fact, there is currently a great interest in the prospects of automatic image analysis methods for dermoscopy. The benefits of such methods are two fold: to provide quantitative information about a lesion that can be of relevance for the clinician; as a stand alone early warning tool. The effective implementation of such a tool could lead to a reduction in the number of cases selected for exeresis, with obvious benefits both to the patients and to the health care system. The standard approach in automatic dermoscopic image analysis has usually three stages: (i) image segmentation, (ii) feature extraction and feature selection, (iii) lesion classification.

The dermoscopic diagnosis of pigmented skin lesions is based on various analytic approaches and algorithms that have been set forth in the last few years, namely, pattern analysis, ABCD rule, Menzies method and seven-point checklist. The common denominators of all these diagnostic methods are particular dermoscopic criteria that represent the backbone for the morphologic diagnosis of pigmented skin lesions. However, most of these criteria are qualitative features and thus difficult to implement on a computer based algorithm. This paper presents contributions to an automatic skin lesion classification system, based on automatic learning rather than on standard empirical rules available in the current commercial systems. This is by no means a straightforward task because there is a large number of possible cases and a potentially too large number of