Message from the Cochairs

It is a pleasure to present to you this exciting collection of articles on mathematical methods in biomedical image analysis: the proceedings of the IEEE Workshop on Mathematical Methods in Biomedical Image Analysis (MMBIA 2001), held in conjunction with the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Kauai, Hawaii, December 9-10, 2001. The meeting is sponsored by the IEEE Technical Committee on Pattern Analysis and Machine Intelligence (IEEE TC-PAMI).

The purpose of this workshop is to present new work and foster discussion and debate on mathematical and computational approaches to research in biomedical image analysis. The workshop is the fifth meeting on biomedical image analysis. Previous meetings were held in conjunction with CVPR’94 (Seattle), CVPR’96 (San Francisco), CVPR’98 (Santa Barbara), and CVPR 2000 (Hilton Head). The call for papers resulted in 72 submissions, which were reviewed double-blind by three reviewers from the program committee. This process resulted in the 28 papers presented in this two-day workshop. The large number and high quality of the submissions resulted in an excellent collection and many good papers that could not be accepted.

A variety of themes emerge from this collection. Segmentation and registration remain fundamental research topics, with continuing exploration of such methodologies as deformable models, level set methods, and elastic registration. We have included work on detection strategies, such as for the analysis of functional images, an area of great interest as the methods and ideas of medical image analysis are used to go beyond straightforward statistical techniques. A number of papers are coupled tightly to acquisition issues, attempting, for example, to correct distortions taking advantage of the knowledge of acquisition physics and geometry. These techniques represent a rich area for future work. The analysis of shape and the construction of atlases are also areas of active research as useful models and metrics for shape characterization are developed.

Many of the techniques presented use probabilistic methods as a foundation for the modeling of noise, shape, and image properties, for example. A number of papers concern the analysis of mammographic images; this area presents difficult problems in a variety of algorithmic domains but tremendous progress has been made in recent years. An additional theme is the use of biomechanical models that come up throughout this proceedings, sometimes implicitly.

In addition to the presentation of these articles, the workshop features two invited talks:

Recent Advances in Cardiac Imaging using HARP MRI
Jerry Prince, Johns Hopkins University

Shape Analysis in Structural Neuroimaging
Guido Gerig, University of North Carolina, Chapel Hill
We hope that all of these presentations elicit interesting and fruitful discussions and interactions.

We thank the program committee for reviewing the manuscripts in such a thorough and careful manner. We also thank our sponsors, the IEEE Computer Society and the Technical Committee on Pattern Analysis and Machine Intelligence, and the CVPR organizing committee. The assistance and advice of Kevin Bowyer and Gerard Medioni are especially appreciated. We are grateful to the IEEE Computer Society staff, Randy Bilof and Anne Jacobs, for their efforts in publishing these proceedings.

Lawrence Staib
Yale University

Anand Rangarajan
University of Florida