Preface

It has been a great pleasure for us to put together the program for the Workshop on Mathematical Methods in Biomedical Image Analysis (MMBIA), being held at the Hotel Nikko, San Francisco, on June 21 and 22, 1996. The idea for holding this meeting was rooted in the Mathematical Methods in Medical Imaging meetings previously held under SPIE sponsorship and at the Workshop on Biomedical Image Analysis held in Seattle in 1994. MMBIA is an attempt to provide a forum for representatives of both communities.

In addition to electronic dissemination, our Call-for-Papers was published by Rangachar Kasturi and Michael Vannier in IEEE-PAMI and IEEE-TMI. It also appeared in several SIAM and mathematical community publications. Of the 50 papers received for review, we accepted 32 for presentation. Most papers were reviewed by three members of the Program Committee, and the recommendations were compiled to produce the list of papers appearing in these proceedings.

The themes for the submitted papers correspond to the titles of the sessions: Medical Image Registration, Deformable Models, Medial Axes, Bayesian Methods, and Shape. Some of these areas have traditionally received a good deal of attention within the more mathematically-minded segment of the medical image analysis community; others, considerably less. Collectively we often meditate about the factors underlying this degree of (im)balance. Some of it understandably derives from the needs of our clinical colleagues or the power of today's magnificent hardware. But some certainly derives from the capabilities of the associated mathematical manipulations, and some simply from the timing of our realization of these capabilities. Indeed, most of our current research areas entail not so much applications of recent fundamental breakthroughs in applied mathematics as rediscoveries of techniques that have resided in the mathematical literature for a considerable period of time. Branches of mathematics fundamental to our discipline include geometry, linear algebra, functional analysis, partial differential equations, optimization theory, and graph theory; other disciplines that contribute to our thinking include medical physics and statistics. The papers in this volume develop computational methods based on these sources in many clever ways, providing interesting solutions to medical image analysis problems.

Our two keynote addresses focus on the theme of Shape, which is being paid a steadily increasing attention across a wide range of medical image analyses. They approach this core from two strikingly different mathematical points of view — the formalization of shape (Bookstein) and the formalization of deformation of shape (Terzopoulos).
We thank the entire Program Committee for their meticulous reviews of all the submitted manuscripts. We also thank the IEEE Computer Society and the PAMI Technical Committee for sponsoring MMBIA, as well as SIAM, which has been a cooperating society. Special thanks are due the organizers of CVPR '96 and the IEEE Computer Society staff. Finally, thanks to Dmitry Goldgof and Kevin Bowyer for constructive comments on organizational aspects of MMBIA.

We look forward to an exciting meeting. Welcome!

Amir Amini, Fred Bookstein, and David Wilson

Program Co-Chairs