THE CHINESE UNIVERSITY OF HONG KONG

SHUN HING INSTITUTE OF ADVANCED ENGINEERING

Shun Hing Distinguished Lecture Series

Computational Models for Medical Image Analysis

by

Professor Nicholas Ayache
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Date: 18 October 2005, Tuesday
Time: 4:00 PM
Venue: TY Wong Hall, 5/F, Ho Sin Hang Engineering Building, CUHK

Abstract

Medical image analysis brings about a revolution to the medicine of the 21st century, introducing a collection of powerful new tools designed to better assist the clinical diagnosis and to model, simulate, and guide more efficiently the patient's therapy. A new discipline has emerged in computer science, closely related to others like computer vision, computer graphics, artificial intelligence and robotics.

In this talk, I will describe the increasing role of computational models of anatomy and physiology to guide the interpretation of complex series of medical images, and illustrate my presentation with three applications: the modeling and analysis of 1) brain variability from a large database of cerebral images, 2) tumor growth in the brain and 3) heart function from a combined exploitation of cardiac images and electrophysiology.

I will conclude with a presentation of some promising trends, including the analysis of *in vivo* microscopic images.

Biography of Speaker

Nicholas Ayache is a Research Director at INRIA (French Research Institute in Computer Science and Automatic Control), Sophia-Antipolis, France, where he has been the scientific leader of the EPIDAURE research group on medical image analysis and robotics since 1993. He is currently teaching graduate courses in Computer Vision and Medical Imaging at Ecole Centrale Paris and Ecole Normale Supérieure (Cachan), and was previously teaching at the Universities of Paris XI and Nice-Sophia Antipolis. Since 1984, he has been a scientific consultant for several industrial companies, and participated in the creation of several start-up companies in image processing, computer vision, and bio-medical imaging.

Dr. Ayache received his Ph.D in 1983, and his "Thèse d'Etat" in 1988, both in computer science, from the University of Paris XI, on the development of vision cababilities for autonomous robots, more precisely on topics related to model based object recognition, passive stereovision, and multisensor fusion. Since 1988, Dr. Ayache's research interests have been in Medical Image Analysis (including shape and motion representation, rigid and nonrigid registration, tracking and analysis of deformable objects), simulation of surgery (including the modelling of soft tissue), and image guided therapy (in particular in the context of medical robotics). Dr. Ayache has also been involved in the analysis of functional images and their application to medicine and neurosciences, and more recently in the analysis of microscopic images for medical or biological applications. Dr. Nicholas Ayache is the author and co-author of more than 200 scientific publications in these domains.
Dr. Ayache has several editorial responsabilities : he is the co-founder and co-Editor in Chief of the scientific

journal Medical Image Analysis (Elsevier), an Associate Editor of Transactions on Medical Imaging (IEEE), a member of the editorial board of the Int. Journal of Computer Vision (Kluwer) and Computer Assisted Surgery (Wiley), advisory editor of Videre-Computer Vision Research Journal (MIT-Press), and Medical Imaging Technology (Japanese Society of Medical Imaging).

Dr. Ayache is the author of the book Artificial Vision for Mobile Robots (MIT-Press) ("Vision stéréoscopique et perception multisensorielle", Inter-Editions) and Editor of the book "Computational Models for the Human Body". He chaired the first International Conference on Computer Vision, Virtual Reality, and Robotics in Medicine (CVRMed) held in Nice in April 1995, and co-chaired the First Symposium on Surgery Simulation and Soft Tissue Modeling in 2003. Dr Ayache has been serving on the editorial board of major conferences in Medical Imaging, Computer Vision, Visualisation, and Robotics including MICCAI, ISBI, CVPR, ECCV and ICCV.

And Dr. Ayache is the member of Advisory Board for the Shun Hing Institute of Advanced Engineering, CUHK.

Bibliography of Speaker

Available at http://www-sop.inria.fr/epidaure/BIBLIO

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