

Cutting Edge Data Analysis Methods for Extracting the “Invisible” from Biosignals and Medical Images

Hervé Delingette

Equipe-Projet Asclepios, INRIA Research Center, Sophia Antipolis, France

Current clinical practice involves more and more the analysis of medical images either for establishing diagnoses, planning therapies or assessing the outcome of therapies. The analysis of anatomical, and functional images is often considered to be tedious, mostly qualitative and with limited reproducibility. Computational tools can assist practitioners to provide a quantitative and objective assessment of the anatomy and function from medical images. In this lecture, I show how the coupling of physical and physiological models of the human body with medical images can provide relevant and quantitative indices that are useful clinically. A key task is to personalize those models from patient images and signals, i.e. to choose a specific set of parameters that best corresponds to the studied patient. Examples of this technique will be provided for the analysis of cardiac mechanics and electrophysiology as well as the growth of brain tumours.

Biography

Dr. Hervé Delingette is currently a research director in the ASCLEPIOS research group at the INRIA research center in Sophia Antipolis and is leading the INRIA research action CardioSense3D on cardiac modelling. He received in 1989 a Master degree and in 1994 a PhD degree from the Ecole Centrale des Arts et Manufactures de Paris, (France) and was habilitated in 2006. From 1989 until 1992, he was a Visiting Scientist at the Robotics Institute of Carnegie Mellon University (CMU) and the Human Interface Laboratory of Nippon Telegraph and Telephone (NTT). His research interests are in the fields of medical image analysis, image segmentation, soft tissue modelling, surgery simulation and computational models of the human body. He is member of the Editorial Board of the Medical Image Analysis journal and he authored and co-authored more than 50 journal papers in those fields. He co-chaired the First Symposium on Surgery Simulation and Soft Tissue Modeling in 2003 and the Fifth International Conference on Functional Imaging and Modeling of the Heart in 2009.