Co-organisés par CNRS/GDR STIC-Santé, IEEE France Section Chapitre EMB
Engineering in Medecine and Biology), ISIR/Univerité Paris 6
Contact : pissaloux@robot.jussieu.fr
Date : vendredi 25 mai
Heure : 16h à 18h
Lieu :
Risc - UMS 2551 CNRS
Maison de la recherche
28 rue Serpente - 75006 Paris
Salle S 002

SEMINAIRE 1 : Complex Analysis of Biosignals and Their Role in >Diagnosis
Orateur : Maurice E. Cohen, Ph.D.

Biomedical signals are nonlinear in nature and pose problems for long-term analysis. Over the last three decades, chaos theory has been applied to a variety of applications ranging from meteorology to medicine as a means of dealing with nonlinearities. More recently, the term complexity has been used to describe nonlinearities that arise in biomedical signals as well as to the overall analysis of biomedical data. In this lecture, the nature of chaotic systems is discussed from both a theoretical and practical standpoint. The use of the Poincaré Differential Plot for biosignal signal analysis will be introduced and will be illustrated in the analysis of biomedical signals of different types, including signals with repeating patterns such as the electrocardiogram, as well as those without repeating patterns such as the electroencephalogram and time series generated from hemodynamic studies. While biomedical signals alone can provide valuable diagnostic information, results are often not sufficient to provide a comprehensive model of the patient's condition.Higher-order decision models such as expert systems or neural network models can be used to combine signal analysis results with other clinical parameters. This process will be illustrated using the neural network Hypernet for applications in cardiology and neurology.

Short CV
Maurice E. Cohen, Ph.D. is Professor of Radiology at University of California, San Francisco, and also Professor in the Graduate Groups in Biological and Medical Informatics and the Joint Graduate Group in Bioengineering at UCSF and UC Berkeley. He has over 240 publications in the areas of applied mathematics, artificial intelligence in medicine, chaotic modeling, signal analysis, complex systems, neural networks, and image processing. He has received numerous honors, including the Faculty Research Award from UCSF and Outstanding Professor from California State University.
e was named Renaissance Scholar by the National Honor Society of Phi Kappa Phi. Dr. Cohen is a Fellow of the American Institute for Medical and Biological Engineering for his pioneering work in cardiology for which he also was awarded a prize from the American Medical Informatics Association.He solved two problems in mathematics and chaos theory that were believed to be insoluble. In addition, Dr. Cohen is an internationally recognized artist and has shown his painting in San Francisco, Carmel, New York, and Paris, including the 2006 Salon of the Sociéte Nationale des Beaux Arts in the Caroussel du Louvre.>

SEMINAIRE 2 : Evaluation of Evidence in Complex Decision Support Models
Orateur : Donna L. Hudson, Ph.D.

Hybrid systems provide a basis for incorporation of diverse types of data, including numerical, text-based, time series, and imaging data with the goal of forming comprehensive

decision models. The hybrid approach also permits the use of expert-supplied knowledge as well as data-derived knowledge through a combination of several reasoning paradigms in the same model. Intelligent agent interfaces provide a sound basis for assigning tasks to appropriate methodologies and for combining results to present a global picture. Hybrid methods are particularly useful for building diagnostic models for biomedical data due to the wide variety of data types that are routinely encountered.Evaluation of the effectiveness of hybrid systems is complicated when multiple methods are combined to reach a conclusion. In this lecture, methods for combining results based on the general reliability of each model as well as its applicability to the case under evaluation are presented. Reliability >measures differ depending on whether symbolic or numeric information is analyzed and depend on the strength of the decision algorithm as well as the soundness of the domain knowledge upon which the decision is based. In addition to reliability, combination of results is complicated by the need to weight each method to form the final conclusion.Weighting factors depend on the degree of certainty that the decision is correct for each of the methods. The process is illustrated in an application to cardiac diagnosis. Extensions to decision making in any domain will also be discussed.

Short CV.

Dr. Donna Hudson received her Ph.D. from UCLA in 1981 and has been on the Faculty of the University of California since that time. She is currently Professor and Director of Academic Research and Technology at University of California, San Francisco and a Faculty Member in the Joint Graduate Group in Bioengineering, UCSF and UC Berkeley. She is also a member of the Executive Committee of the Graduate Group in Biological and Medical Informatics at UCSF. Dr. Hudson is a Fellow of the IEEE as well as a Fellow of the American Institute for Medical an Biological Engineering.She has over 200 publications in the areas of medical decision support systems, neural network modeling, complex analysis of biosignals, and healthcare informatics. Dr. Hudson served as President of the International Society for Computers and Their Applications (1999-2001). She has held a number of offices in the IEEE Engineering in Medicine and Biology Society (EMBS) including Chair of the Distinguished Lecturers Committee (1998-2000), Vice President for Publications (2001-2002), Vice President for Financial Planning (2003-2005), President-Elect (2006), and is currently President (2007-2008).