Keynote:

Title: Generative-Discriminative Based Methods for Arabic Recognition

Abstract: The recognition of handwriting by computer remains a challenging task. Despite the impressive progress achieved during the last few decades and the increasing power of the computers, the performances of the automatic systems remains still far from the human capabilities. In this talk, we describe our experience combining two different paradigms in machine learning: generative and discriminative learning for the effective recognition of Arabic handwriting. Two main examples were considered to illustrate the feasibility of these approaches on writing recognition. In generative methods, starting with Hidden Markov Models (HMM) with order 1 and 2, we progressively extended HMM to the plane by proposing a planar-HMM. Faced to their dimensionality limit, we experimented Dynamic Bayesian Networks. Then, to combine the advantages of the dimensionality and the temporality of the models, we proposed a new approach which integrates causal Markov Random Field in two dimensional modeling and HMMs. The word image is viewed as a random field realization which at its turn is considered to be an observation sequence of pixel columns. We then showed different applications of this model, first for analytical recognition, second for syntactic analysis by incorporating structural information as implant. In discriminative methods, Neural Networks were the basis of the research. Based on a cognitive model, we proposed a transparent neural network where the learning is replaced by an activation process considering the nodes neighborhood. This model was extended for the recognition of decomposable words in large vocabulary context.

Biography:

Abdel Belaïd received his Ph.D degree in Computer Science in 1979 and his D.Sc. in 1987 from the University Henri Poincaré Nancy I, France. After a few years as Assistant Professor, he joined the National Center for Scientific Research (CNRS) as a Research Scientist in 1984. In 2002, he became full Professor in Université de Lorraine and responsible of the Cognitive Science Master. He leads since 1992 a research group at the LORIA (http://read.loria.fr/) working on Document Analysis and Text Recognition. His areas of research include Image Processing, Pattern Recognition, Document Analysis and Handwriting Recognition where he has authored over 150 articles which have been published in international journals and conferences. He is the co-author of a book, Pattern Recognition: Methods and Applications, and of many book chapters. He has developed retro-conversion techniques for document structure recognition using multi-agent systems, reasoning based cases, emergent architectures and part of speech tagging. For text printed, he developed several systems based on Neural classifiers and a on a combination of OCR and ICR techniques. He developed handwriting recognition systems based on stochastic modelling, for linear and bi-dimensional representations. Abdel Belaïd has a wide national and international visibility as he acts in several program committees and editorial boards such as International Journal on Document Analysis and Recognition, Pattern Recognition, Pattern Recognition Letters, IEEE PAMI, ICDAR where he is PC co-chair, etc. He has several collaborations with several universities and high schools (IUF Fribourg – Switzerland, ENIT, ESSTT – Tunisia, PUC in Brasil, ISI

– Calcutta India, ETS – Montréal), and industrial companies (Xerox France, ITESFOT, A2iA, Berger-Levrault, Jouve, La Poste, Universalis, etc.) with whom he developed several systems. He belongs to several scientific committees.