Special Session Proposal for ICMLA12:
Title: Machine Learning Ensemble Methods and Applications

Organiser:
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Brief Introduction to the Background (should not used as a part of the formal proposal)
This special session on ensemble methods and applications has been successfully held in three previous consecutive IEEE World Congress on Computational Intelligence (WCCI) and its associated conference IJCNN (WCCI06/IJCNN06, WCCI08/IJCNN08 and WCCI10/IJCNN10), and it has become better and stronger in the last three WCCIs. The number of papers submitted to it and the audience attended its oral presentations had been increased significantly each time.
In the WCCI/IJCNN 2010, our special session was so popular and of high quality that the final accepted papers for oral presentations had to be divided into 3 separate oral presentation sessions, not to mention that dozens of papers accepted for posters. In particular, that a paper in this special session was voted as the only best student paper of IJCNN 2010 is just an indication of the high quality and popularity of this special session.
Both the speakers/researchers and audience attended this special session expressed their strong wishes that this special session must continue in the future WCCI/IJCNN and possibly other major conferences in Machine Learning. Although this year it will be run for WCCI12 under a title “Ensemble Methods in Computational Intelligence” jointly organised with Ponnuthurai Suganthan and Nikhil Pal from Singapore Universities, it is always my strong intention to do it in this conference as it is one of major conferences in Machine Learning, to provide a much focused platform for the researchers to present their latest progress, exchange and discuss their ideas in depth more effectively on the topics of ensemble methods and applications.

Short Bio of Dr. Wenjia Wang
Dr. Wang obtained his PhD in Advanced Computing from UMIST (University of Manchester Institute of Science and technology) in 1997. He is a senior lecturer in the School of Computing Sciences, the University of East Anglia. His research interests include Ensemble Methodology, Diversity Measurement, Clustering, Feature Selection, Evolutionary Computing, Genetic Algorithm, Artificial Immune Systems, Neural Networks and Bayesian Theory. Since 2002, he has been a principal investigator for three research projects sponsored by the UK Research councils EPSRC (The Engineering and Physical Sciences Research Council) and ESRC (The Economic and Social Research Council). He supervises PhD and asters students. He is a member of IEEE, IEEE Computer Society and Computational Intelligence Society, and has been invited as a member of the Programme Committee of international conferences in Artificial Intelligence, Data Mining and Software Engineering, and chaired many sessions. He is a reviewer for journals and many conferences. He has been the organising for the special session on this topic for last three consecutive WCCI/IJCNNs. He is the Programme Chair and Organising Chair of the 12th International conference on Intelligent Data Engineering and Automated Learning (IDEAL 2011), 7-9 September, Norwich, UK.

In addition, Dr. Wang was the co-organiser of the competition of ICMLA 2008:
Automated Micro-Array Classification Challenge
http://www.icmla-conference.org/icmla08/CFP_Competition.html

Please see the formal description of our proposal in next page.
Brief Description of the Background and Objectives

As rapidly increasing quantity and complexity of real-world data have overwhelmed the existing individual machine learning methods and techniques to produce satisfactory performance when working alone, more and more attention has been paid to machine learning ensemble methods that utilize the collective power of many individual models to achieve better and more importantly highly reliable performance.

Various ensemble methods and algorithms have been developed and applied to many real-world problems over last decade. However, there are still some fundamental issues that are not well understood and there is a need for further in-depth investigation to answer key questions in ensemble approaches. For example, what factors affect the performance of an ensemble and in what extent they do? Which diversity measures should be used when assessing the difference among the models in an ensemble? What methodology and procedure should be used for constructing an effective ensemble in a more efficient manner? What are the constraints and challenges of the ensemble approach? This special session is intended to bring the researchers from a widened spectrum to report their progress made in the last two years and to discuss their successes as well as failures.

Keywords: Ensemble, Machine Learning, Diversity, Decision Fusion, Data Mining.

Topics
The major topics of interest for this special session include, but are not limited to:
− Ensemble methodology, strategies and techniques,
− Semi-supervised machine learning ensemble methods
− Diversity definition and measurement,
− Strategies and techniques for generating diverse models,
− Relationships between diversity and ensemble's accuracy,
− Ensemble performance methods and comparisons with other approaches,
− Decision fusion strategies,
− Active learning
− Model selection methods
− Ensemble methods for classification, clustering, regression, pattern recognition, feature selection, etc.
− Ensemble Implementation/software development,
− Applications (of both positive and negative experiences).

Preliminary Programme and Technical Committee:

Prof. Daniel C. Neagu (University of Bradford, UK),
Prof. Marcin Blachnik, (Silesian University of Technology, Poland)
Prof. Klaus-Robert Müller, (Berlin Institute of Technology, Berlin, Germany)
Prof. Zhi-Hua Zhou (Nanjing University, China)
Prof. Ning Zhong (Maebashi Institute of Technology, Japan)
Prof. Philip Yu (UCI, USA)
Prof. N. Suganthan, (Nanyang Technological University, Singapore)
Prof. R. Pal, (Indian Statistical Institute, Kolkatta, India)
Dr. Qiao Li, (Imperial College, UK)
Dr. Jamil Al Shaqsi (Sultan Qaboos University, Oman)
Dr. Hujun Yin (University of Manchester, UK)
Dr. Tony Bagnall(UEA, UK)
Dr. Gavin Cawley(UEA, UK).
Dr. Bea de la Iglesia (UEA, UK)

Additional information to support the proposed Special Session

A web site will be set up for this special session. Once this proposal is approved, a web site that has been set up will be made available to general public and the poster for calling for papers will be distributed via the organisers’ research network as well as the conference web site.