

August 15, 2009

**Report on International Workshop**

***“Machine Learning for Aerospace”***

**July 3rd and 4th, 2009**

**Holiday Inn Marseille, Marseille, France**

The international workshop “*Machine Learning for Aerospace (MLA2009)*” was held on July 3rd and 4th in Marseille. The aim of the workshop was to discuss various cutting edge design exploration techniques for practical design problems among participants from the machine learning and aerospace disciplines. Thus, the workshop was supported by Global COE program, *World Center of Education and Research for Trans-disciplinary Flow Dynamics*, and European Machine Learning network, *PASCAL2 (Pattern Analysis, Statistical Modelling and Computational Learning)*. This was held as one of activities of International Joint Laboratory “*Development of Design Exploration Method for Real-World Design Problem by International Collaborations*”. In this workshop, all the lectures were recorded to broadcast on web, therefore they are available on [videlectures.net](http://videlectures.net) website as same to other workshops supported by *PASCAL2*.

In the previous Global COE workshop “*Multi- Objective Design Exploration*” held in March, cutting-edge Multi-Objective Design Exploration techniques were mainly discussed. Through the discussion, the importance of cross-disciplinary techniques such as machine learning or intelligent system for further development of design systems was recognized. Therefore, 10 invited lectures and four general presentations from the machine learning and aerospace communities were given at the two-day workshop to integrate machine learning and aerospace researchers. There were in total 23 participants (19 from nine foreign countries) from all over the world to discuss how machine learning methods can be used for aerospace applications such as design optimization.

The workshop was begun with opening lecture by Prof. Shigeru Obayashi, project leader of the Global COE joint laboratory. He began with the foundation of fluid dynamics to goal and overview of Design Exploration with aerospace applications. Since participants belonged to two different communities, many lecturers started with simple basics to the applications. Dr. Pelckmans (Uppsala University) gave us two basic lectures on machine learning algorithms. The application of

machine learning and intelligent algorithms were introduced by Dr. Marigineantu (Boeing Research & Technology), Dr. Jeong (Korean Institute of Science and Technology Information), Prof. Bontempi (Université Libre de Bruxelles), and Dr. Preisach (University of Hildesheim). On the other hand, lectures about the latest techniques for advanced design optimization were given by Dr. Ray (University of New South Wales) and Dr. Forrester (University of Southampton). Dr. Shahpar (Rolls-Royce) discussed the design optimization research in aerospace industry and the issues with real design problems. Prof. Pironneau (University of Paris VI) lectured on basic idea of aerodynamic optimization. As aerospace applications of design optimization techniques, Dr. Meunier (ONERA) and Dr. Sasaki (Tohoku University) introduced their aerodynamic design activities. Current research on Data Mining to analyze optimization results was also discussed by Dr. Pediroda (University of Trieste) and Dr. Graening (Honda Research Institute Europe). An enthusiastic and useful discussion over the design exploration and machine learning techniques was conducted.

The MLA09 workshop provided the opportunity to learn cutting edge design exploration techniques as well as machine learning techniques. Useful ideas and future potentials to integrate machine learning and design optimization techniques for advanced design exploration system were acquired through presentation and discussions. This workshop must have been useful for all the participants to understand the direction and current problems to advance their research on design exploration system. Finally, this workshop was extremely useful to conduct the collaborative research under the joint laboratory project.



Picture 1: Presentation by Dr. Pelckmans