**Pitoyo Hartono, Chukyo University**
**Kayo Ogawa, Japan Women's University**

In the last few years, many form of Learning Management Systems (LMS) have been introduced in many educational institutions with the main objective of obtaining meaningful information for from accumulated learning data to be then utilized for increasing the quality of the educations. One of the most popular techniques for extracting information is by visualizing the high dimensional data. In this study, we propose to utilize Context-Relevant Self Organizing Map, a unique visualization algorithm that preserves not only the topographical characteristics of high dimensional data but also their context. Our preliminary experiments with real world LMS data show that the Context-Relevant Self-Organizing map is able to provide visual information which cannot be provided by the conventional Self-Organizing Map.

**[#1327] How to Estimate Relative Spatial Resolution of Different Maps or Images of the Same Area?**
**Vladik Kreinovich, University of Texas at El Paso**
**Christian Servin, El Paso Community College**
**Aaron Velasco, University of Texas at El Paso**

In this paper, we describe how to estimate relative spatial resolution of different maps or images of the same area under uncertainty. We consider probabilistic and fuzzy approaches and we show that both approaches lead to the same estimates -- which makes us more confident that this joint result is reasonable.

**[#1543] Short Term Power Prediction of the Photovoltaic Power Station Based on Comparison of Power Profile Sequences Using F–Score Computation**
**Martin Radvanský, VŠB Technical University Ostrava**
**Milos Kudelka, VSB - Technical University of Ostrava**
**Vaclav Snasel, VSB - Technical University of Ostrava**

Due to the annual increase in energy prices, photovoltaic power stations (PVPS) are often used as a primary source of power for smart off–grid houses. Integration of this kind of energy source is challenging because it is a source of variably generated power due to meteorological uncertainty, but the cost of this energy source rapidly decreases. In this paper, we present results of the short term prediction method of generated power for small PVPS based on self–organizing maps, previously introduced power profiles, their sequences and computing F–Score as an alternative to commonly used algorithms.

**[#1564] Solving the p-Median Problem by a Simple Differential Evolution**
**Pavel Kromer, VSB-TU Ostrava**
**Jan Platos, VSB-Technical University of Ostrava**

Differential evolution is a real-parameter metaheuristic optimization method with a history of successful applications in many different domains. The p-median problem is a well-known combinatorial optimization problem with several possible formulations and many practical applications in areas such as operational research and planning. It has been also used as a testbed for many heuristic and metaheuristic optimization algorithms. This work uses a simple differential evolution to solve the p-median problem and evaluates it in a series of computational experiments.

**[#1583] Particular Fine-Grained Parallel GA for Simulation Study of Distributed Human-Based GA**
**Kei Ohnishi, Kyushu Institute of Technology**

The paper proposes and investigates a particular fine-grained parallel genetic algorithm (GA) for understanding the behaviors of a similar distributed human-based GA through simulations. The particular fine-grained parallel GA restricts interactions between individuals in terms of not space but time, which can occur in real human interactions. Specifically, it gives each individual its own cycle time for encountering other individuals according to a probability distribution. The simulation results show that the GA performance depends on the setting of the encounter timings for the individuals.

## Session: Control of Uncertain Systems II

## Wednesday, October 8, 1:50PM-3:30PM, Room: Rm3: Royal1

**[#1831] Hydro Plant Network Control LPV Framework**
**MUHITTIN YILMAZ, Texas A&M university-Kingsville**
**Simon Adesola Adediran, Texas A&M University-Kingsville**
**Lifford McLauchlan, Texas A&M University-Kingsville**

This paper presents a network controlled Linear Parameter Varying (LPV) control framework for a hydro power plant. The linearized plant dynamics is assumed to be controlled via remote controller operations over communication networks. The controller action to hydro plant and the plant output to controller input signals are assumed to be transmitted over different networks with a bounded network delay and associated packet drops. As the network delay is modeled as a Pade approximation, the control system signal transmissions over the networks are modeled as an LPV system such that the accurately received packets and lost packets are used as the real-time time-varying parameter that can be measurable in future periods. The communication network LPV characteristics are expressed in terms of a polytopic parameter-dependent model to efficiently characterize the overall network operations for received and lost packages, and the associated LPV controller synthesis perspectives are detailed. The networked controlled LPV controller synthesis and simulation results clearly demonstrate the effectiveness of the framework for networked control system delay and packet loss issues on stability and performance.

**[#1862] Adaptive Super Twisting Sliding Mode Control of a HVAC System**
**Kaveh Kianfar, Simon Fraser University**
**Mehrdad Saif, University of Windsor**
**Roozbeh Izadi Zamanabadi, Danfoss A/S**

In this paper an adaptive super twisting sliding mode cascaded control strategy to control superheat temperature of an evaporator of Heating Ventilation Air Conditioning Systems(HVAC) is presented. Two internal loop and external loop of the cascaded controller are designed using sliding mode by butilizing feedback linearization method. By controlling superheat temperature, Tsh, in the external loop, and evaporating temperature of refrigerant, Te, in the internal loop, a better performance with robustness against parameter uncertainty is achieved. The value of superheat temperature is determined by using the estimated value of length of two phase flow of the refrigerant inside the evaporator. The performance of the proposed control strategy against disturbance and parameter uncertainties is illustrated through simulation in MATLAB/Simulink environment. It is shown that in comparison with super-twisting method, the proposed adaptive super twisting method improves the performance of system by reduction of undesirable chattering in the response of system.

**[#1004] The IMC-PID Controller Design for TITO Process**
**XiaoFeng Li, Electric Power Research Institute of Guangdong Power Group Co.**

A new IMC-PID design method is presented in this paper for boiler-turbine coordinated control system. The process model

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