Open research issues on
Multi-models for Complex Technological Systems

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Abstract - We are going to report here about state of the art works on multi-models for complex technological systems both from the theoretical and practical point of view. A variety of algorithmic approaches (k-mean, dss, etc.) and applicative domains (wind farms, neurological diseases, etc.) are reported to illustrate the extension of the research area.

Keywords: - multi models, control systems, complex technological systems

Introduction

The format of special issues hosted in WSEAS Transactions on Systems is well proved and continues to develop over time [1-15]. The main aim of this special issue "Multi models for complex technological systems" is the presentation of state of the art contributions in the field originating from our community of authors. Despite conventional approaches, Multi-models for Complex Technological Systems are not guided by rigid control algorithms but by flexible event adaptable ones that makes them more vivace and available. All these allow a new design of technological systems dotted with intelligence, autonomous decision making capabilities, and self-diagnosing properties. Heuristics techniques, data mining planning activities, scheduling algorithms, automatic data identification, processing and control represent as many trumps for these new systems` analyzing formalism. This special issue deals with the following issues [16-21]:

- An improved *K*-means algorithm-based aggregation modeling method is proposed for large wind farms. A model is built for a 300 MW wind farm typical of the northern Jiangsu Province in China and simulations performed. The results are compared with simulation results obtained using a single-fan aggregation model and a detailed model. The aggregation method proposed in this study proves to be accurate, fast, and capable of meeting the requirements for output simulation.

- An analysis of the functioning for the heating automation system with hot air blown into an individual dwelling. The structure of the automatic control system for indoor temperature in the dwelling is determined, in which the controller is a thermostat having feature type relay with hysteresis, the conditions related to the evolution of automatic control of the process are specified and the oscillation period of the control system is calculated. The automatic temperature control system model in individual dwelling is established using Simulink and its functioning by simulation in different representative situations is checked.

- Identification of a dynamic behaviour of a through-flow heat exchanger and a design of a self-tuning predictive controller for its control. The designed controller was verified by a real-time control of an experimental laboratory heat exchanger.

- A study on the development and validation un of an Integrated Intelligent System for Parkinson's disease Screening and the system will be extended in the future work for other Neurological Disorders. The system is designed in order to be used by the physician for home monitoring, medical treatment, medical prescriptions, and rehabilitation of the patients. This Decision Support System for Neurological Disorders (NeuroParkinScreen) is among first proposed systems that are cost-efficient and non-invasive.

- New models and concepts for developing smart power grid control systems based on the open standards IEC 61850, IEC 61499 and holonic concepts. Along with the proposed holonic models for different levels of control, we present a simple fault protection application illustrating how the IEC 61499 artifacts can be used for modeling and implementation of IEC 61850 compliant applications.

- A new watermark system for color images which uses the Content Addressable Method. The cover image is divided into a set of clusters which are built using Content Addressable Method. Each cluster is segmented in its turn into a number of portions. In all pixels of a portion a number of bits (3 bits in our study) of the watermark are duplicated. The robustness of our system comes from the fact that it resists to image rotation attacks. The results show that a rotation of any degree does not have any effect on the embedded watermark which can be extracted without any distortion.

Conclusions

We challenge the reader to reveal the development stage of the complex manufacturing systems and to anticipate theirs future evolution in respect to technological and environmental changes. Readers with diverse background like research, academia, industry, etc., can take advantage of this special issue and can shape a new way of analyzing complex technological systems.

Finally before diving into the collected research works [16-21], let us remember the reader that WSEAS Transactions on Systems has broad spectre of Special Issues, e.g. [1-16]. This is has the objective of creating an active and contributing research community around the journal and to present their latest efforts which have achieved wide interest among its members. As a reader of the journal you are invited to take inspiration by the presented papers and to consider to submit your future works to the journal itself.
Enjoy your reading!

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