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Optimal Operations of a Hybrid Electric Vehicle Based on the Prediction of the Torque And Power Availabilities
Daniel Pătrașcu and Corneliu Lazăr



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This paper presents a methodology for real time prediction of the torque and power availabilities of an electric traction drive used in Hybrid Electric Vehicle (HEV). The electric traction drive is composed of an Interior Permanent Magnet (IPM) synchronous electric machine, a High Voltage (HV) Battery and a Voltage Source Inverter (VSI). Having a prediction of the torque and power availabilities, the Vehicle System Control (VSC) can assure an optimal torque and power management, providing full e-traction performance while protecting the electric components. The prediction horizons are considered fixed in time, one at 1s and the other at 10s. The 1s prediction torque availability assures the usage of full e-traction performance, while the 10s value provide the electric components protections, due to overheating, excessive draining or overcharging. The 1s predicted power is calculated based on the 1s predicted torque and the actual rotor speed while the 10s predicted power is computed as 10s predicted torque multiplied with the base speed. The base speed is calculated for each real time operating point as the function of the HV Battery level, the predicted inverter current and the IPM machine parameters. For validating the proposed prediction algorithm, a dynamic simulator for the entire parallel hybrid vehicle was developed and additional extensive tests were done on electric motor bench and vehicle. The simulation results based on the standard driving cycle EPA US06 are presented and discussed.

Key words: Torque prediction, Power prediction, HEV, E-traction, Electric Machine, Inverter, HV Battery.

2010 Mathematics Subject Classification: 93C10

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Card Fraud Detection Using Learning Machines

Armand Eugen Pășărică



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Searching Card Fraud via Internet will return approximately 180 million results. The total level of fraud reached 1.26 billion euro in 2010 in Europe according with BCE. The ingenuity of thieves reached highly sophisticated forms. To model mathematically this behavior requires a classification method derived from supervised learning algorithm which must be able to separate the class of fraudulent with a high degree of accuracy. Following his definition, the technique of Support Vector Machines is characterized by two strong hypotheses: margin optimization and kernel representation. So, I chose the techniques of SVM with non-linear kernels. We propose the Gaussian kernel function for measuring the similarities between features into new linear space as the best approach to detect the fraud patterns.

Key words: card fraud behaviour; SVM; non-linear kernels; Cover's theorem; LIBSVM.

2010 Mathematics Subject Classification: 68T05, 62H30, 93E35.

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The Dynamics of Wind System at the Optimum Load

Florica Balog, Horia Ciocarlie, Marius Babescu and Gheza-Mihai Erdodi



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In case of the wind systems control, the fundamental problem is to determine the reference of mechanical-angular speed. In any control system, the fundamental problem is to know the rotation speed for that the captured energy is maximally. This paper presents the dynamics of a wind system, which consists of a wind turbine coupled to a permanent magnet synchronous generator, at the optimum load. Therefore, they are presented a few case studies referring to the behavior of wind system for different values of proportionality constant.

Key words: dynamics of a wind system; maximum energy; optimum mechanical angular speed; variable wind speed; simulation; wind turbine mathematical.

2010 Mathematics Subject Classification: 68M99, 68W35.

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Calculation of Energy Efficiency in Space for Telecommunications Equipment

Gheorghe Doru Dicu



[Full text](#)

This paper will consist of a study on energy needs for heating, cooling and ventilation of the spaces for telecommunications equipment (shelters). The study is performed two options when heating equipment, cooling or ventilation or not monitored and controlled by a controller.

Key words: ambient parameters, temperature, monitoring, ventilation, equipment, telecommunocations.

2010 Mathematics Subject Classification: 68M99, 68W35

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Forecasting Knowledge Extraction by Computational Intelligence Techniques

Elia Georgiana Dragomir and Mihaela Oprea



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Most of the recently developed intelligent systems have a knowledge base that incorporates the expertise domain knowledge and use it in reasoning chains during decision making. An important problem that should be solved by an intelligent system is forecasting the evolution of specific parameters that are monitored, for example. Among the various approaches that provide an efficient solution to the forecasting problems, some computational intelligence techniques allow the extraction of the forecasting knowledge under the IF-THEN rules form. The paper presents a general methodology that can be used to forecasting knowledge extraction and the experimental results of a comparative study between a computational intelligence technique, the adaptive neuro-fuzzy inference system (ANFIS), and a decision tree based technique, CART, applied to air pollution forecasting rules extraction, by following the proposed methodology.

Key words: computational intelligence; forecasting knowledge extraction; adaptive neuro-fuzzy inference system; methodology

2010 Mathematics Subject Classification: 68T27, 68T30.

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