and Date). Here, a bootstrapping approach is used to expand the initially given list of locations, identifying new locations as well as locations corresponding to spelling variants and typographical errors of the known locations. The second module relates to relation extraction (RE). It extracts binary and ternary relations between such entities to obtain relevant traffic information. In our experiments, the NER module has yielded a F-measure of 96%, while the RE module resulted in 87%. Also, results show that our bootstrapping approach identifies 1,058 new locations when 10,000 short posts are analysed.

11:00AM *Multiobjective Selection of Input Sensors for Travel Times Forecasting Using Support Vector Regression [#14707]*

Jiri Petrlik, Otto Fucik and Lukas Sekanina, Brno University of Technology, Czech Republic

In this paper we propose a new method for travel time prediction using a support vector regression model (SVR). The inputs of the method are data from license plate detection systems and traffic sensors such as induction loops or radars placed in the area. This method is mainly designed to be capable of dealing with missing values in the traffic data. It is able to create many different SVR models with different input variables. These models are dynamically switched according to which traffic variables are currently available. The proposed method was compared with a basic license plate based prediction approach. The results showed that the proposed method provides the prediction of better quality. Moreover, it is available for a longer period of time.

11:20AM *Predicting Bikeshare System Usage Up to One Day Ahead [#14351]*

Romain Giot and Raphael Cherrier, Univ. Bordeaux, France; QUCIT, France

Bike sharing systems are present in several modern cities. They provide citizens with an alternative and ecological mode of transportation, allowing them to avoid the use of personal car and all the problems associated with it in big cities (i.e., traffic jam, roads reserved for public transport, ...). However, they also suffer from other problems due to their success: some stations can be full or empty (i.e., impossibility to drop off or take a bike). Thus, to predict the use of such system can be interesting for the user in order to help him/her to plan his/her use of the system and to reduce the probability of suffering of the previously presented issues. This paper presents an analysis of various regressors from the state of the art on an existing public dataset acquired during two years in order to predict the global use of a bike sharing system. The prediction is done for the next twenty-four hours at a frequency of one hour. Results show that even if most regressors are sensitive to over-fitting, the best performing one clearly beats the baselines.

11:40AM *Battery-supercapacitor electric vehicles energy management using DP based predictive control algorithm [#14082]*

Xiaofeng Lin, Meipin Hu, Shaojian Song and Yimin Yang, College of Electrical Engineering,Guangxi University, China

To achieve a reasonable power split scheme of Li battery pack and supercapacitor hybrid electric vehicles, we propose dynamic programming (DP) based predictive control algorithm (PCA) in this paper. First, the model of the vehicle plant is established consisting of mathematical models of supercapacitor and Li battery pack. Then, the PCA based control system is designed in order to make full use of future road information. Thirdly, a DP-based-controller is proposed to minimize the cost function which consists of power loss and constrains of output. The simulation suggests that the proposed strategy can generate reasonable power split by taking the power loss, constraints of two sources and flatness of power output of Li battery pack into account.

CIES'14 Session 1: Theories and Designs

Thursday, December 11, 10:20AM-12:00PM, Room: Bonaire 4, Chair: Vladik Kreinovich, Michael Beer and Rudolf Kruse

10:20AM *If We Take Into Account that Constraints Are Soft, Then Processing Constraints Becomes Algorithmically Solvable [#14060]*

Quentin Brefort, Luc Jaulin, Martine Ceberio and Vladik Kreinovich, ENSTA-Bretagne, France; University of Texas at El Paso, United States

Constraints are ubiquitous in science and engineering. Constraints describe the available information about the state of the system, constraints describe possible relation between current and future states of the system, constraints describe which future states we would like to obtain. To solve problems from engineering and science, it is therefore necessary to process constraints. We show that if we treat constraints as hard (crisp), with all the threshold values exactly known, then in the general case, all the corresponding computational problems become algorithmically unsolvable. However, these problems become algorithmically solvable if we take into account that in reality, constraints are soft: we do not know the exact values of the corresponding thresholds, we do not know the exact dependence between the present and future states, etc.

10:40AM *Why Ricker Wavelets Are Successful in Processing Seismic Data: Towards a Theoretical Explanation [#14341]*

Afshin Gholamy and Vladik Kreinovich, University of Texas at El Paso, United States

In many engineering applications ranging from engineering seismology to petroleum engineering and civil engineering, it is important to process seismic data. In processing seismic data, it turns out to be very efficient to describe the signal's spectrum as a linear combination of Ricker wavelet spectra. In this paper, we provide a possible theoretical explanation for this empirical efficiency. Specifically, signal propagation through several layers is discussed, and it is shown that the Ricker wavelet is the simplest non-trivial solution for the corresponding data processing problem, under the condition that the described properties of the approximation family are satisfied.

11:00AM *Fuzzy Local Linear Approximation-based Sequential Design [#14588]*

Joachim van der Herten, Dirk Deschrijver and Tom Dhaene, Ghent University - iMinds, Belgium

When approximating complex high-fidelity black box simulators with surrogate models, the experimental design is often created sequentially. LOLA-Voronoi, a powerful state of the art method for sequential design combines an Exploitation and Exploration algorithm and adapts the sampling distribution to provide extra samples in non-linear regions. The LOLA algorithm estimates gradients to identify interesting regions, but has a bad complexity which results in long computation time when simulators are high-dimensional. In this paper, a new gradient estimation approach for the LOLA algorithm is proposed based on Fuzzy Logic. Experiments show the new method is a lot faster and results in experimental designs of comparable quality.