บทความที่น่าสนใจประจำเดือนสิงหาคม 2559
สาขาวิทยาศาสตร์และเทคโนโลยี

1	Title:	Relay Requirement and Traffic Assignment of Electric Vehicles
	Author:	Chi Xie and Nan Jiang
	Journal:	Computer-Aided Civil and Infrastructure Engineering, Volume 31, Issue 8, pages 580–598, August 2016
	Abstract:	This article defines, formulates, and solves a new equilibrium traffic assignment problem with side constraints—the traffic assignment problem with relays. The relay requirement arises from the driving situation that the onboard fuel capacity of vehicles is lower than what is needed for accomplishing their trips and the number and distribution of refueling infrastructures over the network are under the expected level. We proposed this problem as a modeling platform for evaluating congested regional transportation networks that serve plug-in electric vehicles (in addition to internal combustion engine vehicles), where battery-recharging or battery-swapping stations are scarce. Specifically, we presented a novel nonlinear integer programming formulation, analyzed its mathematical properties and paradoxical phenomena, and suggested a generalized Benders decomposition framework for its solutions. In the algorithmic framework, a gradient projection algorithm and a labeling algorithm are adopted for, respectively, solving the primal problem and the relaxed master problem—the shortest path problem with relays. The modeling and solution methods are implemented for solving a set of example network problems. The numerical analysis results obtained from the implementation clearly show how the driving range limit and relay station location reshape equilibrium network flows.
	Database:	Wiley Online Library

2	Title:	Optimal Recovery from Disruptions in Water Distribution Networks
	Author:	Munir A. Nayak and Mark A. Turnquist
	Journal:	Computer-Aided Civil and Infrastructure Engineering, Volume 31, Issue 8, pages 566–579, August 2016
	Abstract:	An optimization model is developed to guide recovery of a disrupted water distribution system. The model minimizes the total cost of recovery, including the disruption cost of unmet demand during the repair process and the repair cost itself. The optimization schedules repair tasks under precedence and resource constraints and contains an embedded flow problem that optimizes the distribution of water in each time period, given the state of the network. A simulated annealing algorithm is developed for scheduling the tasks, with the embedded flow problem solved using a generalized reduced gradient method. Experiments with a test water distribution system confirm the effectiveness of the model and provide insight regarding the effects of limited resources available for recovery and of the usefulness of having multiple modes for execution of specific tasks.
	Database:	Wiley Online Library

3	Title:	Emergency Response in Complex Buildings: Automated Selection of Safest and Balanced Routes
	Author:	V. Zverovich, L. Mahdjoubi, P. Boguslawski, F. Fadli and H. Barki
	Journal:	Computer-Aided Civil and Infrastructure Engineering, Volume 31, Issue 8, pages 617–632, August 2016
	Abstract:	The extreme importance of emergency response in complex buildings during natural and human-induced disasters has been widely acknowledged. In particular, there is a need for efficient algorithms for finding safest evacuation routes, which would take into account the 3-D structure of buildings, their relevant semantics, and the nature and shape of hazards. In this article, we propose algorithms for safest routes and balanced routes in buildings, where an extreme event with many epicenters is occurring. In a balanced route, a trade-off between route length and hazard proximity is made. The algorithms are based on a novel approach that integrates a multiattribute decision-making technique, Dijkstra's classical algorithm and the introduced hazard proximity numbers, hazard propagation coefficient and proximity index for a route.
	Database:	Wiley Online Library

4	Title:	Review on the State-of-the-Art Technologies for Acquisition and Display of Digital Holograms
	Author:	Peter Wai Ming Tsang ; Ting-Chung Poon
	Journal:	IEEE Transactions on Industrial Informatics, Volume:12 , Issue: 3, 2016, Page(s) 886 - 901
	Abstract:	Optical holography for recording three-dimensional (3-D) scenes can be traced back to the early sixties. Since then, the art of holography has been applied in many areas, primarily as a tool for 3-D imaging, processing, and display. Extension of optical holography to other disciplines, such as optical computing and encryption, has been explored, but the scope of development is relatively limited. However, with the rapid advancements in electronics, computing, and material science technologies, most of the optical processes can be substituted with numerical or digital hardware means, thus leading to the emergence of digital holography. A typical digital holography framework can be encapsulated into three major stages, namely the input, processing, and output stages. The input and output stages are gatekeepers connecting the optical and digital worlds, without which the study on digital holography could only be restricted to theoretical and numerical analysis. In the past few decades, numerous research works have been conducted on these two important areas. In this paper, we shall provide a review on the recent development in these two important areas of digital holography. Selected pieces of important and popular works on the acquisition and display of digital holograms will be reported.
	Database:	IEEE/IET Electronic Library (IEL)

5	Title:	Wind Pattern Recognition and Reference Wind Mast Data Correlations With NWP for Improved Wind-Electric Power Forecasts
	Author:	Serkan Buhan ; Yakup Özkazanç ; IŞık Çadırcı
	Journal:	IEEE Transactions on Industrial Informatics, Volume:12 , Issue: 3, 2016, Page(s) 991 - 1004
	Abstract:	A new statistical approach has been proposed for improved short-term wind-electric power forecasts of wind power plants (WPPs) based on a new wind-pattern-recognition technique, and reference wind mast (RWM) data correlations with numerical weather predictions (NWPs) to localize wind data to the given WPP site. For this purpose, first, NWP data are combined using adaptive boosting (AdaBoost) machine-learning algorithm to provide a proper combination of meteorological grid data from a set of grids around each WPP. Then, combined grid data are clustered, and for each cluster, an artificial neural network (ANN)/support vector machine (SVM) model is constructed to learn the relationship between the wind patterns of NWP data and RWM measurements. The outputs of this wind-to-wind modeling stage are used to obtain raw short-term 48-h-ahead wind-electric power forecasts via the consecutive statistical ANN/SVM models applied in the wind-to-power stage. The systematic errors are eliminated by applying model output statistics (MOS) and a weighted average combination method is used to obtain the final 48-h-ahead wind-electric power forecasts. The proposed model has been successfully applied to seven WPPs with installed capacities in the range from 10 to ${sim}200;text{MW}$. The wind-electric power-forecast results obtained by using the proposed approach are compared with the reference benchmark models and other statistical models, which do not use any wind pattern recognition or NWP data correction via RWM measurements. It has been shown that the proposed wind-pattern-recognition technique and the wind-to-wind model developed by the use of an RWM for each WPP bring an improvement in the range from 2.3% to 5.1% on the normalized mean absolute error of wind-electric power forecasts, for an average training period of 2 years and a test period of 6 months for the given WPPs, as compared with conventional statistical methods.
	Database:	IEEE/IET Electronic Library (IEL)

6	Title:	Temporal Self-Regulation of Energy Demand
	Author:	S. N. A. U. Nambi ; Evangelos Pournaras ; R. Venkatesha Prasad
	Journal:	IEEE Transactions on Industrial Informatics, Volume:12 , Issue: 3, 2016, Page(s) 1196 - 1205
	Abstract:	The increase in the deployment of smart meters has enabled collection of fine-grained energy consumption data at consumer premises. Analysis of this real-time energy consumption data bestows new opportunities for better demand-response (DR) programs. This paper offers a new perspective to study energy demand and helps in designing novel mechanisms for decentralized demand-side management. Specifically, a new concept of finding the demand states using energy consumption of

	consumers over time and feasible transitions therein is introduced. It is shown that the orchestration of temporal transitions between the demand states can meet broad range of smart grid objectives. An online demand regulation model is developed that captures the temporal dynamics of energy demand to identify target consumers for different DR programs. This methodology is empirically evaluated and validated using data from more than 4000 households, which were part of a real-world smart grid project. This paper is the first one to comprehensively analyze the temporal dynamics of demands.
Database:	IEEE/IET Electronic Library (IEL)

7

Title:	Hyper-connectivity of functional networks for brain disease diagnosis
Author:	Biao Jie, Chong-Yaw Wee, Dinggang Shen, Daoqiang Zhang
Journal:	Medical Image Analysis, Volume 32, August 2016, Pages 84–100
Abstract:	Exploring structural and functional interactions among various brain regions enables better understanding of pathological underpinnings of neurological disorders. Brain connectivity network, as a simplified representation of those structural and functional interactions, has been widely used for diagnosis and classification of neurodegenerative diseases, especially for Alzheimer's disease (AD) and its early stage - mild cognitive impairment (MCI). However, the conventional functional connectivity network is usually constructed based on the pairwise correlation among different brain regions and thus ignores their higher-order relationships. Such loss of high-order information could be important for disease diagnosis, since neurologically a brain region predominantly interacts with more than one other brain regions. Accordingly, in this paper, we propose a novel framework for estimating the hyper-connectivity network of brain functions and then use this hyper-network for brain disease diagnosis. Here, the functional connectivity hyper-network denotes a network where each of its edges representing the interactions among multiple brain regions (i.e., an edge can connect with more than two brain regions), which can be naturally represented by a hyper-graph. Specifically, we first construct connectivity hyper-networks from the resting-state fMRI (R-fMRI) time series by using sparse representation. Then, we extract three sets of brain-region specific features from the connectivity hyper-networks, and further exploit a manifold regularized multi-task feature selection method to jointly select the most discriminative features. Finally, we use multi-kernel support vector machine (SVM) for classification. The experimental results on both MCI dataset and attention deficit hyperactivity disorder (ADHD) dataset demonstrate that, compared with the conventional connectivity network-based methods, the proposed method can not only improve the classification performance, but also help discover disease-related biomarkers important for disease diagnosis.
Database:	ScienceDirect

8	Title:	Estimation of fiber orientations using neighborhood information
	Author:	Chuyang Ye, Jiachen Zhuo, Rao P. Gullapalli, Jerry L. Prince
	Journal:	Medical Image Analysis, Volume 32, August 2016, Pages 243–256
	Abstract:	Data from diffusion magnetic resonance imaging (dMRI) can be used to reconstruct fiber tracts, for example, in muscle and white matter. Estimation of fiber orientations (FOs) is a crucial step in the reconstruction process and these estimates can be corrupted by noise. In this paper, a new method called Fiber Orientation Reconstruction using Neighborhood Information (FORNI) is described and shown to reduce the effects of noise and improve FO estimation performance by incorporating spatial consistency. FORNI uses a fixed tensor basis to model the diffusion weighted signals, which has the advantage of providing an explicit relationship between the basis vectors and the FOs. FO spatial coherence is encouraged using weighted ℓ1-norm regularization terms, which contain the interaction of directional information between neighbor voxels. Data fidelity is encouraged using a squared error between the observed and reconstructed diffusion weighted signals. After appropriate weighting of these competing objectives, the resulting objective function is minimized using a block coordinate descent algorithm, and a straightforward parallelization strategy is used to speed up processing. Experiments were performed on a digital crossing phantom, ex vivo tongue dMRI data, and in vivo brain dMRI data for both qualitative and quantitative evaluation. The results demonstrate that FORNI improves the quality of FO estimation over other state of the art algorithms.
	Database:	ScienceDirect

9	Title:	Continuous Adjoint Methods for Turbulent Flows, Applied to Shape and Topology Optimization: Industrial Applications
	Author:	E. M. Papoutsis-Kiachagias, K. C. Giannakoglou
	Journal:	Archives of Computational Methods in Engineering, June 2016, Volume 23, Issue 2, pp 255–299
	Abstract:	This article focuses on the formulation, validation and application of the continuous adjoint method for turbulent flows in aero/hydrodynamic optimization. Though discrete adjoint has been extensively used in the past to compute objective function gradients with respect to (w.r.t.) the design variables under turbulent flow conditions, the development of the continuous adjoint variant for these flows is not widespread in the literature, hindering, to an extend, the computation of exact sensitivity derivatives. The article initially presents a general formulation of the continuous adjoint method for incompressible flows, under the commonly used assumption of “frozen turbulence”. Then, the necessary addenda are presented in order to deal with the differentiation of both low- and high-Reynolds (with wall functions) number turbulence models; the latter requires the introduction of the so-called “adjoint wall functions”. An approach to dealing with distance variations is also presented. The developed methods are initially

	validated in 2D cases and then applied to industrial shape and topology optimization problems, originating from the automotive and hydraulic turbomachinery industries.
Database:	SpringerLink

10	Title:	Deforming Fluid Domains Within the Finite Element Method: Five Mesh-Based Tracking Methods in Comparison
	Author:	S. Elgeti, H. Sauerland
	Journal:	Archives of Computational Methods in Engineering, June 2016, Volume 23, Issue 2, pp 323–361
	Abstract:	Fluid flow applications can involve a number of coupled problems. One is the simulation of free-surface flows, which require the solution of a free-boundary problem. Within this problem, the governing equations of fluid flow are coupled with a domain deformation approach. This work reviews five of those approaches: interface tracking using a boundary-conforming mesh and, in the interface capturing context, the level-set method, the volume-of-fluid method, particle methods, as well as the phase-field method. The history of each method is presented in combination with the most recent developments in the field. Particularly, the topics of extended finite elements and NURBS-based methods, such as isogeometric analysis, are addressed. For illustration purposes, two applications have been chosen: two-phase flow involving drops or bubbles and sloshing tanks. The challenges of these applications, such as the geometrically correct representation of the free surface or the incorporation of surface tension forces, are discussed.
	Database:	SpringerLink