Computer Highlights Society Magazines

The IEEE Computer Society’s lineup of 13 peer-reviewed technical magazines covers cutting-edge topics in computing, including scientific applications, Internet computing, machine intelligence, pervasive computing, security and privacy, digital graphics, cloud computing, and computer history. Here, we highlight recent issues of other Computer Society magazines.

CoFlaVis: A Visualization System for Pulverized Coal Flames
One problem concerning researchers of various domains, such as chemistry and fluid dynamics, is the optimization of coal combustion processes to increase coal-related systems’ efficiency, safety, and cleanliness. Researchers examine the combustion process by using complex simulations that normally yield highly complex data comprising many characteristics. Scientists employ such datasets to validate their hypotheses or to present new hypotheses. And the analysis is mostly restricted to time-consuming workflows capable of handling only a portion of the data. To support the experts, various suppliers have developed interactive visualization and analysis tools to manage and understand multivariate data. This article from CiSE’s November/December 2017 issue demonstrates how one of these tools can improve data exploration of pulverized coal combustion.

The “IBM Family”: American Welfare Capitalism, Labor, and Gender in Postwar Germany
This article from Annals’ October–December 2017 issue examines IBM’s corporate labor and gender relations from a transatlantic perspective. It argues that IBM chair and CEO Thomas Watson Sr. shaped labor relations in his company’s West German subsidiary. In the US, Watson acted as a business progressive, expanding operations, opening professional careers to young women, and implementing welfare capitalist measures. When IBM took tighter control of its foreign operations after World War II, Watson sought to implement welfare capitalist measures in the companies’ overseas subsidiaries. With his wife by his side, he presented himself as the caring paterfamilias. German IBM employees embraced Watson’s rhetoric but continued to join national unions and formed a workers’ council, thwarting the major welfare capitalist goal of averting labor organization. Against such local labor practices, Watson undergirded a loyal workforce even in critical situations, an overlooked factor contributing to the company’s success.

Intelligent Resource Management in Blockchain-Based Cloud Datacenters
Today, more and more companies migrate business from their own servers to the cloud. With the influx of computational requests, datacenters consume tremendous amounts of energy every day, attracting great attention in energy-efficiency circles. In this article from Cloud Computing’s November/December 2017 issue, researchers investigate the energy-aware resource-management problem in cloud datacenters, to which green energy with unpredictable capacity is connected. By proposing a robust blockchain-based decentralized resource-management framework, researchers save the energy that the request scheduler otherwise consumes. Moreover, they propose a reinforcement learning method embedded in a smart contract to further minimize energy costs. Because the reinforcement learning method is informed by historical knowledge, it doesn’t rely on request arrival and energy...
supply. Experimental results on Google cluster traces and real-world electricity prices show that the approach reduces datacenter costs significantly.

Visual Communication and Cognition in Everyday Decision Making
Visual communication's role has quickly changed. And new materials and technology have helped create new commercial-art and graphic-design approaches. From ancient writing systems to Johannes Gutenberg's development of metal movable type and the start of the printing revolution, materials and technology have created opportunities for visual communication to reach more people and share more diverse messaging faster than ever before. Learn more in this article from CG&A's November/December 2017 issue.

Robust Tracking of Soccer Robots Using Random Finite Sets
Maintaining a good estimation of other participating robots' positions is crucial in soccer robotics, as in most multirobot applications. Classical approaches use a vector representation of the robots' positions and Bayesian filters to propagate them over time. However, these approaches suffer from the data-association problem. To tackle this challenge, this article from Intelligent Systems' November/December 2017 issue presents a new methodology for the robust tracking of robots based on the Random Finite Sets framework, which doesn't require any explicit data association. Moreover, the proposed methodology can integrate information shared by teammate robots, including their positions and their estimations of the other robots' positions. The proposed method reduces errors in the estimates of robots' positions by about 35 percent.

Nowcasting of Earthquake Consequences Using Big Social Data
Messages posted to social media in the aftermath of a natural disaster have value beyond announcing the event itself. Mining such digital traces helps provide a timely estimate of the disaster's consequences on the population and on infrastructures. Yet, to date, researchers have paid little attention to such automatic assessments of disaster-related damage. In this article from Internet Computing's November/December 2017 issue, the authors explore the process of feeding predictive models with tweets conveying on-the-ground social sensors' observations of earthquakes, and nowcasting the temblors' intensity.

Ultra-Low-Power Processors
Society's increasing use of connected sensing and wearable computing has created robust demand for ultra-low-power (ULP) edge-computing devices and associated system-on-chip architectures. In fact, ULP processing's ubiquity has already made such embedded devices the processor component with the highest production volume, with even more market dominance expected in the near future. The Internet of Everything calls for an embedded processor in every object, necessitating billions of chips. At the same time, the explosion of data that these devices generate, in conjunction with the traditional model of using cloud-based services to process the information, will place tremendous demands on the limited wireless spectrum and energy-hungry wireless networks. Smart ULP edge devices are the only way to meet these demands. Learn more in this article from Micro's November/December 2017 issue.

Deep Learning Triggers a New Era in Industrial Robotics
Deep learning's pattern-recognition capabilities have pushed the limits in various fields, including industrial robotics. Deep learning alone won't solve all of this field's problems but will certainly improve robotics systems' perception capabilities, given its power to robustly recognize complex real-world patterns. The author of this article from MultiMedia's October–December 2017 issue examines deep-learning applications for robotics.

What Will We Wear After Smartphones?
Wearable computing research has been going on for 20 years. This survey from Pervasive Computing's October–December 2017 issue looks back at how the field developed and explores where it's headed. According to the authors, wearable computing is entering its most exciting phase yet,
as it transitions from demonstrations to the creation of sustained markets and industries, which in turn should drive future research and innovation.

The Future of Digital Forensics: Challenges and the Road Ahead

Today’s huge volumes of data, heterogeneous information and communication technologies, and borderless cyberinfrastructures create new challenges for security experts and law-enforcement agencies investigating cybercrimes. This article from S&P’s November/December 2017 issue explores digital forensics’ future, with an emphasis on the challenges it faces and the advancements needed to effectively protect modern societies and pursue cybercriminals.

Safe, Secure Executions at the Network Edge: Coordinating Cloud, Edge, and Fog Computing

System design in which cyberphysical applications are securely coordinated from the cloud could simplify the development process. However, this would push private data to the cloud, causing users to lose the control they have when they execute applications locally. Meanwhile, computing at the network edge is still lacking support for straightforward multidevice development, which is essential for a wide range of dynamic cyberphysical services. This article from Software’s January/February 2018 issue proposes a novel programming model. It also proposes a secure-connectivity framework for leveraging safe coordinated device proximity as an additional degree of freedom between the remote cloud and the safety-critical network edge, especially under uncertain environment constraints.

The Economics of “Fake News”

False information has economic, political, and social consequences. The authors of this article from IT Pro’s November/December 2017 issue analyze the real and perceived costs and benefits to people that create false information and those that provide them with platform support. The authors particularly consider digital advertising ecosystems that support fake-news creation. They also discuss the context of false-information consumption and suggest that fake-news creators, consumers, and arbiters can reinforce each other and form a vicious circle. The article proposes mechanisms to break the circle and alter this activity’s cost-benefit structure.

Editorial: Unless otherwise stated, bylined articles, as well as product and service descriptions, reflect the author’s or firm’s opinion. Inclusion in Computer does not necessarily constitute endorsement by the IEEE or the Computer Society. All submissions are subject to editing for style, clarity, and space.

Reuse Rights and Reprint Permissions: Educational or personal use of this material is permitted without fee, provided such use: 1) is not made for profit; 2) includes this notice and a full citation to the original work on the first page of the copy; and 3) does not imply IEEE endorsement of any third-party products or services. Authors and their companies are permitted to post the accepted version of IEEE-copyrighted material on their own webservers without permission, provided that the IEEE copyright notice and a full citation to the original work appear on the first screen of the posted copy. An accepted manuscript is a version which has been revised by the author to incorporate review suggestions, but not the published version with copyediting, proofreading, and formatting added by IEEE. For more information, please go to: http://www.ieee.org/publications_standards/publications/rights/paperversionpolicy.html. Permission to reprint/republish this material for commercial, advertising, or promotional purposes or for creating new collective works for resale or redistribution must be obtained from IEEE by writing to the IEEE Intellectual Property Rights Office, 445 Hoes Lane, Piscataway, NJ 08854-4141 or pubs-permissions@ieee.org. Copyright © 2018 IEEE. All rights reserved.

Abstracting and Library Use: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy for private use of patrons, provided the per-copy fee indicated in the code at the bottom of the first page is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.