Computer Highlights Society Magazines

The IEEE Computer Society’s lineup of 13 peer-reviewed technical magazines covers cutting-edge topics ranging from software design and computer graphics to Internet computing and security, from scientific applications and machine intelligence to cloud migration and microchip design. Here are highlights from recent issues.

A Cyberplatform for Sharing Scientific Research Data at DataCenterHub
In this article from the May/June 2018 issue of Computing in Science & Engineering, the authors introduce DataCenterHub, a new solution for preserving, sharing, and discovering data produced by scientific research. Datasets are organized by experiments, with a simple common structure for metadata, file collections, and key parameters. Researchers associate annotations, reports, media, and measurements to each experiment, and interactive viewers interpret data by type and use so that they can be investigated before downloading. Parameters are extracted for discovery of key data otherwise hidden in files. DataCenterHub provides an alternative discipline-neutral solution, with the goal of helping researchers classify and share data for easy discovery and exploration.

According to author David Halsted, the term “computer architecture” seems to have appeared first at IBM in the late 1950s and early 1960s, and then spread to establish itself within the computing community. What impact did the architectural metaphor have on computing during this early period? In this study from the January–March 2018 issue of IEEE Annals of the History of Computing, Halsted argues that computer architecture represents more than a simple terminological transfer from one field of practice to another. When the architectural metaphor entered the computing domain, it changed in ways that are specific to computing machinery. Computing absorbed the architectural metaphor into its practice and made (a subset of) architectural concepts its own.

Privacy-Preserving Image Processing in the Cloud
Millions of private images are generated in various digital devices every day. The consequent massive computational workload means more people are turning to cloud computing platforms for their economical computation resources. Meanwhile, privacy concerns arise over the sensitive information contained in outsourced image data. Lack of security and privacy guarantees becomes the main barrier to further deployment of cloud-based image processing systems. This article from the March/April 2018 issue of IEEE Cloud Computing studies the design targets and technical challenges in constructing cloud-based privacy-preserving image processing systems. The authors explore various image processing tasks, including image feature detection, digital watermarking, and content-based image search.

Toward Visual Avatars that Dress You Well and Impact Your Health
Imagine a future where you walk up to your wardrobe and a magic mirror displays your avatar, to whom you can talk about your planned activities for the day. You get visual suggestions about what to wear, taking all sorts of constraints...
into account, such as the clothes in your closet, weather conditions, and so on. Seeing your avatar in the suggested clothes could help you decide quickly what to wear, keep you warm or cool, and contribute to your health. Read more in this article from the March/April 2018 issue of IEEE Computer Graphics and Applications.

Investigative Knowledge Discovery for Combating Illicit Activities
Developing scalable, semi-automatic approaches to derive insights from a domain-specific Web corpus is a longstanding research problem in the knowledge discovery community. The problem is particularly challenging in illicit fields, such as human trafficking, where traditional assumptions concerning information representation are frequently violated. In this article from the January/February 2018 issue of IEEE Intelligent Systems, the authors describe an end-to-end investigative knowledge discovery system for illicit Web domains. They built and evaluated a prototype involving separate components for information extraction, semantic modeling, and query execution on a real-world human trafficking Web corpus containing 1.3 million pages, with promising results.

Social Computing for Verifying Social Media Content in Breaking News
Social media is the place to go for both journalists and the general public when news events break, offering a real-time source of eyewitness images and videos through platforms like YouTube, Instagram, and Periscope. Yet, the value of such content as a means of documenting and disseminating breaking news is compromised by the increasing amount of content misuse and false claims in social media. The authors of this article, featured in the March/April 2018 issue of IEEE Internet Computing, discuss cost-effective social computing solutions for user-generated content verification, which are crucial for retaining the value of and trust in social media for breaking news.

A Microarchitecture for a Superconducting Quantum Processor
The authors of this article from the May/June 2018 issue of IEEE Micro propose a quantum microarchitecture (QuMA). Flexible programmability of QuMA is achieved by multi-level instructions decoding, abstracting analog control into digital control, and translating instruction execution with non-deterministic timing into event trigger with precise timing. QuMA is validated by several single-qubit experiments on a superconducting qubit.

Sensing Technologies for Monitoring Serious Mental Illnesses
Around 450 million people worldwide suffer from serious mental illnesses, which results in devastating personal outcomes and huge societal burden. Effective symptom monitoring and personalized interventions can significantly improve mental health care across different populations. However, traditional clinical methods often fall short when it comes to real-time monitoring of symptoms. Sensing technologies can address these issues by enabling granular tracking of behavioral, physiological, and social signals relevant to mental health. This article from the January–March 2018 issue of IEEE MultiMedia describes how sensing technologies can be used to diagnose and monitor patient states for numerous serious mental illnesses, and how the multimedia community can build on these technologies to enable efficient clinical decision making in mental health care.

A Public Transit Assistant for Blind Bus Passengers
Public transit is the key to independence for many blind persons. Despite recent progress in assistive technology, public transit remains challenging for those without sight. To this end, the authors of this article from the January–March 2018 issue of IEEE Pervasive Computing developed a prototype mobile application that communicates information via Wi-Fi access points installed in buses and at bus stops to help blind bus passengers reach their destination. A user study of the system yielded insights into general accessibility issues for blind public transit riders as well as ways to improve the proposed system.

Privacy-Aware Restricted Areas for Unmanned Aerial Systems
Although drones are receiving a lot of attention from industry and academia alike, the protection of citizen privacy
is still an open issue. The authors of this article from the March/April 2018 issue of IEEE Security & Privacy demonstrate how basic principles of information privacy could be integrated with existing infrastructure to build a framework for the dispatch of privacy-aware unmanned aerial systems (UASs). The proposed framework enables UAS operators to determine whether a selected flight path intersects with a restricted area by considering privacy preferences that can be configured by citizens.

Software

From Monolithic to Microservices: An Experience Report from the Banking Domain

Microservices have seen their popularity blossoming with an explosion of concrete applications in real-life software. Several companies are currently involved in a major refactoring of their back-end systems to improve scalability. This article from the May/June 2018 issue of IEEE Software presents an experience report of a real-world case study from the banking domain to demonstrate how scalability is positively affected by re-implementing a monolithic architecture into microservices. The case study is based on the FX Core system—a mission-critical system of Danske Bank, the largest bank in Denmark and one of the leading financial institutions in Northern Europe—for converting one currency to another.

To Blockchain or Not to Blockchain: That Is the Question

Blockchain has been considered a breakthrough technology—but does your company need it? In this article from the March/April 2018 issue of IT Professional, the authors discuss the advantages and disadvantages of blockchain technology using examples from the insurance sector, which can be generalized and applied to other sectors.

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