Editorial: Recent Advances on Big Data Technologies and Applications

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Editorial:

Due to the explosive evolution of Information Technology and Computer Science, we have entered in Big Data Age, and this is really a scientific revolution, not just a fashion. As always, the technological aspects evolve faster than the scientific community mentality. Transforming Big Data into Big Knowledge and developing a Knowledge-Based System require new visions and approaches. Companies, facing the Big Data challenges, are moving faster in the right direction than the scientific community, being under a stronger competitive pressure. They were forced to renounce to wishful thinking, like the idea that a few variables, embedded in a few rules, discovered using the old fashion statistics, will give intelligent support for business decisions. We have to do the same for developing various applications.

Moreover, motivated by the big data analytics needs, new computing and storage technologies are developing rapidly and pushing for new high-end hardware geared toward big data problems. While the high performance computing technologies have the potential to greatly improve effectiveness of big data analytics, the cost and sophistications of those technology and limited initial application support often make them inaccessible to the end users and not fully utilized in academia years later. Meanwhile, comprehensive analytic software environment and platforms, such as R and Python, have become increasingly popular open-source platforms for data analysis.

Particularly, it has been important to understand urban data (e.g., weather, traffic, and energy) that can be acquired from our cities. Various methods for processing such urban data have gained great attention of scientific community over the last several years. The urban data challenges range from handling the size and variety of urban data, to dealing with the complexity of the underlying physical models, to addressing the concerns on protecting individual's privacy, and so on. However, the past few years have seen significant advances in addressing such challenges by researchers who are stepping up their efforts in understanding the biology of cities using big data. It is our hope that through this workshop, the knowledge, experiences, and lessons can be shared to make data mining an essential and easy-to-use tool for various applications.

In this special issue, six high quality papers have been selected. The first article, “Understanding Customer Experience Diffusion on Social Networking Services by Big Data Analytics”, authored by Piccialli and Jung, proposed an interesting data analytics framework for the big data in social networking services (e.g., Twitter). The social networking services have been playing an important role on information diffusion, and it shows that there are several patterns (i.e., speed and coverage) with respect to the contents of the tweets.

The second article, “Real-Time Traffic Flow Management Based on Inter-Object Communication: a Case Study at Intersection”, presented the big data processing methods for Internet of Things domains. Particularly, the proposed method is based on process synchronization and it has been applied to traffic flow management for connected vehicles.

In the next article with the title “Discovering Social Bursts by Using Link Analytics on Large-Scale Social Networks”, the author investigated the social network analytics for the big data collected from online social

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networking services. The topological patterns (e.g., social centralities) have been taken into account by social link analysis. It has claimed that the proposed method can be applied for discovering social bursts (e.g., social events) in real time.

Also, computing multimodal data (audio-video data) has been regarded as a crucial issue that impacts the success of big data communities. The fourth article, “Real-Time Head Pose Estimation Framework for Mobile Devices” proposed a practical scheme to understand the contexts of human drivers by analyzing image streams captured through mobile devices. It has focused on estimating head pose in real time for assisting human users to drive.

Multimedia data from Cultural Heritage (CR) is widely regarded as one of the most promising domain for big data analytics. The fifth article titled “Mobile Application for Archaeological Site Image Content Retrieval and Automated Generating Image Descriptions with Neural Network” proposed an interesting deep learning method for image classification (e.g., image description).

The last article titled “Soft Cooperative Spectrum Sensing using Quantization Method in the Presence of Smart PUE Attack” investigated efficient quantization-based system for sensing and analyzing big data (called

soft cooperative spectrum sensing). Especially, it has been applied for secure communication against PUE attacks.

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