



Computing

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Call for Papers

Special Issue on
**Data analytics for engineering,
science and society**

Guest Editors

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Goal

Nowadays a wide range of technological and pervasive applications has made available a huge amount of heterogeneous complex real data. Digging deep these data collections can unearth a rich spectrum of knowledge valuable to ultimately add intelligence in the targeted domains. However, data analytics on such collections is still a daunting task, because they are generally too big, dirty, complex, and heterogeneous to be processed through state-of-the-art data analysis techniques. Consequently, various data science challenges arise, tailored to each application domain, and dealing with the creation, storage, search, sharing, modelling, analysis, and visualization of data and their inner knowledge.

The goal for this special issue is to explore how new emerging data science solutions and systems can help real-life settings to become smarter. Specifically, innovative contributions that either solve or advance the understanding of issues related to deploying data science technologies in the real world are very welcome. Interesting topics cover data analytics issues addressing all facets of the knowledge discovering process from the applied data-science perspective. The final goal is to disseminate cutting-edge applied research findings and industrial real-world advances on innovative data analytics methodologies and technologies to share data science innovation.

Overview

Due to the large amounts of data produced by modern and always connected industries and applications, the necessity of powerful and reliable architecture and methodologies to analyze data is becoming prominent. Furthermore, the recent expansion of IoT-enabled (Internet of Things) devices in a large variety of applications, from manufacturing contexts to food production and their subsequent data-driven needs, paved the way to the advent of the “*data-science anywhere*” era.

Data science is an interdisciplinary field about scientific processes, methodologies, and systems to extract useful knowledge or insights from data in various forms. Different and heterogenous analytic

techniques, such as data mining, machine learning, statistics and optimization processes could be combined to discover interesting and hidden knowledge from complex heterogeneous data. The real impact of those approaches is valuable when the proposed analytics methodologies are effectively exploited in real-life settings and the discovered knowledge effectively add intelligence to real systems.

To this aim, *algorithms* are powerful tools to manage and analyze data. They are the way to fulfill the data science expectations, and although we barely notice them, they are behind a large part of the services we use every day. However, most algorithms, besides being precise and effective, are obscure and human unreadable. Making their choices and outcomes understandable and transparent would allow people to understand the reasons for algorithm choices, and thus improve their usability in various real-life settings. Therefore, *transparent solutions* are needed to produce more credible and reliable data analytics services, playing a key role in proactive user engagement by making the results of the data analytical process and its models widely accessible.

The growing diffusion of many domains such as engineering and physical science is generating increasing opportunities to data scientists to exploit artificial intelligence in real-world problems and systems, through the analysis of real-world data that are complex in contents, heterogeneous in formats and often order of Terabytes in amount. New opportunities to work on exciting real-world problems and deal with complex and unexpected research issues arise. From the smart factory, filled with sensors over the whole production chain, to the more advanced IT services with huge amounts of log data, it is of paramount importance the ability to manage and elaborate data in both real time and off-line to discover useful knowledge for production process improvements and competitive business advantages. Thus, almost every application calls for data science solutions, algorithms, methodologies to enhance the quality of the provided services, add intelligence, advance the user needs with the ultimate goal to create new forms of business.

In this scenario, new and exciting research issues should be faced. Heterogeneous data collected from different sources in real-life settings should be adequately combined, integrated and stored to ensure efficient and effective data analytics, knowledge exploration and understanding. Not only the heterogeneity of real-world data is a challenge, but also the increasing amount of data to be managed by machine learning techniques, as well as their poor quality. Additionally, increasing privacy awareness and transparency request for machine learning approaches call for data usage fairness in all business sectors.

The general idea behind this special issue is to disseminate cutting-edge analytics contributions from various engineering, scientific and social settings that exploit data analytics, machine learning and data mining techniques. The special issue is expected to include papers that span a wide range of topics in the field of applied data science innovation, from methodological aspects, to theoretical and technological views. More specifically, this special issue covers some emerging and cutting-edge research topics concerning new trends in applied data analytics, such as transparency and fairness, new platforms for data handling, emerging hardware and software technologies for data discovery process, data analytics on novel architectures supporting compatibility with both on-premises and in-the-cloud environments, design and exploitation of reliable and largely supported Big Data platforms tailored to advanced machine learning techniques, and data science solutions.

A variety of modern real-life settings along with academic contexts could benefit from the dissemination of those advances and novel paradigms covering all facets of the data discovery process. Industries and modern applications could share their experience on exploiting data analytics solutions keeping pace with the latest technologies. Academics could identify open research issues coming from the industrial and real-life contexts to continuously support the data discovery innovation process with the required methodological and technological solutions.

Topics of interest

The special issue welcomes submissions of technical, experimental, methodological contributions focused on real-world problems and systems that are deployed or are in the process of being deployed addressing – though not limited to – the following topics:

- Data management and analytics
- Methodologies, models, algorithms, and architectures for applied data science
- Big Data frameworks and architectures
- Data warehouses and large-scale databases
- NoSQL and NewSQL databases
- Energy-efficient computing
- Metadata management
- Scalable and/or descriptive analytics algorithms
- Concepts, transparency methodologies, innovative and transparency solutions for sensing, modeling, managing, mining, understanding citizens behavior, perceptions, activities, desiderata and needs
- Real-time data analytics
- Machine learning and deep learning techniques
- Reinforcement learning models
- Next-Generation Sequencing data analysis
- Cloud computing techniques for data science
- Parallel and distributed computing for data science
- Performance optimization and benchmarks
- Crowdsourcing and collaborative analyses
- Personalization and recommendation techniques for Big and small Data
- Question answering techniques and systems
- Visualization methods for data-intensive applications
- Privacy aware access and usage control
- Privacy and security policies enforcement mechanisms
- Privacy preserving data allocation and storage

In one of – though not limited to – the following application scenarios:

- Bio-sciences and healthcare
- Internet of Things
- Network traffic analytics
- Urban economy and urban environments
- Government transparency and IT against corruption
- Public safety and disaster relief
- Transportation
- Energy
- Financial applications
- Customer relationship management
- Agriculture
- Mobile applications
- e-commerce
- Business analytics and finance
- User-generated content (like tweets, micro-blog)
- Industry 4.0
- Data journalism
- Education
- Ethical issues, fairness and accountability
- Topics aligned with the UN development goals:

<https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

Time Scale

Submission Due:	March 30 th , 2019
1st Review Notification:	May 30 th , 2019
Revision Due:	July 30 th , 2019
Final Notification:	September 30 th , 2019

Major Guidelines

We invite the submission of original and high-quality manuscripts describing relevant applied research addressing various aspects of data management, data analytics and systems related to real-world problems. Contributions in this special issue should be of interest to a large and varied cross-disciplinary audience of researchers and practitioners involved or interested from different perspectives in applied data science.

Submissions of “extended versions” of already published works (e.g., conference/workshop papers) should be significantly extended with a relevant part of novel contribution. A “Summary of Differences” between the submitted paper to this special issue and the former one must be included.

Submission Guidelines

Papers should be formatted according to the *Computing* journal instructions for authors at: <http://www.springer.com/607>. Springer has LaTeX templates: see “Instructions for Authors / Text” at <http://www.springer.com/607>. No templates for Word. Either LaTeX OR Word is accepted.

Manuscript length

Please note, the special issues page limit is different from *Computing* regular paper submissions. Papers that exceed the length of 12 pages may not be considered for review and publication. In special cases up to 15 pages will be allowed subject to approval from the Guest Editors. Authors aiming for 15 page submission should contact the Guest Editors in advance.

Submission instruction

The article will be submitted in the usual way via the online submission site at (<http://www.springer.com/607>).

When submitting a manuscript for this special issue, authors should take care to select ‘Data analytics for engineering, science and society’ as the Manuscript Type.