Guest editorial

Urban informatics: decoding urban complexities through data sciences

Digital ubiquity in the contemporary urban environment is escalating exponentially. The widespread use of wireless technologies and mobile communication spread through associated data networks has now, more than ever made people and technology merge to create novel socio-technical realities. The Internet of Things revolution enabling this digital ubiquity has thus already begun giving shape to Mark Weisser's (1991) vision of Ubiquitous computing. This phenomenon coupled with the increasing urbanisation of the world has marked a significant shift from an economy based on industry to one driven by digital information and service provision.

This context implies changes to the manner in which the physical, the human and the digital counterparts formulating contemporary cities are inextricably interlinked into complex relational networks. This new reality has implications on how urban planners and designers can understand the city and its dynamic nature through a mediated layer of real-time data, often studied under the domain of Spatial Data Science. A critical understanding of the complexities and relational algorithmic approaches within Spatial Data Sciences, however, is still relatively unexplored and is often treated as a black box of computational methods by a majority of the design community. This special issue captures the intricacies behind this mediated layer of real-time data (informatics component) omnipresent in the urban environment. This "Urban Informatics" domain can be interpreted as the study, design and practise of urban experiences across different urban contexts, created by new opportunities of real-time, ubiquitous technology and the augmentation that mediates the physical and digital layers of people, networks and urban infrastructures.

This special issue on urban informatics focuses on cutting edge articles which detail the scientific and creative use of urban sensing, data processing and urban impact yielding methodologies. How harnessing this data-science-driven layer of urban informatics enables the collection, analysis of vital datasets and most importantly how it impacts the urban in a tangible manner, is a vital focus of the issue. Differences in methodologies, frameworks, hard and software, visualisation techniques and computational approaches, while, approaching critical urban issues ranging from urban health and wellbeing, urban mobility, safety and security, urban energy and sustainable urban design, are thus exposed from a data-science perspective via this special issue. The issue is also an attempt to expose the domain of data sciences to contemporary and future urbanists, enabling them to tackle both existing and projected urgencies in dynamic urban environments.

The special issue, rather than focusing on theoretical debates around the Smart City paradigm, takes an objective approach, diving in the domain of computational design and data sciences while relating the output to tangible evidence-based cases. These cases cover practical areas such as energy, health and safety, environment and mobility from a Spatial Data Sciences perspective. The special issue, via its ten papers, manages to trace the methodological differences while balancing the connection between hard and soft sciences in order to make an original contribution to the field of urban informatics. Featured papers such as "Participatory urban informatics: towards citizen-ability" focus on community engagement and tangible experimental works while papers such as "Towards Typogenetic Tools for generative urban aesthetics" and "Towards a multi-scalar framework for smart healthcare" put forth novel design and informatics structures for performative healthcare and shape grammar driven urban density generation. Other featured papers such as "Mapping preferences for the number of built elements", "Monitoring urban environmental

phenomenon through a wireless distributed sensor network" and "Spatio-temporal analysis of trajectories for safer construction sites" focus on advanced sensing, data monitoring and data analytics techniques. Finally, the papers "Modelling walking and cycling accessibility and mobility: the effect of network configuration and occupancy on spatial dynamics of active mobility", "A modelling methodology for a solar energy efficient neighbourhood", "ParticipationPlus—documenting a design process of a media architecture installation in the second digital turn era", and "Experimentation at scale: challenges for making urban informatics work".

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