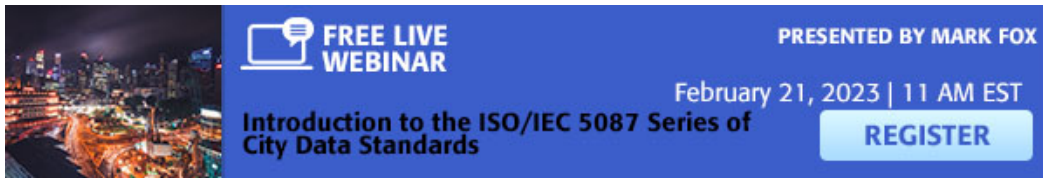IEEE Smart Cities

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Smart Cities - Explainable Artificial Intelligence for Smart Cities

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Foreword: Special Issue – Explainable Artificial Intelligence for Smart Cities
Written by Wei Zhang

Artificial intelligence (AI) and intelligent systems are everywhere in Smart Cities. However, consumers and industry start raising questions and demands about the explainability and interpretability of AI and intelligent systems. Explainability and interpretability enable model/system inspection, validation, and optimization and, more importantly, they help gain confidence and trust from consumers and industry and facilitate final system deployment. In this special issue, we discuss the latest advancements of explainable AI and present several related articles from various perspectives.

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Enabling Interpretability in Smart Cities with Knowledge Graphs: Towards a Better Modelling of Consent
Written by Anelia Kurteva and Anna Fensel

Data sharing is not a new phenomenon. With the current technological advancements, it is happening everywhere and at any time. Such is the case of data sharing in smart cities where one's data is constantly monitored by hundreds of sensors. But do we know what specific data is actually shared, with whom and for what purposes? The General Data Protection Regulation (GDPR)[1], which came into force in May 2018, aims to help answer these questions by highlighting the importance of informed consent, making it one of its six lawful bases that need to be satisfied when dealing with the data of European citizens. GDPR has led to a major shift in all sectors which depend on data sharing and has put the focus on empowering individuals by requesting higher levels of transparency.

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Intelligent Deployment of Autonomous UAV Networks for Provisioning Communication Services

Written by Xuehe Wang, Xiao Zhang, and Lingjie Duan

An Unmanned Aerial Vehicle (UAV) network has emerged as a promising robotics technique to rapidly provide communication services to a geographical area out of coverage or capacity of the ground infrastructure. However, UAV-aided communication services (UCS) face challenges due to the UAV limitation in wireless coverage and energy storage. Aware of such physical limitations, a future UAV network should be intelligent enough to self-plan trajectories and best service users. There are important issues regarding the UAV-user interaction for path planning, UAV-UAV cooperation for sustainable service provision, onboard energy allocation for balancing both hovering time and service capacity, and dynamic UCS pricing according to leftover energy and random demands. These networking and service management issues are largely overlooked in the literature. This article discusses intelligent solutions for the autonomous UCS deployment and operation.

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Human-AI Teaming for the Next Generation Smart City Healthcare Systems

Written by M. Abdur Rahman, M. Shamim Hossain, Ahmad J. Showail, and Nabil A. Alrajeh

We have been witnessing impressive advancements in healthcare provisioning in Smart Cities. Several technological advancements have contributed to this advancement, including the Internet of Medical Things (IoMT), medical big data, edge learning, and 6G. With the support of Artificial Intelligence (AI) capability at the edge, IoMT nodes, such as the CT Scan machine, can now do the diagnosis at the hospital edge nodes with very high accuracy and share the results with authorized medical personnel almost in real time. The massive amount of medical big data that are generated by IoMT devices each day is becoming unmanageable by humans. Hence, AI contributed to superior forecasting and prediction, emergency health operations and response, prevention of infection spreading, highly accurate medical diagnosis, treatment, and drug research capabilities.

Explainable Machine Learning for Secure Smart Vehicles

Written by Michele Scalas and Giorgio Giacinto

Vehicles are seeing their architecture revamped to enable autonomous driving and connect to the outside environment of Smart Cities, supporting vehicle-to-everything (V2X) communications. A significant part of the "smartness" of vehicles, such as computer vision capabilities, is enabled by Machine Learning (ML) models, which have proven to be extremely effective. However, the complexity of the algorithms often prevents understanding what these models learn, and adversarial attacks might alter or mislead the expected behavior of the vehicle; hence, undermining the capability of proper safety testing for deployment. For these reasons, there is a growing interest of the research community to exploit techniques for explaining machine learning models to help to improve the safety and security of smart vehicles [1].

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