Chapter 6
Overview of XAI for the Development and Modernization of Smart Cities:
Explainable Artificial Intelligence

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ABSTRACT

AI systems are integral to the development of smart cities, but their complexity can make decision-making processes opaque, leading to concerns about accountability and transparency. Explainable AI (XAI) aims to address this by designing algorithms that can explain decisions in a way that humans can understand. XAI can increase transparency and accountability in smart cities, promote trust between residents and officials, and enhance the adoption and acceptance of smart city technologies. However, there are still challenges to overcome, and continued research is necessary to fully realize the potential benefits of XAI.

I. INTRODUCTION

Smart cities are cities that utilize interconnected information to enhance their operations, optimize the use of limited resources, and gain better control over their activities. Meanwhile, Explainable Artificial Intelligence (XAI) is an emerging field that aids in elucidating the decision-making process of an AI model. To guarantee transparency and trust in the decision-making process of AI systems, XAI integration is essential for the development and modernization of smart cities. (Metwally & Ibrahim, 2023).

Figure 1. AI vs. XAI: Transparency prioritized
Source: Javed et al. (2023)
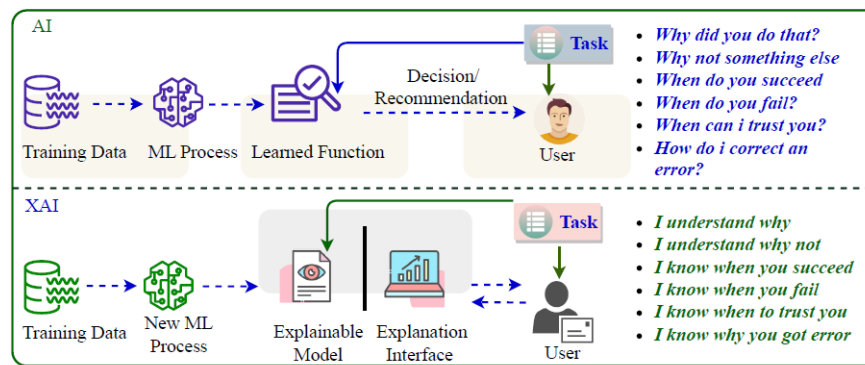
As depicted in Fig 1.0 XAI is essential for building intelligent systems that can provide clear and understandable reasoning behind their decisions, making them more reliable and trustworthy. The ability to explain decisions is crucial for smart cities as it enables citizens to understand how AI systems operate and trust that their data is being used in a fair and ethical manner. The integration of XAI into smart city development can help to address concerns about the potential misuse of AI and ensure that these technologies are used in a responsible and sustainable way (Chaddad, Peng, Xu, & Bouridane, 2023).

To guarantee transparent, comprehensible, and dependable decision-making in smart cities, it is crucial to incorporate XAI into their development and modernization processes. Policymakers, developers, and stakeholders involved in smart city initiatives must prioritize the creation and implementation of XAI technology (Gunning & Aha, 2019).

A. Definition of XAI and Smart Cities

Explainable Artificial Intelligence (XAI):

As depicted in Fig 2.0 Explainable AI (XAI) is a subset of AI that focuses on developing algorithms and techniques that allow humans to understand how AI systems make decisions. These decision-making processes can be complex, leading to doubts about the transparency, accountability, and reliability of the AI systems. XAI addresses these concerns by creating AI systems that can explain their decision-making in ways that are easily understandable(Taj & Zaman, 2022). This improves transparency and trust, enables the detection and correction of errors and biases, and encourages the use of AI in various fields,

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