Review of data serialization challenges and validation methods for improving interoperability

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ABSTRACT

Digitalized communication and information exchange are the bedrock of smart cities and infrastructure. Enhancement of neutral data exchange platforms and data serialization is an inevitable step toward improving smart city architecture. Data serialization is defined as a process for encoding or translating data into neutral file formats so they could be transferrable or retrievable by other applications. The semantic data need to be communicated with other systems and, therefore, need to be converted into a neutral format that could be globally communicable. The Industry Foundation Classes (IFC) are one of the examples of neutral data exchange format that benefited the Building Information Modeling (BIM) in the built environment. The expansion of neutral data exchange schemas is receiving more attention every day; however, it is full of challenges. Review and aggregation of challenges experienced by other researchers and their approaches for overcoming the interoperability complications could help future researchers. Moreover, reviewing the key elements in semantic and syntactic validation procedures improves the early planning of the project and improves the research process's reliability. This paper reviews the most common data serialization methods and provides a summary of the challenges and gaps. The findings of this research can inspire other researchers with their data exchange system architecture, verification, and validation methods to increase the effectiveness of their research.