Chapter 4
Edge Computing on IoT: Architectures, Techniques, and Challenges

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ABSTRACT

The internet of things (IoT) is escalating into diverse aspects of our lives with innovative technologies and solutions. In general, IoT devices are restricted to storage and processing power, which results in the lack of performance, reliability, and privacy of IoT applications. The applications in various sectors like agriculture, healthcare, smart cities, smart homes, and production units are enriched by twining the IoT and cloud computing. Cloud analytics is the process of extracting actionable business insights from the data stored in the cloud. Cloud analytics algorithms are applied to large data collections to identify patterns, predict future outcomes, and produce other useful information to business decision makers. Edge computing has arisen to support this intense increase in resource requirements by leveraging the untouched potential away from the enterprise data cores. Processing power is gained by a collective process between various entities at the network edge including the user devices, mobile-based stations, and gateways and access points.

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The Internet of Things "IoT" has been a buzzword for recent years, the business organization has adopted the technology in an increased way. Current expansion of IoT demands intelligent models to be deployed at the edge. The Internet of Things (IoT) is escalating into diverse aspects of our lives with innovative technologies and solutions. In general, IoT devices are restricted to storage and processing power, which results in the lack of performance, reliability and privacy of IoT applications. The applications in various sectors like agriculture, health care, smart cities, smart homes, and production units are enriched by twining the IoT and cloud computing. Integrating AI techniques into cloud analytics, is called as cloud intelligence. Edge Computing is a archetype to push cloud services from the network core to the network edges. The goal of Edge Computing is to host computing tasks as close as possible to the data sources and end-users. The edge computing and cloud computing are not mutually exclusive. The edge computing is the extension of the cloud and which complements instead.

The core functions of edge computing are, to perform analytics at the edge, data needs to be viewed as real-time flows. Edge computing continually processes streaming flows of data in motion, whereas big data analytics is focused on large quantities of data at rest.

Organization of the work will be as follows, Introduction, overview of edge computing, machine learning and deep learning algorithms, the importance of edge intelligence, enabling techniques and advantages, applications of edge intelligence, finally the conclusion.

INTRODUCTION

Advanced computer technologies such as big data, Artificial Intelligence (AI), cloud computing, digital twins, and edge computing have been applied in various fields as digitalization has progressed.

The most important inspiration for Digital Twins (DTs) comes from the need for feedback between real physical systems and the digital cyberspace model. People try to recreate what occurs in the material world in digital space. Only the whole life tracking using cyclic feedback is the true concept of the whole life cycle. This way, digital consistency with the material world may be truly ensured throughout the life cycle. Various simulations, analysis, data accumulation, mining, and even artificial intelligence applications based on digital models can ensure that it is suitable for real physical systems. An intelligent system's intelligence must first be observed, modeled, evaluated, and reasoned. If there is no accurate modeling description of the actual production system by the digital twins, the intelligent manufacturing system cannot be realized.