Live Data Analytics with Collaborative Edge and Cloud Processing in Wireless IoT Networks

ABSTRACT:

Recently, big data analytics has received important attention in a variety of application domains including business, finance, space science, healthcare, telecommunication and Internet of Things (IoT). Among these areas, IoT is considered as an important platform in bringing people, processes, data and things/objects together in order to enhance the quality of our everyday lives. However, the key challenges are how to effectively extract useful features from the massive amount of heterogeneous data generated by resource-constrained IoT devices in order to provide real-time information and feedback to the end-users, and how to utilize this data-aware intelligence in enhancing the performance of wireless IoT networks. Although there are parallel advances in cloud computing and edge computing for addressing some issues in data analytics, they have their own benefits and limitations. The convergence of these two computing paradigms, i.e., massive virtually shared pool of computing and storage resources from the cloud and real-time data processing by edge computing, could effectively enable live data analytics
in wireless IoT networks. In this regard, we propose a novel framework for coordinated processing between edge and cloud computing/processing by integrating advantages from both the platforms. The proposed framework can exploit the network wide knowledge and historical information available at the cloud center to guide edge computing units towards satisfying various performance requirements of heterogeneous wireless IoT networks. Starting with the main features, key enablers and the challenges of big data analytics, we provide various synergies and distinctions between cloud and edge processing. More importantly, we identify and describe the potential key enablers for the proposed edge-cloud collaborative framework, the associated key challenges and some interesting future research directions.

INTRODUCTION:

The current trend in the Internet world is to connect all the devices/objects/things to the Internet with the objective of enhancing the quality of our everyday lives, thus leading to the emergence of Internet of Things (IoT) [1], [2]. In this direction, there has been a tremendous growth in the number of Internet-enabled smart devices and connections such as smartphones, Machine to Machine (M2M) connections, smart home appliances, and smart wearable devices, and this trend is expected to continue in the future. According to CISCO, more than 50 billion devices are expected to be connected to the Internet by 2020. Recent advances in sensing, computing, wireless communications, Internet protocols, and networking technologies have made the concept of IoT feasible. However, the main challenge is how to handle the real-time processing of a huge amount of data/information, called big data, generated from heterogeneous wireless IoT environment