Chapter 55
Cognitive Internet of Everything (CIoE):
State of the Art and Approaches

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ABSTRACT

In today's world, we are living in busy metropolitan cities and want our homes to be ambient intelligent enough towards our cognitive requirements for assisted living in smart space environment and an excellent smart home control system should not rely on the users' instructions (Wanglei, 2015). The ambient intelligence is a sensational new information technology paradigm in which people are empowered for assisted living through multiple IoTs sensors environment that are aware of inhabitant presence and context and highly sensitive, adaptive and responsive to their needs. A noble ambient intelligent environment are characterized by their ubiquity, transparency and intelligence which seamlessly integrated into the background and invisible to surrounded users/inhabitant. Cognitive IoE (Internet of Everything) is a new type of pervasive computing. As the ambient smart home is into research only from a couple of years, many research outcomes are lacking potentials in ambient intelligence and need to be more dug around for better outcomes. As a result, an effective architecture of CIoE for ambient intelligent space is missing in other researcher's work. An unsupervised and supervised methods of machine learning can be applied in order to classify the varied and complex user activities. In the first step, by using fuzzy set theory, the input dataset value can be fuzzified to obtain degree of membership for context from the physical layer. In the second step, using K-pattern clustering algorithms to discover pattern clusters and make dynamic rules based on identified patterns. This chapter provides an overview, critical evaluation of approaches and research directions to CIoE.

MOTIVATION: DIGITAL EVERYTHING AND DIGITAL EVERYWHERE

In recent years, impressive hardware technologies have been developed that let mobile and embedded devices to better exploit the web-internet features to ensure an enhanced interactive experience with the physical world. As earlier, Satyanarayanan (2001) suggested that great technology inventions are those, who dissolve themselves into everyday life and be invisible for human consciousness. Such research developments are making futuristic scenarios of Ambient Intelligence and smart environments into the reality of everyday lives by integrating research contribution from the fields of pervasive computing, sensor networking, IOTs, artificial intelligence, machine learning and context-aware computing. These smart spaces extend the functionality of ambient intelligence toward more proactive possibilities, where the smart environment not only monitors people for tasks or support them by executing their requests, but also influences and changes their plans and intentions. Also by the EU report, pervasive computing will be the next wave of new ICT innovation in the next five years, and it is said by 2020 pervasive computing will be one major type of ICT system (Ricci et al, 2015).

As, it is a great statement by EU 2020 report on IoTs that, pervasive computing will be the next wave of new ICT innovation in the next five years, and it's said by 2020 is will be one major type of ICT system. Many researchers all around the world are working on Context aware IoTs projects and many of them proposed their research findings but still this process is in iterative in nature which makes research to involve and investigate more about smart home, smart cities and urban computing projects. Furthermore, Taylor et al. (2015), stated that there will be a significant increase in the rate of change in the electronics industry as the Internet of Things (IoTs) becomes a reality, an explosion of sensor technology will take place. The challenges to integrate smart grids and cities, for semi-autonomous automobiles, smart manufacturing, building and home automation and to offer improved health care via remote monitoring or drug tracking; securely, offer tremendous opportunities to the electronics industry.

Overall, IoT is an enabling technology, whereas the internet and current communication networks connect People to People (P2P), it will connect Machine to Machine (M2M).Examples of applications include: wearable's, building and home automation, smart cities, smart manufacturing, health care and

Figure 1. Predicted growth of IoT
(Taylor et al. 2015)
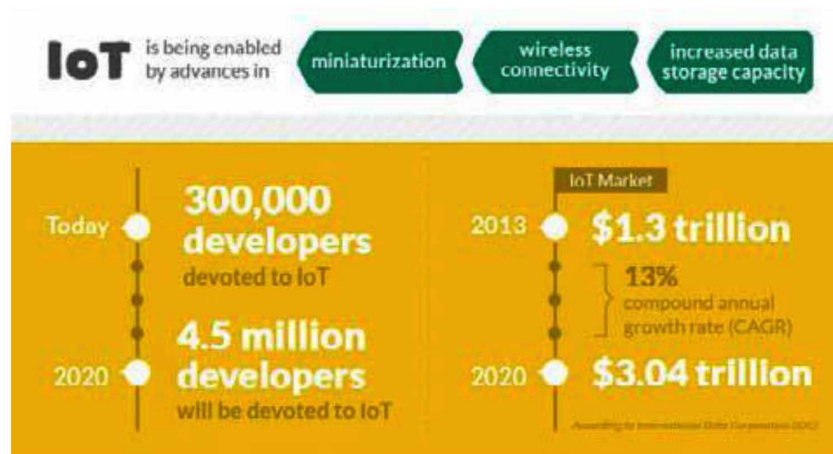
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