

In the Era When Everything Is Connected

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The word “Internet” takes me back to when I was still a graduate student. It was the early 1990s, and not many people, even in the university, were aware of emails or the worldwide web (WWW). I with my seniors installed yellow cables (10BASE5) in the university building to connect laboratory work stations to the network and browse only a few websites that were available using NCSA MOSAIC (a web browser developed at the University of Illinois). Those days, almost nothing was connected to the Internet, except for those expensive workstations. The current digital native generation may not even be able to imagine such a ridiculously inconvenient world. Certainly, it was hard task to organize work; papers for international conferences arrived by airmail, and we would have to organize them manually. Conversely, if I went on an overseas business trip, I would be free from work-related requests. It was such a slow-paced era.

More than 20 years have passed since then, and various things are connected to the Internet. Not only that, cloud computing has enabled us to analyze big data on the Internet. These systems are today known as the Internet of Things (IoT). It is attracting much attention as potential technology for social revolution and business opportunities. According to the Gartner Hype Cycle 2018, IoT platforms have passed the period of Peak of Inflated Expectations and entered the Trough of Disillusionment stage.

The smart watch, the latest popular item, is a good example of the personal IoT. It gathers and analyzes various data with various sensors such as acceleration, gyro, pulse and GPS, and gives us advice for optimal feedback on exercise. More recently, we also hear more often about human microchip implants. Sweden, where the population is approximately 10 million, is keenly pursuing this new technology, with several thousand people already having a microchip implanted. In 2017, the Swedish State-owned Railway Company introduced a system that allows you to get on a train with an implanted microchip. This implanted device can gather biometric data more accurately than wearable devices such as a smart watch. The microchip can store all the smart cards inside your body, and it also serves as highly

valuable sensors to monitor the state of your health. When information about humans is connected to the network, it will evolve into the Internet of Humans (IoH). While there are security and ethical issues still to be discussed, the technology is advancing steadily, backed by human curiosity. The era of the Internet of Everything (IoE) will be coming where not only objects, but humans, and everything else are connected to the network. New innovative services will be provided and change our lifestyles significantly. It seems a completely different age for me compared to when I installed yellow cables.

This conjures up a picture full of hopes and expectations, but I fear that some of us may struggle to catch these giant waves of change in the fields of manufacturing and medical care in Japan. For example, it is said that explosion-proof regulations are preventing the introduction of IoT devices at manufacturing sites. Even if the government encourages smartification, Japan-specific regulations are hindering such an initiative. Thus, these kinds of structural issues should be addressed promptly and wisely, along with technological issues.

The vast amount of data taken from humans and things would serve for nothing if it was merely stored at a massive data center. It is thus necessary to develop a system that extracts valuable information from the data and prompts appropriate actions. While I do not agree with the latest loose trend to consider multiple regression analysis as a part of artificial intelligence, it is true that machine learning technology, including deep learning, is making remarkable progress so that extremely complex data analysis can be done by computers. However, useful tools are not so useful if there is no one who can leverage them. It will not be easy to change the policy of organizations that had been rather indifferent to data analyses until recently. Fostering talented people is one of the major challenges to be addressed.

Facing the world that is oriented to the Analytics of Everything (AoE), there is something we cannot leave to computers yet; it is to determine the visions to be aimed at. In the world where things and humans are connected to the network, how do we want society to be, and what should we do to realize that society? At this time of transformation, we will be asked to have determination and act, to provide value to society, and to think about what value is to be created, with wide perspectives, rather than settling for a local optimization.

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