# Remarks for Special Issue on AI and Social Value Creation

Over the past several years, the world has witnessed a tremendous upsurge in activity in the field of artificial intelligence (AI). In the years to come, that activity will only intensify as AI is applied to an ever wider array of social issues from energy and food shortages to overpopulation and urbanization, traffic congestion, labor shortages and productivity enhancement. AI is expected to play a crucial role in the new world by eliminating wasteful functions and operations, as well as by visualizing, analyzing, and prescribing to the real world all from the viewpoint of overall optimization. At the same time, it is crucial that these new technologies bring people to the fore, rather than marginalizing them. While helping individual social systems evolve to the next level, AI can also help individuals to achieve their true potential. In this new world, everyone will have the opportunity to display their unique capabilities regardless of gender, age, race, or physical or mental challenges. We call such a society - where digitization has penetrated every aspect of economic and social life - the society of "digital inclusion".

For more than a half a century, NEC has been directing its efforts towards the creation of just such a society. NEC Technical Journal's first special issue on AI was published more than 30 years ago in 1986. NEC has since developed numerous worldleading AI-related technologies in the fields of visualization, analysis, and prescription. These have been systematized in a proprietary suite of cutting-edge AI technologies, which we named "NEC the WISE" in recognition of its goal of providing support and guidance in the operation of various social systems.

The visualization technology of NEC the WISE is our biometric technology, which includes face recognition, fingerprint recognition, and iris recognition. Generally regarded as the No.1 in the world<sup>1)</sup>, this technology was largely covered in the



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last issue of NTJ, which featured social value creation using biometrics. In this issue, we want to focus on the remaining areas of analysis and prescription, which correspond to machine learning and data analysis. Here too, NEC's technological expertise is among the top in the world. The total number of papers put out by NEC that have been adopted at major society meetings ranks fifth in the world and first among Japanese companies, giving us a prominent voice in shaping the future of artificial intelligence and the new digitally inclusive society.

One of the most important characteristics that distinguishes NEC's AI is our white-box approach whereby our system not only provides an answer, it provides the basis for that answer. Mainstream deep learning technology, on the other hand, adopts a black-box design that does not give you any explanation of how the answer was derived. When addressing a problem that may have more than one solution — social and management issues, for instance — it is important to know what the basis is for a particular solution. This gives people the opportunity to make more informed decisions based on the various suggestions proposed by AI.

NEC foresaw the necessity for white-box AI early on and has been pushing forward with research and development in this area since about 2010. In 2012, we were the first to launch full-fledged operation of white-box AI and have since implemented about 160 systems in areas such as plant failure symptom detection, total optimization of supply and demand across manufacturing, logistics, and distribution, and illicit bank transaction monitoring. Today we are seeing dynamic implementation of R&D into "accountable AI." In this respect as well, we have been leading the industry both in terms of research and operations, achieving considerable success in development of AI capable of mutual understanding with humans and AI that can offer new awareness and expand human capabilities. We'll take a closer look at the results we have achieved in these areas in this issue.

Going forward, the achievement of an AI-supported society of "digital inclusion", requires not only the enhancement of AI performance and functions, but also increased social acceptability and simpler implementation and introduction. Accomplishing this depends not only on technological development, but also adaptation of usage principles and conformity to legal systems that take into consideration privacy, ethics, and accountability. With this in mind, NEC announced "NEC Group AI and Human Rights Principles" in April 2019, with the goal of creating AI that would be acceptable to human society. Also, in an effort to counter the worldwide shortage of skilled AI personnel, NEC has been working hard to develop AI human resources since 2013 and has produced a steady supply of AI experts over the past few years, deploying their talents in a wide range of fields.

In this special issue on AI, we highlight several case studies which offer an in-depth look at how NEC is creating new social value by leveraging AI and an array of cutting-edge AI technologies designed to achieve a more digitally inclusive society. In addition to those technical papers, our AI policies and commitment to developing human resources are also discussed.

We hope you enjoy reading this issue and look forward to your ongoing support and encouragement.

#### Reference

https://www.nec.com/en/press/201910/global\_20191003\_01.html

NEC Face Recognition Technology Ranks First in NIST Accuracy Testing, Oct. 2019.

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Remarks for Special Issue on AI and Social Value Creation Data — Powering Digitalization and AI

## **Papers for Special Issue**

#### **NEC's Efforts Toward Social Applications of AI**

NEC's Commitment to Its New "NEC Group AI and Human Rights Principles" Policy Human Resource Development in the Age of AI

#### AI-Enhanced Services/Solutions to Accelerate Digital Transformation

NEC Advanced Analytics Platform (AAPF) Promoting "AI Co-Creation" Use of Individual Identification Based on the Fingerprint of Things Recognition Technology Visual Inspection Solutions Based on the Application of Deep Learning to Image Processing Controllers Remote Vehicle Surveillance Solution Based on Communication Prediction/Control Technology NEC's Emotion Analysis Solution Supports Work Style Reform and Health Management Facial Recognition Solution for Offices — Improved Security, Increased Convenience Outline of an Auto Response Solution (AI Chatbot) for Assisting Business Automation and Labor Saving AI for Work Shift Support — Accelerating the Transition to Human-Centered Business Value Creation NEC Cloud Service for Energy Resource Aggregation Leveraging AI Technology Patient Condition Change Signs Detection Technology for Early Hospital Discharge Support Effective Data-Based Approaches to Disease Prevention/Healthcare Domains Co-creation of AI-Based Consumer Insight Marketing Services "Anokorowa CHOCOLATE" Lets People Savor Delicious Chocolates that Reflect the Mood of Special Moments in History

Cutting-Edge AI Technologies to Create the Future Together With Us Heterogeneous Object Recognition to Identify Retail Products Optical Fiber Sensing Technology Visualizing the Real World via Network Infrastructures Intention Learning Technology Imitates the Expert Decision-Making Process Graph-based Relational Learning Retrieval-based Time-Series Data Analysis Technology New Logical Thinking AI Can Help Optimize Social Infrastructure Management Deep Learning Technology for Small Data A Computing Platform Supporting AI



