Orchestrating a brighter world

NEC

Tokyo Tech

NEC and Tokyo Institute of Technology use AI to dramatically increase image clarity under severe conditions

- Automatically combines visible and non-visible images -

Tokyo, June 5, 2017 - NEC Corporation (NEC; TSE: 6701) and Tokyo Institute of Technology (Tokyo Tech) today announced their joint development of a multi-modal image fusion technology that dramatically improves the clarity of images by using artificial intelligence (AI) to automatically combine visible images taken by standard cameras with non-visible images taken by specialized devices, such as thermal or terahertz cameras.

In recent years, technological advancements and cost reductions for specialized devices that photograph non-visible images, such as thermal cameras, which capture heat, and X-ray cameras, have enabled them to be used for an expanding range of purposes, including nighttime monitoring under severe weather conditions, such as dense fog (*). However, these cameras tend to provide images of poor resolution and quality in comparison to images taken of visible subjects.

Conventionally, in order to analyze non-visible and visible images of the same subject, images had to be viewed and compared separately, or they had to be manually combined by a trained expert. Moreover, the detection of abnormalities or hazards contained in non-visible images could be easily overlooked when combining the images.

This new technology uses AI to achieve greater image visibility by automatically selecting highly visible parts from multiple images and combining them, while enhancing the smallest characteristics contained in non-visible images. Specifically, AI carries out detailed examination of each image in order to assess the degree of visibility of each part, then automatically extracts the best areas from each image, taking environmental characteristics into consideration, such as brightness, the direction of light and obstacles.

“As this technology enables instant visual clarification, even under harsh conditions, it allows users to make well informed evaluations. For example, it can be applied to monitoring systems to assist with nighttime observations, or to infrastructure inspection devices to improve the detection of interior and exterior abnormalities, such as cracking," said Akio Yamada, General Manager, Data Science Research Laboratories, NEC Corporation.

“Until now, a specialist had to manually carry out complex conversion tasks in order to combine images taken by different types of cameras. This technology eliminates the need for such manual work, using AI to effectively and automatically combine images taken by different cameras. This also increases visibility by actively utilizing the strong points of each visible image and non-visible image, even when the images are difficult to visualize,” said Professor Masatoshi Okutomi, School of Engineering, Tokyo Institute of Technology.

Moreover, AI analyzes the slightest clue to detecting an abnormality and hazard in a non-visible camera image and automatically generates a multimodal (fusion of visible and non-visible) image with exceptionally high visibility, while properly regulating the degree of enhancement to avoid causing image breakdowns, such as clipped highlights and crushed blacks.

NEC and Tokyo Tech will present this technology on June 7, at the 23rd Symposium on Sensing via Image Information to be held at Pacifico Yokohama (Nishi-ku, Yokohama City) from Wednesday, June 7 to Friday, June 9.

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Note:
*Obtained permission to use the severe environment simulator in the ImPACT Tough Robotics Challenge program.

About NEC Corporation
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The NEC Group globally provides “Solutions for Society” that promote the safety, security, efficiency and equality of society. Under the company’s corporate message of “Orchestrating a brighter world,” NEC aims to help solve a wide range of challenging issues and to create new social value for the changing world of tomorrow. For more information, please visit http://www.nec.com/en/global/about/solutionsforsociety/message.html.

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About Tokyo Institute of Technology

Tokyo Institute of Technology stands at the forefront of research and higher education as the leading university for science and technology in Japan. Tokyo Tech researchers excel in a variety of fields, such as material science, biology, computer science and physics. Founded in 1881, Tokyo Tech has grown to host 10,000 undergraduate and graduate students who become principled leaders of their fields and some of the most sought-after scientists and engineers at top companies. Embodying the Japanese philosophy of "monotsukuri," meaning technical ingenuity and innovation, the Tokyo Tech community strives to make significant contributions to society through high-impact research.
Website: http://www.titech.ac.jp/english/

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