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Development of image-analysis technology with AI for real-time people-detection and tracking

Detecting a given individual from a combination of over 100 features and tracking using wide-area images

1. Detection
Real-time categorization and search of external appearance and movement features

2. Tracking
Analysis of the entire body image, and extract images of the same person

Wide-area people-tracking system using this technology

Tokyo, March 27, 2017 --- Hitachi, Ltd. (TSE: 6501, Hitachi) today announced the development of a detection and tracking technology using artificial intelligence (AI) which can distinguish an individual in real-time using features from over 100 categories of external characteristics such as sex, color of clothing or carried items, and immediately detect and track the person sought after individual. Using this technology, it will be possible to detect a suspicious individual or a lost child using information from eye-witness accounts to detect a person fitting that description from public security cameras set up in large facilities or city areas. Further, by analyzing the entire image of the person detected, it will be possible to follow the person from camera images where only the rear-view is captured and the face cannot be seen, or the person is captured from a distance. Hitachi will apply this technology to wide-area security and surveillance systems[1] such as those in public areas, contribute to public safety and security.

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To ensure safety, measures such as surveillance using security cameras and patrol by security staff are being implemented in public areas such as city areas and large facilities such as airports and stations. In order to prevent emergencies, however, it is necessary to be able to immediately close-in on images of a suspicious person or a lost child based on eye-witness accounts from persons on the scene, and locate in real-time the whereabouts of the person sought after from the wide-area surveillance camera network. As it is difficult to screen all of the images with a limited number of staff, technology to detect and track people has been developed using facial images procured at some entry point or features such as color of clothing, however it was difficult to detect and track a person if there was limited eye-witness account, other people wearing similar color clothing, or if the surveillance camera was unable to capture a clear facial image due to angle or lighting.

To overcome this challenge, Hitachi applied AI to distinguish an individual in real-time using multiple features such as sex, age group and clothing, and furthermore, track that individual in real time from the images from wide-area surveillance cameras. Features of the technology developed are as below:

(1) High-speed person detection technology that categorizes and searches using characteristics of external appearance and movement
AI that can perform real-time simultaneous detection to identify from camera images, more than 100 characteristics related to 12 types of appearance such as sex, age, hair style, color and form of clothing, and carried items, and movement characteristics from 10 categories such as walking, running, and bending. Conventionally, each item needed to be calculated separately to distinguish the characteristics. This time, a method to simultaneous calculate multiple items has been adopted, reducing calculation time to 1/40th[2]. As a result, by providing specific conditions based on characteristics categorized in real-time by AI, high-speed detection of an individual is now possible.

(2) High speed person tracking technology that analyzes in detail the entire image of the body and extracts images of the same person
AI that recognizes an individual as the same person by analyzing and converting the image of the entire body into a numerical description so that the same person will be recognized regardless of a change in body angle or lighting. By recording the result of the AI analysis in a database[3] with high-speed vector processing developed by Hitachi, an image of the same person can be extracted from among

several ten thousands of recorded images in less than 1 second. Further, over a three-fold improvement[2] in accuracy of obtaining an image of the same person, was found when the AI developed was compared with that of facial analysis only.

Real-time people detection and tracking was made possible by combining the technologies developed. From now, Hitachi will apply this technology to wide-area security and surveillance systems such as those in public areas, contribute to public safety and security.

(1) In installing such technology, sufficient discussion will be held with the customer to ensure measures that are introduced to protect personal information and privacy.

(2) Comparison with conventional Hitachi technology.

(3) "EnraEnra" database, a high-speed similar image search technology developed by Hitachi.

About Hitachi, Ltd.

Hitachi, Ltd. (TSE: 6501), headquartered in Tokyo, Japan, delivers innovations that answer society's challenges. The company's consolidated revenues for fiscal 2015 (ended March 31, 2016) totaled 10,034.3 billion yen ($88.8 billion). The Hitachi Group is a global leader in the Social Innovation Business, and it has approximately 335,000 employees worldwide. Through collaborative creation, Hitachi is providing solutions to customers in a broad range of sectors, including Power / Energy, Industry / Distribution / Water, Urban Development, and Finance / Government & Public / Healthcare. For more information on Hitachi, please visit the company's website at http://www.hitachi.com.

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