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MITSUBISHI ELECTRIC DEVELOPS A "BEST APPEARANCE" FACIAL IMAGE RECORDING TECHNOLOGY

Automatically selects the most suitable images for recording

TOKYO, Feb. 17, 2004 — Mitsubishi Electric Corporation (President and CEO: Tamotsu Nomakuchi) has developed a "Best Appearance" Facial Recognition Technology. The technology is capable of detecting and tracking human faces, and automatically selects the most appropriate images to record for storage and retrieval purposes.

The process begins with the world's fastest facial detection technology, capable of detecting not only frontal views but also facial profiles in real-time video data. This technology could form the basis for creating a recording system for security or surveillance cameras, an access control system, or a visitor recording system for an office or home. In addition, by combining facial identification, this technology can be applied to a video editing system that can extract facial images of a specified person.

The technology will be exhibited at the forthcoming "Security Show 2004" (March 2 - 5, 2004, at Tokyo "Big Sight").

Background

The demand for video surveillance systems has been steadily increasing of late, and video storage systems for security and surveillance cameras are being installed in numerous locations. The recording efficiency of these systems can be improved by only recording

important sequences and scenes. Given the huge amounts of video data that need to be analyzed, an extremely high processing speed is required.

With regards to recording human beings, it is important to be able to record and retrieve facial imagery. Mitsubishi Electric has recently developed a high speed Facial Detection Technology, which enables the detection of facial images from a video camera in real-time and is considerably faster than other facial detection technologies, as well as being capable of detecting facial profiles. Robust High Speed Pattern Matching and "Best Appearance" Facial Image Selection technologies, that will automatically select the most appropriate facial images to record for storage and retrieval purposes, have also been developed.

Main Features

1. *High Speed Face Detection Algorithm detects human faces from input images in real time.*

Mitsubishi Electric has developed a high speed Face Detection Algorithm. Rectangle Filters[1], consisting of several rectangular areas, are used to define the features of a human face. The algorithm can detect a single frontal face, plural faces, rotated faces and profiles at a processing speed of more than 20 frames/sec. The high-speed detection process is a base technology that can be applied to many other problem areas in the security business, such as attribute determination (gender, age), suspicious person detection and individual authentication.

[1] A rectangle filter consists of a combination of rectangles. For example, a two-rectangle filter consists of two identical rectangles placed side-by-side. The value of a two-rectangle filter is the difference between the sums of the pixels within the two rectangular regions. If we imagine a two-rectangle filter shaped like two horizontal bars stacked along their long edge, this filter might be useful for finding eyes when one bar is over the eyes (typically dark areas) and the other bar over the cheeks (typically light areas).

2. Robust High Speed Pattern Matching and "Best Appearance" Facial Image Selection select the facial images with the most appropriate appearance.

Mitsubishi Electric has developed a detected-face tracking technology called Robust High Speed Pattern Matching[2], and a "Best Appearance" Facial Image Selection technology which selects the most appropriate image to record from a person's set of images. These technologies make it possible to record the most appropriate facial images, which is extremely important for surveillance video systems. In addition, highly efficient storage is

made possible by storing only the valuable still images, as opposed to numerous frames of video.

[2] Pattern Matching is a technology that attempts to locate areas in a target image that are identical to a partial image (template) provided in advance. External factors, such as changing light conditions, sometimes cause performance to deteriorate. To avoid this problem, our technology selectively uses partial areas in a template based on the creditability of the partial area. This leads to more robust and faster pattern matching.

Future Developments

Performance testing under various conditions will continue, in order that the technology may be applied to video surveillance systems in the best possible way. Work on face-based applications, such as people identification, gender classification, age inference and so on, will be also be expanded.

Patents Pending

Two patents relating to this development are currently pending in Japan; one patent is currently pending abroad.

About Mitsubishi Electric

With over 80 years of experience in providing reliable, high-quality products to both corporate clients and general consumers all over the world, Mitsubishi Electric Corporation (TSE: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. The company has operations in 35 countries and recorded consolidated group sales of 3,639 billion yen (US$30.3 billion[*]) in the year ended March 31, 2003. For more information visit http://global.mitsubishielectric.com

[*]At an exchange rate of 120 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2003.

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