

Commonwealth of Pennsylvania - Justice Network



Industry

- Government

Challenges

- Antiquated facial-recognition technology
- Labor-intensive data entry
- Cumbersome user access
- Low-matching accuracy

Solution

- NEC NeoFace® Facial Recognition Matching Algorithm
- FACE Plus Integrated Facial Recognition System from DataWorks Plus

Results

- Faster, more accurate identification matching
- Full integration with existing system
- Simplified, yet highly secure access & use
- Timely, more efficient criminal investigations

The Pennsylvania Justice Network (JNET) is a collaborative effort of 16 state agencies to build a secure, integrated justice system that promotes information sharing through the use of its applications, services, architecture, outreach and training. JNET allows criminal-justice and other public-safety resources to be shared among federal, state, county and municipal agencies.

NEC, in conjunction with DataWorks Plus, created a fully integrated facial-recognition solution for the JNET. The commonwealth is leveraging its new JNET Facial Recognition System (JFRS) to enable faster, more accurate identification matching.

Challenges

The Pennsylvania JNET is an online environment for authorized users to access public-safety and criminal-justice information. The system serves more than 800 contributing law enforcement agencies and state offices in Pennsylvania. This includes more than 250 capture locations and 38,000 web-retrieval users sharing data records and mug shot images across the commonwealth's Wide Area Network (WAN).

"We have used the JNET for almost two decades, building on the system over the years," says Harry Giordano, Special Projects Manager, Pennsylvania Justice Network. "The portal provides critical information to aid in timely criminal investigations, which enhances public safety."

The ability to identify unknown suspects and witnesses is paramount in law enforcement's efforts to protect and serve. Facial-recognition technology is an invaluable tool for criminal investigations. "Investigators often use photos or surveillance videos to determine potential crime suspects and witnesses," adds Giordano. "Facial-recognition technology is not used to make a positive ID for arrest, but it does enable investigators to compare images with photos in our existing database. In other words, it is used as an investigative tool."

Pennsylvania law officials already used facial-recognition technology for several years; but, the solution had limitations. "Our legacy solutions didn't generate very accurate results and the process was labor intensive," says Lucinda Stone, Statewide Administrator, Pennsylvania Justice Network. "Users often had to enter a lot of demographics and go through hundreds of photos just to find a match."

The commonwealth sought an updated facial-recognition application to better assist investigators in identifying individuals in photos. The solution needed to be available through JNET for law enforcement officers throughout Pennsylvania. It also needed to simplify usability and improve accuracy with photo matching.

Solution

FacePlus facial-recognition technology from DataWorks Plus is a web-based solution that seamlessly integrates with the JNET. FacePlus incorporates NEC's NeoFace® facial-recognition-matching algorithm for quick, accurate image comparison and processing.

"We asked NEC to create an algorithm using our mug shots database. NEC analyzed the info, came up with a search engine, then provided us the analysis," says Giordano. "So we were actually a part of creating the solution and we feel like this solution was custom built for us."

The NEC NeoFace algorithm is designed to quickly detect and extract specific eye and facial features within photo images. The algorithm is based on a neural-network technology, enabling the solution to identify patterns that are too complex to detect with the naked eye or other computer techniques. "The solution produces accurate results even when photographed subjects are wearing hats or sunglasses that conceal parts of their facial features," adds Giordano.

The algorithm also converts faces in photographs to 3D images for further processing and matching. The NeoFace solution rotates the 3D image in all directions while applying different illumination and shadowing to account for varying poses and facial expressions. "With 3D imaging, we are able to analyze facial features even when the subject is photographed from the side or looking away from the camera," says Stone. "This drastically improves our chances of making a match in our database. We didn't have this capability with our legacy solution."

The commonwealth is also using the NEC NeoFace technology for its powerful ability to process poor-quality, highly compressed surveillance videos and images that were previously considered of little or no value to investigations. "The JFRS enables users in the field to extract images from bank cameras, ATMs, retail-security cameras and other sources," says David Naisby, Executive Director, Pennsylvania JNET. "This improves our opportunity for additional identifications."

Results

The updated facial-recognition solution lets users compare photographs and surveillance footage against a database of 3.5 million criminal booking photographs and quickly identify potential matches. The solution has aided investigators in solving numerous cases, including homicides, robberies, burglaries, fraud and identity theft.

"The system produced success even during the training sessions," says Giordano. "We asked officers to bring photos of unknown suspects from open cases and got hits during some of the sessions."

A day after completing his training, a detective used the facial recognition system to identify six persons of interest in an ongoing home-invasion investigation. The police department recovered several snapshots of individuals from a vehicle believed to be involved in the crime, but was unable to make any positive identification. As a result, the investigation had stalled.

The detective ran the photos into the system and successfully identified six of the men within an hour and a half. "They had been showing the photos for weeks without success, so the value of the facial-recognition software was immediately apparent to the department," says Giordano. "According to the detective, they are confident this new tool will lead to breakthroughs in many of their unsolved crimes."

A detective from the Carlisle Police Department scans daily Pennsylvania Criminal Intelligence Center (PaCIC) reports from agencies all over the state containing photos of unknown suspects. "He entered a photo from a retail theft case that occurred in the area and believed the system identified the suspect," adds Stone. "He forwarded the information to the agency looking for the individual for confirmation."

In another case, a detective received a call from another agent with information on a suspected drug dealer that had moved into the area. "The suspect only had a Facebook pseudonym, so the detective pulled photos from the Facebook account and ran the images in the facial recognition system, got several matches and identified the suspect," says Giordano.

In 2012, the JNET Facial Recognition System received Laureate and 21st Century Achievement Awards from IDG's Computerworld Honors Program, competing in a field of more than 500 entries from across the globe.

"NEC's NeoFace facial matching algorithm and the DataWorks Plus solution have made it easier for criminal justice professionals in Pennsylvania to quickly identify and remove potentially dangerous or wanted criminals from our streets, greatly enhancing public safety. The ability to work with poor quality and lower-pixel count images has also been a great benefit," Naisby concludes.

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