



BRIEFING NOTES

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FACIAL RECOGNITION: MILITARY, SECURITY, AND CIVILIAN APPLICATIONS

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SUMMARY

- ✚ One of the foremost biometric identifiers is facial recognition technology that are used in security applications, namely military, airport security, Federal Bureau of Investigation (FBI) identification system, and INTERPOL.
- ✚ The facial recognition technology is used in civilian applications, namely retail, banking, transportation, casinos, events, and stadium security.
- ✚ Countries such as China, Japan, Malaysia, Singapore, United Arab Emirates, and the United States (US) are leading the way in using facial recognition technology for various military, security, and civilian applications.

CONTEXT

✚ **Military and Security Sector:**

Military:

- Facial recognition method utilizes images and video which are captured without interaction with people. This lack of communication makes this technology an efficient and effective security method.
- The US military is developing a portable face-recognition device to identify individuals from a kilometer away. The Advanced Tactical Facial Recognition at a Distance Technology project is being carried out for US Special Operations Command (SOCOM) [1].
- Scientists at the US Army Research Laboratory, using the visible spectrum and existing facial recognition technology, proposed a method to produce a visible space from a thermal image. Thermal images plot hot and cold regions in the face, which is sufficient to create valuable information for the right method of synthesis. Afterward, the scientists utilized a convolutional neural network (CNN) to put in the missing details in local regions of the face, e.g., eyes, nose, mouth, to synthesize a face [1].

Airport Security:

- **Kairos:** Kairos offers a Face Recognition API (application programming interface) to help any firm with their security issues. Developers can combine facial identities and emotions into their services using a Representational State Transfer (REST)-style API [2].
- **Yitu Technology:** Using computer vision and facial recognition, Yitu Technology built Smart Security solutions to help airports, transportation, and shopping centers [2].

Government and Law Enforcement Applications:

- **New York's Department of Motor Vehicles (DMV) Software:** All new licenses, passports, and photo IDs will be entered into the DMV facial recognition software. If the software finds a match, an alert goes to the DMV investigators. Aside from information from New York DMVs, the software is connected to the federal and state law enforcement databases [3].
- **The FBI's Next Generation Identification System:** The FBI's Facial Analysis, Comparison, and Evaluation Services Unit uses the Next Generation Identification System (NGI) database [3].

Civilian Sector:

Passenger Processing at Airports:

- **Aurora Computer Services:** This technology can authenticate the identity of the passengers using facial recognition technology. This software can be integrated into the airport scanning system, or it can be used as a separate module [2]. As one of the Yitu Technology clients, Suzhou Municipal Public Security Bureau uses their model to identify regular suspects and even suspects in disguise with masks or paints. This system resulted in solving more than 500 criminal cases since June 2015. As their past clients, we can mention Microsoft, Tencent, and China Merchants Bank.
- **SenseTime:** This product uses facial recognition and authenticates the passengers' identity. It can be integrated into the pedestrian gates and other security operations [2].
- **Societe Internationale de Telecommunications Aeronautiques (SITA):** SITA offers a smart path where airports and airlines can integrate this software into existing foundation such as border control stations, secure gates, boarding gates, and check-in kiosks [2].

Banking:

- **IntelliVision and CloudWalk Technology:** During a customer card insertion into an IntelliVision client's Automated Teller Machine (ATM) or CloudWalk technology ATM, the facial recognition verifies the account owner. It lets the owners do the transactions and validate or reject the transaction request based on the user's face [4].
- **FaceFirst:** One of the most crucial goals of FaceFirst's software is helping banks to control the access of sensitive areas within their buildings [4].

Retail:

- Various companies use facial recognition to reduce the use of old-fashioned unlocking methods, improve detection capability to distinguish a person's face from a photo, and increase fraud detection. MasterCard is one of the financial institutions that use facial recognition to open the password. The

users utilize the smartphone camera, MasterCard Identity Check Mobile app to pay online, and confirm their payments through facial recognition [5].

CONSIDERATIONS

Military and Security Sector:

- o **Singapore:** Police have installed a “Smart Command Center” concept that has used facial recognition technology and plugged into closed-circuit television (CCTV) cameras to identify criminals in Singapore. Moreover, Singapore’s police are using a Multi-purpose All-Terrain Autonomous Robot (MATAR), which contains several capabilities, e.g., real-time facial recognition. Furthermore, to improve security and reduce terrorism in Singapore, the government equipped all lampposts with facial recognition cameras. This operation is done in a project termed Lamppost-as-a-Platform (LaaP) [6].
- o **United Arab Emirates (UAE):** Dubai police use thousands of cameras to identify criminals and increase safety. Smart glasses and facial recognition technology are used to recognize, and arrest wanted people in Abu Dhabi, after scanning, processing, and analyzing numerous faces in the crowd. Besides, to identify criminals and wanted vehicles, police cars that patrol the streets are equipped with facial recognition technology, under the supervision of the UAE’s Ministry of Interior [6].
- o The governments of the US, China, and Malaysia support using facial recognition technology in airport security, border security, and policing. More than 160 countries form a unique global criminal database, including facial images, termed the INTERPOL Facial Recognition System (IFRS). One adaptive facial recognition software is developed by the Naval Air Warfare Center Weapons Division in China Lake. One of the applications of this software in the military is that it can easily distinguish between friend and foe [6].

Civilian Sector:

- o **China:** The main motivations behind using facial recognition in China are traffic control and efficiency. In businesses, by facial recognition, transaction speeds, and sales are growing. China’s state-owned banks use facial recognition to identify customers when making transactions at self-service machines. Recording the students’ attendance in classrooms, analyzing their behavior, detecting their emotional states, entering the universities, and boarding planes are other applications of this algorithm in China [6].
- o **Japan:** The main goals of using facial recognition in the Japanese civilian sector are monitoring employees’ productivity, checking their smiles when interacting with customers, and identifying sleepy employees on the job. Other purposes are reducing traffic accidents for the sake of tired or drowsy drivers and identifying gambling addicts in casinos by counting the number of

times they entered the casino. Some Japanese banks use facial recognition to develop a smartphone banking system for clients, verify the purchases of bank employees, and deduct the shopping cost from their monthly wages [6].

- o **Malaysia:** In the civilian sector of Malaysia, the main goals of using facial recognition are across daily social activities, public and private applications, including a wide range of management systems, payments, advertising, and commerce, as well as healthcare and hospitality. Also, check-in systems in events and airports have used this technology [7], [8].

RECOMMENDATIONS:

- ✚ Small drones can use facial recognition and thermal imaging technology to recognize the adversary. Military can use such technology to eliminate a group of enemies with a swarm of these AI-based small drones.
- ✚ Pose estimation and pose recognition can be added to the facial recognition information of every individual. Since the pose is another unique feature besides facial features, adversary's activities and their identification can be recognized by combining pose recognition and facial recognition and combining them into an intelligent recognition system. This method would be useful for indoor places where subjects and their faces can be obfuscated.
- ✚ Police can stop any suspicious activities before it starts by combining facial recognition and pose estimation technologies. A system with this combination can do background checks by using the facial recognition technology and estimate the hazard level by using the pose estimation and notify the police. This combined technology can be used in banks, airports and other public places such as parks or shopping malls.
- ✚ Stores can predict their customers' needs and predict their shopping habits by using facial recognition technology in their stores. They can increase their sales by providing what their customers need.

REFERENCES

- [1] Millicent Abadicio. Facial recognition in the military – current applications. <https://emerj.com/ai-sector-overviews/facial-recognition-in-the-military-current-applications/>, February 2020.
- [2] Millicent Abadicio. Facial recognition at airports – current applications. <https://emerj.com/ai-sector-overviews/facial-recognition-at-airports-current-applications/>, November 2019.
- [3] Pamela Bump. Facial recognition in law enforcement – 6 current applications. <https://emerj.com/ai-sector-overviews/facial-recognition-in-law-enforcement/>, November 2018.
- [4] Niccolo Mejia. Facial recognition in banking – current applications. <https://emerj.com/ai-sector-overviews/facial-recognition-in-banking-current-applications/>, December 2019.
- [5] Kumba Sennaar. Facial recognition applications – security, retail, and beyond. <https://emerj.com/ai-sector-overviews/facial-recognition-applications/>, November 2019.
- [6] Abishur Prakash. Facial recognition cameras and ai: 5 countries with the fastest adoption. <https://www.roboticsbusinessreview.com/ai/facial-recognition-cameras-5-countries/>, December 2018.
- [7] Nor Azlina. Malaysia's eyes set on pursuing facial recognition technology. <https://www.opengovasia.com/malaysias-eyes-set-on-pursuing-facial-recognition-technology/>, December 2019.
- [8] Priya Dialani. Top 5 countries to adopt facial recognition technology. <https://www.analyticsinsight.net/top-5-countries-to-adopt-facial-recognition-technology/>, January 2019.