

Biometric Recognition White Paper

2019

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Writing Units

Sensetime, Xiaomi, Pingan, Ant Financial, Cloudwalk, Fudan University, etc.

••Jeff's comment: Notable absentees: Megvii (Face++) and Yitu --- two of the "big four" facial recognition giants

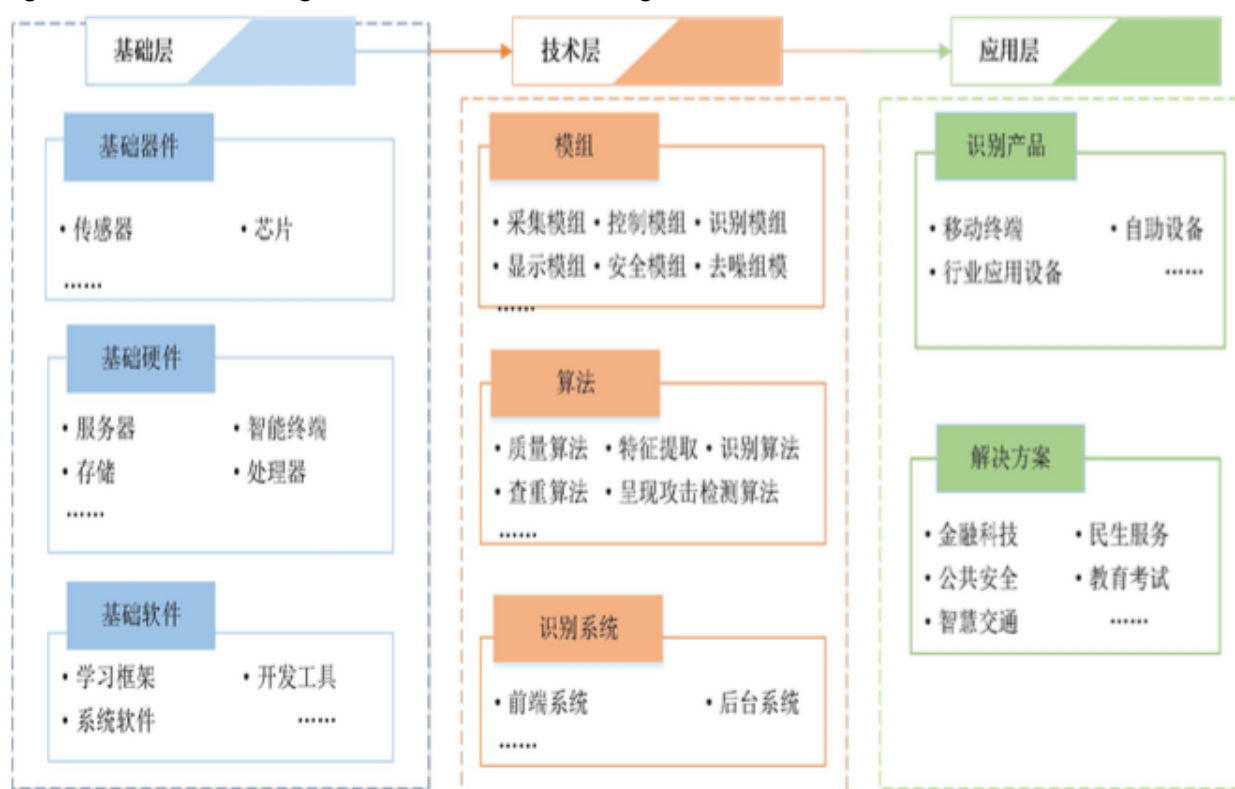
1.2 Current State of Development of Biometric Recognition in China

In recent years, biometric recognition technology has been widely used in the fields of financial technology, public services, public safety, education examinations, and smart transportation, etc. Its development mainly shows the following characteristics:

1. The industrial value-chain is basically formed and the market size is growing rapidly

From the perspective of the entire industrial value-chain, China's biometric recognition companies span the fundamental layer (development of fundamental devices, fundamental hardware, and fundamental software), the technical layer (development of modules, algorithms, and recognition systems), and the application layer (recognition products and software solutions). (as shown in Figure 2).

Figure 2 Schematic diagram of the biometric recognition industrial value-chain



At present, China has more than 4,000 companies in the field of biometric recognition. From 2013 to 2018, the number of new companies in China's biometric recognition industry has been increasing year by year. According to statistics, the number of new enterprises in 2018 reached 558, an increase of 3.14% over the number of new companies in the previous year. As of August 30, 2019, the number of new enterprises (for the year 2019) reached 428. Judging from the current layout of the industry, listed companies in biometric recognition are mostly located in eastern coastal areas such as Beijing, Guangdong, Zhejiang and Shanghai [1].¹

The size of China's biometrics market has maintained rapid growth, with the market size increasing from 80 million RMB in 2002 to 17.01 billion RMB in 2018. With the continuous increase of applications in the era of the mobile Internet, the acceleration of interdisciplinary integration, and the increasing demand for public safety and information safety in the entire society, China's biometric recognition industry still has a lot of room for development and will still maintain rapid growth rate [1].

2. Independent enterprises are developing rapidly, and some products have reached the international advanced level.

¹ 2019 年-2023 年中国生物识别技术产业深度调研及投资前景 预测报告, [R], 中投产业研究院 -- Interesting think tank that has some other good reports -- reminder to flag for CSET translation team

In general, products provided by foreign companies with core technologies still hold a certain share of China's biometric recognition market, but some independent products can already rival the advanced international products, and some companies have already gained a relatively high reputation worldwide. For example, in terms of fingerprint anti-counterfeiting, relevant Chinese companies have developed cost-effective fingerprint biometric detection methods based on deep convolutional features and SVM-RFE (Support Vector Machine-Recursive Feature Elimination), which support methods to detect fake fingerprints. This method does not require any additional hardware assistance. With respect to facial recognition algorithms, on November 23, 2018, the 2018 Face Recognition Vendor Test results released by the National Institute of Standards and Technology showed that the top 5 of the 39 face recognition algorithms are from China.

3. A variety of recognition technologies have flourished, and the main competitors have started to cooperate on mutual wins

At present, in China's biometric recognition industry, fingerprint recognition technology and products still occupy a dominant position, accounting for over 1/3 of the overall market for biometric recognition technology. Face recognition, iris recognition, and voiceprint recognition, which have relatively higher levels of technical difficulty, account for 16%, 11%, and 11%, respectively. At the same time, technologies such as vein recognition, behavior recognition and genomic recognition are also developing rapidly, and the potential of various biometric recognition products and markets cannot be underestimated [1].

With the expansion of frontier fields and the emergence of new disciplines, biometrics companies have gradually been divided into two types, namely traditional biometrics companies and new biometrics companies. Traditional biometric recognition companies take equipment R&D and manufacturing as their foundation, and are oriented toward application needs. They have the advantages of rich experience in hardware product design and production, good channels to their customer base, strong market penetration, and concentrated application fields. With the help of cloud computing, big data, and deep learning, new biometric recognition companies have the advantages of business model innovation, richer data volumes, and faster iteration of technology updates. In the vertical application market, the two major types of companies make use of a win-win cooperation to make up for their shortcomings in marketing and applications.

1.3 Current Status of the Chinese Government's Guidance and Policy Support

1) Necessity of government guidance

Although China's biometric recognition industry started late, it has significant advantages in latecomer development, strong industry momentum, and exuberant demand for applications. At the same time, we are also soberly aware that the current problems in China's biometric recognition industry include uneven product quality, inadequate market testing capabilities, and weak corporate awareness regarding standardization, which have restricted the healthy and orderly development of China's biometric recognition technology and industry. Therefore, there is a need for competent government departments to increase guidance and policy support for the biometric recognition industry.

The rapid development of biometrics markets and technologies requires strong support from the state and government departments. In 2012, Chinese investment and financing in biometrics was only 9 million RMB. With the government's policy support for biometrics in China, the scale of biometrics investment and financing reached 16.381 billion RMB by the end of 2018. [1]. With the widespread application of domestic biometric recognition technology in the fields of financial technology, public services, public safety, education examinations, and smart transportation, the efficiency of social operations has been significantly improved, and public safety guarantees have been significantly enhanced. Under the strong guidance and support of the government, the biometric recognition industry will definitely bring more convenience and security to society.

5.2 Domestic Standardization

5.2.1 The Technical Sub-Committee on Biometric Recognition

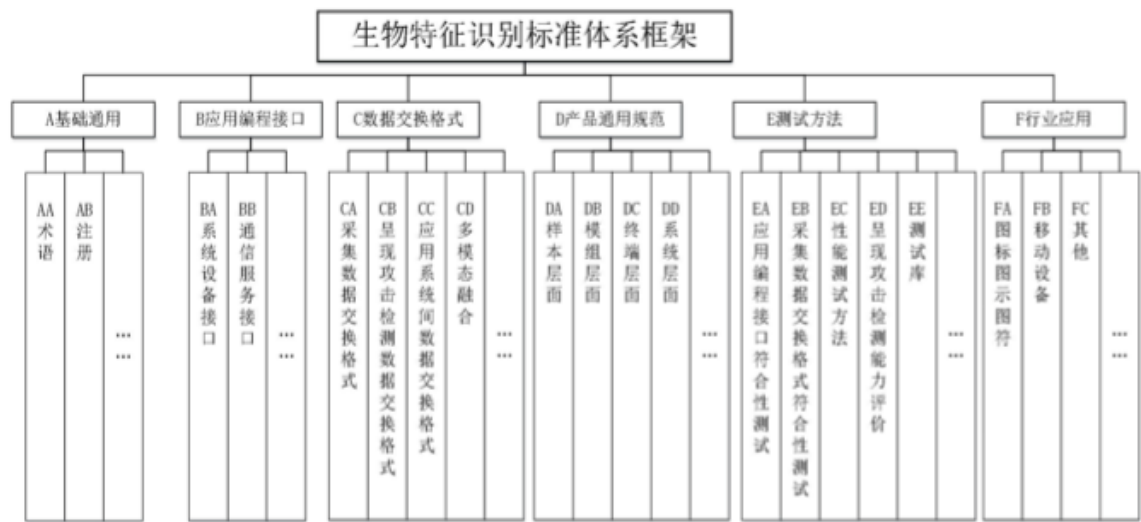
In April 2013, with the approval of the Standardization Administration of China, the National Information Technology Standardization (NITS) established the Biometric Recognition Sub-Committee (SAC / TC28 / SC37, hereinafter referred to as the "Sub-Committee"). The secretariat of the Sub-Committee is located at the China Electronics Standardization Institute.

There are 53 members at the first session of the Subcommittee. In 2016, a mobile device biometric recognition standard working group was established. As of now, there are 36 member units. In 2018, a genome recognition working group was established. As of now, there are 22 member units. Through extensive solicitation and public announcement through multiple channels, the sub-committee completed its general election in July 2019. There are 59 members in the second session of the Sub-Committee, covering the domains of industry,

academia, research institutes, and users in China’s biometrics field. In November 2019, the Sub-Committee established four working groups on face recognition, iris recognition, vein recognition, and behavior recognition.

Since its establishment, the Subcommittee has compiled China’s system of standards for biometric recognition (as shown in Figure 17); it has issued 40 national standards and 3 industry standards (see Table A.2); it is researching 5 national standards (see Table A.3), and has drafted 36 national standards.

Figure 17 Biometric recognition system of standards



5.2.2 Biometric identification standard compliance test

Entrusted by the Sub-Committee to serve as a third-party testing agency, China Electronics Standardization Institute began to build a testing platform for compliance with biometric recognition product standards in 2015. Currently, it has established a testing platform for compliance with fingerprint recognition product standards, facial recognition product standards,, and iris recognition product standards as well as presentation attack detection platforms for facial and iris products. The establishment of the testing platforms has promoted the implementation of national standards for biometrics, standardized and guided the healthy development of the biometrics industry, and improved the level of standardization of biometrics companies, enhanced the testing capabilities for biometrics standards, and promoted the development of biometric recognition standardization work.

5.2.3 Registration of Biometric Recognition (products)

Appendix

Table A.1 International Standards Published by ISO / IEC JTC1 / SC37 and the State of Domestic Adoption

**Appendix contains 118 standards*

Table A.2 The 43 biometric recognition standards published by TC28 / SC37

Table A.3 Five biometric recognition standard projects being developed by TC28 / SC37

The most recent one is: "Information Technology: Biometric Recognition Presentation Attack Detection -- Part 1: Framework"

- *Jeff's comment: think of this as an anti-spoofing mechanism -- how to detect if someone is holding up an artifact sample (e.g. a printed photo) to try and fool the facial recognition system*

Random Notes from 2006 presentation on China's biometrics industry

- **Time attendance made up 42.2% of market share for application sectors; access control second with 27.6%**
- **China had just joined SC37 two years earlier in 2004** (The ISO/IEC joint committee branch focused on biometrics)
- **SAC/TC28 is tasked with absorbing ISO/IEC JTC 1's SC37 standards as national standards -- product standards**
- **SAC/TC100 is tasked with absorbing IEC TC 79's standards as national standards -- more targeted toward public security related applications**
- At the time China's market for biometrics was very small