Intelligent Identification System Research

Zi-Min Wang and Bai-Qing He

Abstract: From the last two decades years, the human intelligence identification technology has made great progress, and realized from the laboratory to the market, a huge change. Some experts believe that, from the perspective of the development in the future, with the rapid economic and social development, intelligent recognition technology in the future will be gaining popularity and the use of, for example, in the industrial, household appliances industry, communications industry, the automotive industry, household service industry, medical industry and consumer electronic products and many other areas. Intelligent recognition technology will become the information technology is seen as the most important one of the top ten technology. In the DSP, RFID technology is now developing fast, intelligent recognition system will be re-future technology development, from simple voice recognition commands to complex human and computer language and actions of exchange or 3D face recognition, identification system is gradually changing people's everyday life, and to gain significant competitive advantage in the marketplace.

Keywords: intelligent; intelligent recognition; DSP; people and computers

First, the intelligent recognition system composed of three

(1) Data acquisition. From the data collection point of view, it is the use of a variety of sensors, which will be object of study-related information into a computer-related symbols or set of values can be accurately identified. Typically, these symbolic and numerical space formed called the pattern space. This critical step is to select the sensor. In order to be effective identification information extracted
from these symbols and numbers, to the relevant data processing, which covers digital filtering and feature extraction\cite{6}.

(2) Data processing. Digital filtering in order to eliminate the input of the data or information noise, remove the irrelevant signals, will be the nature of the study and the methods used to identify closely related features (such as the shape of the object characterization, perimeter, area, etc. etc.) to stay. For example, the fingerprint scanning device fingerprinting process, each time the output of the fingerprint image, and the output will be accompanied by images of different backgrounds, contrast and brightness or background, but also a corresponding difference, deformation occurs in some cases. However, the machine is only possible to identify some of the fingerprint images in the bifurcation point, line and endpoint fingerprint, etc., without the need for other parts of the background or fingerprint. Therefore, to use more scientific filtering algorithms such as block parties photo shows the basis of binary filtering and filtering direction, so as to better integrate fingerprint image filtering out irrelevant things.

Feature extraction refers to the filtered data from the information derived, allowing the machine to recognize them, to find out the most effective information from a lot of features, so it can be difficult largely subsequent processing steps are further reduced. In specific applications use different filtering algorithm, then the extraction method and the extracted feature their characteristics will be different.

(3) Classification decision or matching models. The machine can be a good basis for the data processing mode feature space generated final live work: pattern matching or model classification. From the point of view of the stage, and ultimately it may be output types associated object belongs, or be related to the relevant model number in the database and object of the most consistent. From the point of view of learning, it is possible to belong to the type of unsupervised learning, is not required prior knowledge relevant class model, which is based on statistical models or models based on the law of similarity learning, and thus the type of pattern to judge. Minimum distance from the classification point of view, the concept of clustering based algorithm are simple, it can be calculated between the desired set of known patterns with the presence of an unknown distance mode, to better determine which of a known pattern which is closest previously unknown mode, but it will also be included into this unknown pattern and the shortest distance of its kind known pattern classes to go.

Second, the smart identification technology

(1) Radio frequency identification technology. Radio Frequency Identification (English: Radio Frequency IDentification, Abbreviation: RFID) is a wireless communication technology, wireless signals can identify specific objectives and associated data is written, and the contact between the mechanical or optical systems do not need to identify specific targets establish. For RFID system, which covers the three parts, the electronic tag (TAG), the transponder (abbreviated as transponderReader) application software system. From the working principle analysis, Reader can transfer certain types of radio frequency wave energy, which is transferred
to the Transponder, which can provide energy for Transponder circuit, the internal data transfer out of the order at this time Reader can receive and interpret relevant data, they are sent to the appropriate application, to carry out the corresponding process.

(2) Face recognition technology. Face recognition mode is considered to be a special high-dimensional pattern recognition, in 1986, Kirby and Sirovich its in-depth study, hope to reduce the associated face image representation, we developed the PCA method, that is, principal component analysis. Subsequently, in 1991, Matthew Turk and Alex Pentland earliest PCA face recognition method used in the field, in particular a projection dimension space to obtain a series of lower-dimensional image, taking its main element representative to the face, because the main element from the shape of the face, so called "feature face."

(3) Fingerprint identification. Fingerprint recognition is now hardly a new technology, but after several years of continuous improvement, skilled AuthenTec fingerprint identification company finally succeeded in reducing the size of the fingerprint sensor, also filled more scientific characteristics, for example, to identify finger texture and pores, etc., since this can be obtained more desirable recognition results. In addition, the company also reduced the cost of production well, finally got Apple's favor and praise F. Scott Moody proudly said: "The other fingerprint sensor, you will be sad, but our products can not."

(4) Radar emitter signal recognition. From radar emitter signal recognition point of view, it is very concerned about electronic warfare and various types of identification. However, the use of the usual five-parameter as well as traditional types of identification in the identification process improvement methods applied to new radar emitter signals encountered many difficulties. From the current perspective, there is a subtle inner pulse feature analysis, it can be a very small number of radar emitter signal to carry out a qualitative analysis of the appropriate level, in addition to analyzing the impact of noise rarely brought, very slow to adapt to modern information warfare needs and high standards in the field of electronic warfare intelligence reconnaissance system needs. In order to solve technical problems related to the identification of new highly complex radar emitter signal, the first from a variety of angles, through a variety of ways, the new system is more complicated in the effective radiation signal characteristic of in-depth research, on this basis, in particular against high-dimensional feature, for the specific dimension reduction and screening, re-use and effective classification, so better able to achieve automatic classification and recognition.

Third, the fingerprint identification system, for example

In the analysis of fingerprint recognition technology in the process, by means of its associated image-taking device to read fingerprint image, which should be done by a specific recognition software. From this recognition technology, it can extract the characteristics of the image recorded in the fingerprint data, and then follow the specific application of the matching algorithm to obtain the corresponding result of the operation, reasonably identify the identity of the owner of the fingerprint
information. In this regard the system focus on the following three processes: fingerprint image preprocessing, feature extraction and feature matching. From the point of view, the operation can be divided into pre-processing the binarized image filtering, enhancement and standardization refining. System flow diagram shown in Figure 1.

![Figure 1. Fingerprint flowchart.](image)

Derived from the collected fingerprint image point of view, may be affected by multiple factors, the site includes a lot of gray image noise. Pretreatment can well get rid of the noise correlation among the images, the pre-treatment process, priority covering smoothing processing, normalized fingerprint, the direction of the enhancement processing, binarization, etc., and the sharpening process.

Introduction to sharpening an example, in order to better fingerprint ridge on the boundary between the switch, highlights the edge information to better binarization, to carry out the corresponding fingerprint image sharpening. In the process of sharpening process to use spatial differentiation. The degree of mutation from the image at that point of view, it will be affected by differential operator response intensity, thus sharpening the edge of the fingerprint can be switched, but also on gray slow transformation of the region play a role in mitigation, and the first derivative compared to the second differential empowerment details to be stronger, but also on gray scale step change form a double response, so that you can use to carry out the corresponding Laplace single mask sharpening.

Transform discrete form is defined by two yuan Laplace image:

\[
\nabla^2 f = \left[ f(x+1, y) + f(x-1, y) + f(x, y+1) \\
+ f(x, y-1) \right] - 4f(x, y)
\]

It may introduce a single mask coefficient:

\[
g(x, y) = f(x, y) - \left[ f(x-1, y) + f(x-1, y) + f(x, y+1) \\
+ f(x, y-1) \right] + 4f(x, y) = 5f(x, y) - \left[ f(x+1, y) + f(x-1, y) + f(x, y+1) + f(x, y-1) \right]
\]

We used a mask as shown in Figure 2.

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Laplace transform single mask after sharpening small portion of the image so that the ridge is enhanced.

Summary
Made from human intelligence to identify since the current stage of development, it has a certain degree of scope of application, in addition also in environmental monitoring, environmental protection and health and personal safe home, and other fields, in addition also covers the work of the government, public safety and intelligent transport and intelligent fire, etc., of course, can also be used in national defense and security, industrial inspection and elderly care and other fields, as long as they give full play to its role. Intelligent recognition technology will have a broader research and development space.

References