Key Points for Feature Extraction Technology of Image Targets

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Abstract. With the progress of human society and the continuous development of science and technology, the research of computer vision in China has made continuous progress and achieved certain achievements. The image target feature extraction technology is a better performance in this field, which can extract the features of the image by two aspects of the overall and local features to ensure the authenticity of the target extraction. In this paper, through expounding various kinds of representation methods of the whole and local extraction feature technology, the field and level of the application of these methods are discussed objectively, and the trend and difficulties in the development of feature extraction technology are analyzed in order to bring a limited reference for the readers.

1. Introduction

The so-called image target feature extraction technology is to obtain the relevant data from an image and process and sort these information, which is an important technology and condition to describe the target scene. In addition, for the process of extracting features, the algorithm calculation information is also very critical.

2. Feature Extraction of Whole Target

The so-called overall feature of the target is to express the special features of the image after the segmentation of the target image, then classify the images according to the type, and finally make the decision. Generally speaking, the whole extraction of the whole image is usually divided into two aspects.

2.1 Image Segmentation

The main task in this process is to remove the key targets in the image from the overall image background, which requires different computing methods based on the different subject objects. For example, a purely manual method of segmentation can be used according to the degree of theme participation of the image. In addition, the interactive method or known method is usually used to process images.

2.1.1 Data Segmentation

If it is a visual problem below the middle level, the staff can divide through the data itself. Although they can refer to the previous experience, at the same time, they can not rely too much on these records, and they should make specific analysis of specific problems. For partial image extraction, the method of edge detection can be used to divide the overall target. This method is generally used widely in grayscale images. For some grayscale images, we can also divide the pixel or gray level of the target images into several intervals according to the threshold method. In addition, the feature extraction can be carried out according to the region. In the case of full consideration of the space information, the target image region is divided into many region sets by means of growth, splitting and merging[1].

2.1.2 Knowledge Segmentation

Knowledge segmentation is a segmentation method based on advanced theoretical knowledge and extraction experience, and is widely used in the field of computer. According to the appearance information, deformation information and morphological analysis of the image features, various information standards such as brightness, chromaticiy, structural features, temperature and position of the image are divided and classified. The combination and use of different segmentation methods can improve the efficiency of image segmentation and improve the accuracy of the segmentation, thus saving the time of the whole work and improving the quality of the segmentation.

2.2 Overall Feature Description

The expression of an image target can be expressed by internal and external means. The internal expression can be based on the spectral texture and other features, while the external means are

used to express it, it can be expressed according to the shape characteristics of the image. Of course, there are two kinds of hand segments. External means can be expressed according to the shape characteristics of the images. There are, of course, two methods of being used together. The specific features are divided into the following points:

2.2.1 Spectral Signature

This is a spectral analysis of the image through a variety of professional charts, such as the single-band image grayscale histogram or the color histogram of multispectral images. In the image conclusion, the abscissa represents the color level of the image target, while the ordinate represents the proportion of this color level in the entire image. However, when expressing according to this feature, it also brings some limitations. Because of the function limit of histogram, the quantitative relationship results between the gray level and the color level in the whole image can only be counted, and it can not satisfy the need for coordinate position information of these values in the process of expression[2].

2.2.2 Texture Feature

In people's visual perception system, the texture of an object is the key basis for visual discrimination and expression. The texture described here can be divided into three specific types, namely, natural texture, artificial synthetic texture, and the mixed texture of the two types. Through the process of extracting the feature of the target image, we can find that the texture has some regularity, and we can use the statistical method to describe the rules of texture layout. In addition, texture can be expressed according to the spatial structure of the texture. To a certain extent, it is helpful for the extractor to understand the structure of the texture more easily, and also provide the convenience for the retrieval of the texture information of the high level. In addition, the natural regression models can be used to build image models, to model the target image information and express its texture.

For example, the gray-level co-occurrence matrix extraction algorithm can be used to calculate the texture of the Fig.1.

Figure 1. The texture

The second order statistics of the co-occurrence matrix in four directions(There may be some error)

Table 1: The second order statistics of the co-occurrence matrix in four directions

Second order statistics / Angle	Angular second moment	Contrast	Correlation	Entropy
0	0.027899	2.120565	0.124112	3.951396
45	0.015301	7.396216	0.066974	4.504796
90	0.028788	5.471754	0.087969	4.223461
135	0.015263	7.199856	0.069137	4.491327

The mean and standard deviation of the second order statistics of the co-occurrence matrix in four directions(There may be some error)

Table 2: The mean and standard deviation of the second order statistics of the co-occurrence matrix in four directions

Second order statistics / Characteristic value	Angular second moment	Contrast	Correlation	Entropy
Mean value	0.021761	5.547138	0.087065	4.292437
Mean difference	0.007616	2.442167	0.026394	0.261438

For example, for the above graphics(8 bit RGB) and the form, through this algorithm, we can easily get the second order statistics of four different angles, as well as the statistics of eigenvalues, and can calculate their standard deviation and mean faster. Finally, if we apply these data to eight dimensional texture features, we can make it easier for workers to classify later textures[3].

2.2.3 Shape Feature

The shape features do not change relative to partial image target body, no matter by shrinking, rotating or other ways. In the application of this feature, we can use a lot of geometry knowledge, such as the simplest length, width, area and so on, as well as a little complex solid degree, matrix and so on. The Fourier frequency coefficients can be used to represent image targets based on shape features, which can reflect more details, for example, the high frequency expresses the detail of shape, and the low frequency expresses the shape attributes.

3. Local Feature Extraction Technology

Generally speaking, the overall feature is very convenient when the image target structure is simple, but the effect will be influenced by the accuracy of the image segmentation stage. If we divide the target image into many parts, we can extract and express through the features of these small parts, which will reduce the influence of errors in the later extraction process and improve the accuracy of the extraction and the quality of the output graphics. This extraction method can be divided into two ways:

3.1 Feature Area Detection

In order to ensure that the details of the image extraction are not lost and the results of the extraction work are not affected, a dense selection method can be adopted to divide the target into a non overlapping block. For each small piece, the local features can be analyzed. However, the workload of information extraction is too large. On the contrary, the sparse selection can form a good complement, which is to develop a standard feature, such as the corner point on the boundary. The overall characteristics are detected, and then the regional features with obvious characteristics are sorted out, which greatly saves the work and procedure of information extraction. However, when identifying target specific information, it may not be superior to the dense selection method.

Each extraction method has its own different advantages and limitations, so in the process of the actual image feature analysis and information extraction, the work efficiency and the quality of work are improved according to the different target bodies and multiple extraction methods[4].

3.2 Feature Area Description

In the process of feature extraction of the target, it is normally expressed by the intrinsic characteristics of the target. These features not only show the difference of different targets, but also express the similarity of local characteristics under a certain standard. It is mainly described in the form of a variety of technical applications, such as distribution, space frequency technology, split and so on.

4. The Development of Image Extraction Technology

The development of feature extraction techniques for image targets is to make artificial intelligence have the same visual perception as human in the future, so that they can do complex and dangerous work for people in some fields. Today, researchers in this field have made certain achievements through continuous exploration and efforts. However, the development of this scientific and technological level is still not perfect, and there is a significant difference between theory and

practice, therefore, it also faces challenges in the process of future development. For some of the technologies that have been mastered, neither algorithm nor program can be simulated well.

5. Conclusions

The feature extraction technology of image targets will have broad development space in the future, however, it will be not limited to these parts discussed in this article. With the continuous development of scientific work, especially in the field of mathematics, it is of great help to improve our extraction technology. Although the road of future research is still full of difficulties, this technology will continue to move forward, which is of great significance to people's future. This paper summarizes and analyzes relevant information technology in this field, hoping to give some suggestions to the technical workers in related fields.

References

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