

## Retraction

### **Retracted: Active Contour Image Segmentation Method for Training Talents of Computer Graphics and Image Processing Technology**

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# Active Contour Image Segmentation Method for Training Talents of Computer Graphics and Image Processing Technology

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**ABSTRACT** Image segmentation is a key technology in the field of computer image processing. Among them, segmentation methods based on active contour models have been developed rapidly in recent years due to their effective processing of complex images such as medical images. These methods have achieved significant results in medical, military, and industrial fields. Present research work mainly introduces the training of computer graphics and image processing technology and the method of active contour image segmentation. It focuses on the study of image segmentation methods and focuses on the segmentation methods based on active contour models. Firstly, it summarizes two types of segmentation methods based on edge and region and summarizes their advantages and disadvantages. Then, the segmentation method based on the active contour model is studied, and several typical active contour models are comprehensively compared. Finally, the local binary fitting model and the local Gaussian distribution fitting energy model are improved and simulated. Furthermore, from the development of computer graphics and image processing technology to analyze some methods and means of training this professional talent. The experimental results of this article show that the active contour image segmentation algorithm can not only ensure the image segmentation algorithm but also reduce the number of iterations and shorten the image segmentation time. Compared with the CV, LBF, and LGIF models computational efficiency of Segmentation method is increased by 9.2 times, 2.64 times, and 1.44 times, respectively.

**INDEX TERMS** Computer graphics and image processing technology, talent training, active contour model, image segmentation method.

## I. INTRODUCTION

In recent decades, people have done a lot of in-depth research on image segmentation technology, and hundreds of image segmentation methods have been widely studied and applied in various fields of computer vision. In fact, researchers proposed image segmentation methods and corresponding solutions for specific image research. So far, there is no universal image segmentation method. Some traditional image segmentation methods only use the information of the image itself and strictly follow the bottom-up hierarchical calculation process. However, these traditional fragmentation

methods are increasingly difficult to meet the fragmentation requirements in practical applications such as medical imaging and imaging.

At present, image segmentation has a wide range of applications in the fields of medical imaging, target recognition, industrial communities, and traffic control. In the field of image processing, the results of image fragmentation can be used to observe the pathological changes of organs. At the same time, image segmentation plays an important role in three-dimensional reconstruction, image recording, and medical diagnosis. It is used for the automation of remote sensing images and synthetic bulkhead radar. Export the area of interest. It is widely used in biometric recognition, such as fingerprint recognition, IRIS recognition, and plays an

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important role in traffic monitoring and vehicle target monitoring. Therefore, it is of great practical significance to study the image segmentation technology in more detail.

Khadilkar *et al.* introduced the realization of a new automatic face recognition system. Establishing an automated framework for the recognition of human faces is a very challenging task. It is also of great significance in related engineering disciplines such as computer graphics, pattern recognition, psychology, image processing, and artificial neural networks. In response to this problem, authors also proposed a side face authentication method based on discrete wavelet transform and artificial neural network. Discussed a subset determination strategy that expands the number of training samples and allows protection of global information. However, the proposed face recognition system was immature, making the recognition result not so accurate [1]. Wu *et al.* proposed light field imaging technology that can capture richer visual information from our world. Contrary to traditional photography technology, the light field collects light radiation from all directions, thereby demultiplexing the angular information lost in traditional photography. However, due to the immaturity of the technology, the data display faces huge challenges [2]. Li G developed a fully automatic algorithm based on machine learning to extract cracks from concrete bridge images. The algorithm combines an improved active image contour segmentation model based on regions and a linear support vector machine using a greedy search strategy to eliminate noise. However, due to the inconsistent strength of the cracks, the results will be biased [3].

The innovation of this paper is to propose an improved matching algorithm. Aiming at the problem of feature description, the SICA algorithm is used to reduce the dimension of the feature section, which reduces the number and dimension of feature distribution and reduces the amount of calculation in the matching process. In response to the problem of high irregularity, directional restrictions have been added under restricted conditions. The direction of the feature vector and the Euclidean distance is matched twice to reduce the irregularity rate. It is used to find the end of the function during matching to ensure the time consumption of the algorithm.

## II. ACTIVE CONTOUR IMAGE SEGMENTATION METHOD

### A. ACTIVE CONTOUR MODEL ALGORITHM

The geometric active contour model (GACM) is proposed on the basis of the combination of the level set method and curve evolution theory [4]. Let the image  $I(x, y)$  be the evolution curve:

$$C(v, t) = [x(s, t)y(s, t)] \tag{1}$$

where  $s$  is the normalized arc length of the curve,  $s \in [0, 1]$  and  $t$  is time, the equation expression of the curve evolution with time is:

$$\begin{cases} \frac{\partial C(v, t)}{\partial t} = F(C)N \\ C(v, 0) = C_0(v) \end{cases} \tag{2}$$

Among them,  $F(C)$  is the curvature function of the evolution curve  $C$ ,  $F(C) = ak$ ,  $a$  is a constant, and  $k$  is the curvature of the curve  $C$ . This function is used to drive the evolution curve to the target boundary [5].  $N$  represents the outer normal vector, and  $C(v, 0) = C_0(v)$  is the initial evolution curve.

Next, the level set method is applied to the above-mentioned curve evolution equation expression. The level set method embeds the evolution curve into the three-dimensional surface  $b(x, y, t)$ , where  $b(x, y, t)$  is generally It is expressed as a level set function with a signed distance function, usually taken as:

$$C(t) = \{(x, y)|b(x, y, t) = 0\} \tag{3}$$

That is, the zero level set function, the evolution equation of the geometric active contour model (GACM) is obtained as follows:

$$\frac{\partial b}{\partial t} = g(x, y)|\nabla b|[V_0 + \text{div}(\frac{\nabla b}{|\nabla b|})] \tag{4}$$

Among them,  $V_0$  is the constant value speed,  $g(x, y)$  is the gradient function of the image edge, the value of  $g(x, y)$  can be used to judge whether the pixel  $I(x, y)$  is on the edge of the image when the magnitude of the image gradient is relative When it is smaller, the equation of  $g(x, y) \approx 1$ ,  $g(x, y)$  is as follows:

$$g(x, y) = \frac{1}{1 + |\nabla G_\sigma * I(x, y)|^2} \tag{5}$$

Among them,  $G_\sigma$  represents  $\sigma$  a Russian filter with variance  $\sigma$ , so the evolution process of the contour curve  $C$  is the change process of the level set function  $b(x, y, t)$  [6].

Because the level set method is used in the geometric active contour model, the geometric active contour model has more advantages than the parameterized model. This method can effectively deal with the topological structure changes of the contour curve and solve the instability problem of numerical calculation. However, the disadvantage of this method is that it is prone to edge leakage. Since this method did not conduct a deeper study on the energy function optimization of ACM and other issues, it only combined the level set method and curve evolution simply. On this basis, the researchers quickly proposed many related improvement models [7].

### B. IMAGE SEGMENTATION METHOD

The edge is defined by the pixels in the image. Whenever the image intensity changes suddenly, an edge occurs, and the corresponding pixel is defined as an edge pixel. Reflected in the objects in nature, that is, changes in the boundaries, backgrounds, and materials of the objects lead to changes in brightness in the image [8]. Edge detection is the most basic tool for image segmentation, and it plays a great role in the discovery, recognition, and segmentation of an object in an image. This type of method detects the edges of segmented objects by finding points with similar properties.

Edge-based segmentation methods are constantly being explored and improved. Among them, the segmentation

methods based on edge detection are divided into two categories, including search-based methods, namely the first derivative method, and zero-cross point methods, namely the second derivative method. The so-called search-based method mainly finds the boundary by deriving the first derivative calculated from the image. The so-called zero-crossing method detects the zero-crossing through the second derivative to measure the edge intensity [9]. Related methods are introduced as follows:

### 1) THE FIRST DERIVATIVE

The gradient of this type of operator corresponds to the first derivative. The gradient of a continuous function  $f(x, y)$  at the position  $(x, y)$  is expressed by the following formula:

$$\nabla f(x, y) = [G_x G_y]^T = \left[ \frac{\partial f}{\partial x} \frac{\partial f}{\partial y} \right]^T \quad (6)$$

Its amplitude and direction angle is:

$$\text{mag}(\nabla f) = \|\nabla f\| = [G_x^2 + G_y^2]^{\frac{1}{2}} \quad (7)$$

$$\phi(x, y) = \arctan(G_y/G_x) \quad (8)$$

The Prewitt operator mask is a discrete differential operator. In actual calculations, two  $3 \times 3$  masks are used to approximate the horizontal and vertical derivative values to fit the true gradient value. This operator is more prone to noise. The specific formula is as follows:

$$H_x = \begin{bmatrix} -1 & 0 & 1 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{bmatrix} \quad H_y = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ -1 & -1 & -1 \end{bmatrix} \quad (9)$$

### 2) SECOND DERIVATIVE

1) Laplace operator: There must be a point when the zero-crossing occurs, and this point can be used for edge detection. However, the outstanding feature of the second-order derivative operator is that it is relatively sensitive to noise. Generally, in practical applications, only the function of the operator to determine the brightness and darkness of the pixels is used, and it is not directly used for the initial detection, so as to avoid the double pixel width affecting the accuracy of the result. The Laplace value of any point  $(x, y)$  is defined as follows:

$$\nabla^2 f = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} \quad (10)$$

2) Marr operator: Compared with the Laplacian operator, this operator overcomes its shortcomings of being sensitive to noise. By using the zero-crossing point of the second derivative to realize the detection and determination of the edge position, a wider range of applications. The specific process of the algorithm is as follows:

Step 1, filter the original image through a two-dimensional Gaussian function, and obtain convolution to achieve smoothing of the image and deal with noise:

$$g(x, y) = G(x, y, \sigma) * f(x, y) \quad (11)$$

among them:

$$G(x, y, \sigma) = -\frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2}{2\sigma^2}} \quad (12)$$

This is the two-dimensional Gaussian function used in smoothing [10].

Step 2, then use the Laplacian operator to further manipulate the obtained smooth image:

$$\nabla^2 g(x, y) = \nabla^2 (G(x, y, \sigma) * f(x, y)) = \nabla^2 G(x, y, \sigma) * f(x, y) \quad (13)$$

The above calculation process is the Marr operator, also known as the LoG operator, which combines the Gaussian filter and the Laplacian filter and combines the advantages of the two. So, the edge detection effect of this operator is better.

3) Canny operator: It is an algorithm that uses a hierarchical optimization algorithm to detect edges and is widely used [11]. Similarly, the operator uses a specific Gaussian filter with a specified standard deviation to obtain the convolution with a given image, smooth the image, and effectively overcome the noise. The specific algorithm steps are:

Step 1: Use a specific Gaussian filter to process the original image to reduce the influence of noise, and its size should be flexibly changed with the image situation.

Step 2: Use a suitable first-order operator to detect the gradient and direction of the filtered image.

Step 3: In this step detailed processing is performed on the obtained edge information. The non-maximum elimination method is used to compare the center pixel with the neighboring pixels. When the central pixel is less than or equal to the neighborhood pixel value in the gradient direction, the central pixel is set to zero [12].

Step 4: select dual thresholds to determine the final edge detection result. The dual thresholds are two thresholds, one large and one small. The pixels larger than the larger threshold are defined as strong edge pixels, and the pixels in the middle of the two thresholds are defined as weak edge pixels. This step can further avoid the influence of noise, false edges, and loss of effective edges.

### C. IMAGE PROCESSING PRIORITY ALGORITHM

Independent Component Analysis (ICA) is a data processing method. The basic principle is that there is a relationship  $X = AS$  for the observed entity  $S$  is an independent entity, and  $A$  is a complete classification table. Suppose there is a grade of  $Y$ , then  $Y = WX = WAS$  [13].

In the expression,  $W$  is a mixing matrix. Similarly,  $WA$  is an identification table, and the estimated vector ( $Y$ ) is an independent vector. According to the central boundary theorem, the results show that the Gaussianness of the independent body is stronger than the observed body. When the non-Gaussian is strongest, the rating entity is closer to an independent entity. The ICA algorithm uses the hybrid matrix corresponding to the highest non-standard feature of  $X$  as the projection matrix to achieve dimensionality reduction [14].

The result of processing with the PCA algorithm is very low. The PCA algorithm is largely affected by the number of samples, and the characteristics of the output result in the actual application are very unstable. The ICA algorithm assumes that the data are independent of each other and processes the data by deriving high-level statistical data. At the same time, the sample size has no significant impact on SICA, and the results of export characteristics are better. In terms of constraints, the PCA algorithm requires that each component is uncorrelated, while the ICA algorithm requires strict independence. From the data point of view, it is irrelevant, but it is not necessarily independent, because independence should not be relevant. The ICA algorithm seems to reveal the essence of the data more comprehensively. Structurally, it makes more effective use of the basic features of the image [15].

This paper proposes an improved ICA algorithm. The idea of subtyping is added to the ICA algorithm, and the SICA algorithm is proposed. The algorithm first processes the image into blocks to form a sub-model, and then uses the ICA algorithm to process the sub-model to obtain a mixed matrix, and finally selects the non-mixed matrix used by the image. The SICA optimization algorithm combines the idea of sub-modes to minimize the interference of each target sub-block change on the overall change of the target so that even if the target has a significant interference impact, it can only be reflected in the sub-block, and it will affect the target. The overall feature extraction cannot have a major intervention, which improves the algorithm's robustness to local changes. The main steps of the SICA optimization algorithm are:

- (1) Divide the target into  $N$  sub-blocks and generate corresponding sub-models.
- (2) Use the ICA algorithm for each sub-model to solve the mixed matrix [16].
- (3) Select the unmixing matrix suitable for the current image according to the unmixing matrix in the submodel.

### III. ACTIVE CONTOUR IMAGE CUTTING EXPERIMENT BASED ON IMAGE PROCESSING TECHNOLOGY

#### A. ACTIVE CONTOUR MODEL

The active contour (LGIF) model combines the advantages of the CV model and the LBF model, can effectively segment images with uneven contrast and can reduce the impact of noise on image segmentation. However, the initial contour line  $C$  of the general model is a regular figure, such as a rectangle, a triangle, which leads to an increase and improvement in the evolution speed of the level set. Aiming at the above shortcomings, a method of adding K-means clustering information to the LGIF model is proposed. Experiments prove that this improvement effectively accelerates the convergence speed of the model's active contour evolution. In order to avoid the initialization of the active contour, a penalty term is added to the LGIF model, and a level set function is given in the level set method [17].

When processing Micro-CT medical slice images, the size of the image is equal to the size of the clustering template, and then according to the template defined by the clustering, the area where the target position is located in the image is 1, and the area where the background is located in 0, which is initially obtained. The initial curve of the level set of the image based on the clustering information. The initial curve of the level set is different from the previous rules. The K-LGIF model not only effectively enhances the segmentation of the low contrast part of the Micro-CT medical image, but also improves the recognition efficiency of the segmentation of the image target.

#### B. GRAPHIC IMAGE RETRIEVAL EXPERIMENT

The present study designs an experiment to compare the advancement of retrieval methods based on the improved PAM algorithm, and chooses the Coral image library as the image library to be retrieved in the comparison. There are 20 main categories, each with 100 image targets, and a total of 2000 image targets are used for retrieval in experiments [18]. The particle population is initialized in the PSO-FWA-PAM algorithm, the number of particles is set to 40,  $w$  decreases linearly from 0.7 to 0.2,  $c_1 = c_2 = 0.4$ ,  $r_1$  and  $r_2$  are random numbers between 0 and 1, the group updates the algebra  $N$  is set to 4, and the update algebra is set to 50.

In this experiment, the PSO-K-Means image retrieval method, K-means image retrieval method, and the method in this paper are used for image retrieval operations on the same computer, and the performance of each algorithm is evaluated by the accuracy of each algorithm. The definition of search accuracy PSA is:  $PSA = C/R$ , where  $R$  is the number of images returned after retrieval, and  $C$  is the number of correct images. In the experiment,  $n$  target images are randomly obtained from each category in the target image library to be retrieved as query images, and the average search accuracy of each algorithm is calculated to compare the performance of each algorithm. In each category, 3 target images are randomly obtained for searching, and the performance of each algorithm is compared [19].

#### C. IMAGE SEGMENTATION EXPERIMENT

The test environment for this experiment is Pentium CPU 2.90 GHz, 2 GB RAM, Windows XP 32bit, and Matlab2010a. The proposed algorithm is tested through simulation experiments, and the corresponding results are given.

Regarding the evaluation method, in addition to the calculation of the number of iterations and calculation time, Image result of the expert manual experience segmentation are selected as the gold standard for the image of the experimental simulation, namely GT (Ground Truth), and then use different methods to obtain the segmentation results The results were compared with it according to different evaluation criteria to obtain accurate data. This section uses the following evaluation criteria:

First, use dice similarity to measure the similarity of the two sets of segmentation results and the gold standard, and

then use Jaccard similarity, which is another commonly used standard for evaluating segmentation accuracy [20].

This experiment is divided into four parts: the experiment compares the clustering results before and after the connected region labeling method, the second experiment simply compares the segmentation effect of the LGDF model before and after replacing the kernel function. The third experiment verifies the effectiveness of the clustering method to obtain the initial contour. Experiment 4 further compares the proposed complete method combining clustering and replacing the kernel function with the segmentation effect of the original LGDF model.

#### IV. ACTIVE CONTOUR IMAGE SEGMENTATION ANALYSIS BASED ON GRAPHICS AND IMAGE PROCESSING TECHNOLOGY

##### A. IMAGE SEGMENTATION ANALYSIS OF ACTIVE CONTOUR MODEL

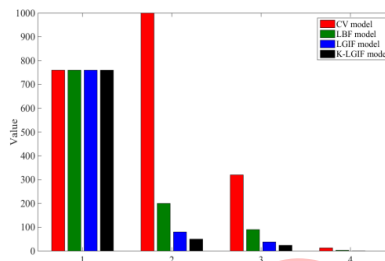
From the analysis of the initial contour angle, it can be seen that the initial contour lines of the CV model, the LBF model, and the LGIF model are all regular circles or rectangles, while the initial contour lines of the K-LGIF model are closer to the target, reducing the number of iterations. Thereby, speeding up the image segmentation speed. Judging from the segmentation effects in Table 1 and Figure 1, the K-LGIF model is better than the CV model and the LBF model. The comparison of the segmentation time is shown in Table 1. It can be seen that compared with the CV model, LBF model, and LGIF model, the calculation speed of the simulation experiment image of the K-LGIF model in this paper has been increased by 5.31 times, 3.24 times, and 2.37 times respectively [21].

**TABLE 1. Comparison of image segmentation efficiency of different models.**

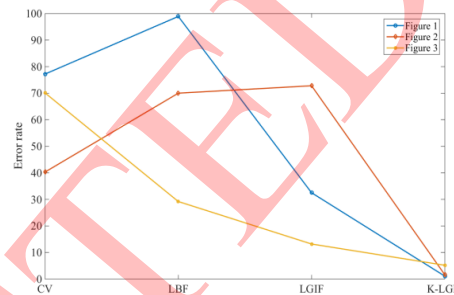
Image information	CV model	LBF model	LGIF model	K-LGIF model
Image size/pixel	145*145	145*145	145*145	145*145
Number of iterations	100	250	100	40
Operation hours	9.18	35.76	72.68	29.61
K-LGIF model relatively improves efficiency	-0.69	0.21	1.46	0

From the comparison of experimental segmentation effects, neither CV nor LBF models can completely separate the objects in the image from the background. The LBF model is better than the CV model for image segmentation with uneven grayscale, while the LGIF and K-LGIF models. The mouse femur trabecula can be segmented more accurately, and the latter can improve the image effect to a certain extent.

Figure 2 indicates the comparison of error rates of different models. From the point of view of calculation error rate, the K-LGIF model in this paper has the least error, which



**FIGURE 1. Image cutting efficiency comparison of different models.**



**FIGURE 2. Comparison of image cutting error rates of different models.**

is 12.5 times, 2.65 times, and 0.54 times higher than the efficiency of CV, LBF, and LGIF models. It can be seen that K-LGI can not only ensure the segmentation effect of low-contrast images, but also it can effectively reduce the error rate [22]. The experimental results show that the K-LGIF model can segment the target better, but due to the complexity of the mouse femur image, a very small part of the trabecular bone cannot be completely segmented by the K-LGIF model. The shortcomings of the algorithm are listed in [23].

The given K-LGIF model overcomes the shortcomings of CV, LBF, and LGIF models that the initial contours of the LGIF model are standard geometric figures. The K-LGIF model combines the advantages of the CV model and the LBF model, which is effective for the segmentation of Micro-CT medicine with uneven gray levels. The slice image has a good effect. After adding the clustering template to the LGIF model combined with the clustering information, its initial contour line can initially identify the target contour in the image, which improves the running speed of the LGIF model. The K-LGIF model also improves the segmentation effect of the LGIF model on low-contrast images. Compared with the CV model, LBF model, and LGIF model, the segmentation efficiency of the K-LGIF model for simulated images and Micro-CT medical images is increased by 9.12 times, 2.57 times, and 1.44 times on average, respectively. However, the K-LGIF model can better improve the segmentation effect of complex images needs further research [24].

##### B. ANALYSIS OF GRAPHIC IMAGE PROCESSING TECHNOLOGY

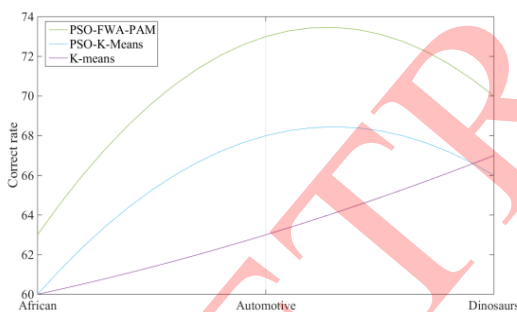
The text-based image restoration technology uses artificial image description and text restoration technology.

However, due to its subjectivity and seriousness of the content, it can no longer meet the requirements of today's society for rehabilitation methods. In addition, the content-based image restoration method (CBIR technology), which starts from the underlying characteristics of the image, compares the image attribute data with the database, judges the similarity of the image, and finds the image between the images. This can reduce human consumption, no subjective description, and search results are good [25].

**TABLE 2. Performance comparison of image algorithms in different categories.**

Retrieve image category	Correct rate		
	PSO-FWA-PAM	PSO-K-Means	K-means
African	63	60	60
Automotive	73	68	63
Dinosaurs	70	66	67

Table 2 is the comparison of the image retrieval method based on the PSO-FWA-PAM algorithm, PSO-K-Means image retrieval method, and K-means image retrieval method proposed in this paper. The target image library is compared in the same environment. From the search accuracy of the three methods, the method proposed is superior to the two methods of PSO-K-Means image retrieval method and K-means image retrieval method [26].



**FIGURE 3. Comparison of image retrieval results.**

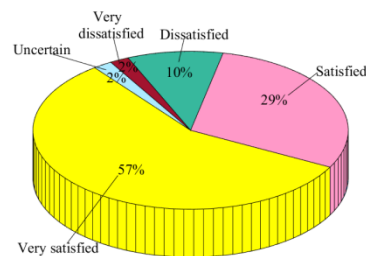
Figure 3 demonstrates the three retrieval effects of the PSO-FWA-PAM algorithm in the image database. The upper left corner of the rendering is the retrieval target, and the rest is the search feedback. It can be seen from the figure that a total of 45 retrieved images were retrieved from the African category, and 25 related images were retrieved. Furthermore, the search accuracy rate was 64.5%; a total of 45 retrieved images were retrieved from the automobile category, and 37 related images were retrieved. The accuracy rate is 78%; in the retrieval of dinosaurs, a total of 45 retrieved images and 35 related images are obtained, and the search accuracy rate is 72.5%. It can be seen from the experimental results that the method of the paper design has improved accuracy compared with the original method [27].

**C. ANALYSIS OF TRAINING TALENTS FOR GRAPHICS AND IMAGE PROCESSING TECHNOLOGY**

The computer graphics and image major is still a new research direction and there are still shortcomings in various aspects, mainly including the following problems that need to be resolved. First, the teaching content lacks the characteristics of vocational education, which is the continuation of undergraduate education, and the application of talent training.

The operation ability is relatively lacking, and the course content is complicated and difficult for students to accept. Secondly, insufficient attention was paid to the application of technology and theoretical principles, a one-sided understanding, and only recognized as the expansion of secondary vocational education. The talents cultivated by this specialty should be practical and should integrate the theory of undergraduate education and secondary vocational education. Comprehensive professional quality education with all-in-one operations. Third, the content of teaching cannot keep up with the needs of market development [28]. Computer graphics and image technology are produced with the development of network information technology, and the rapid development of network information technology has led to the rapid development of the profession. The number and types are diverse, and the update speed is relatively fast. Many of the latest graphics and images technology failed to enter teaching in time [29]. Therefore, in view of the status quo of this profession, efforts are required to carry out reforms and innovations in all aspects of the cultivation of this profession.

In order to explore the effects of the talent training model of computer graphics and image technology processing, the evaluation results of 100 students surveyed are shown in Figure 4:



**FIGURE 4. Evaluation of talent training model for graphics and image technology processing.**

It can be seen from the figure that 58 students out of 100 students are very satisfied with the talent training model of computer graphics and image technology processing, accounting for 58% of the total, and they are satisfied with the talent training model of graphics and image technology processing. It accounts for 30%. In addition, 10% of students are dissatisfied with the talent training model of graphics and image technology processing, and 2% of students are very dissatisfied with the talent training model of graphics and image technology processing. Finally, there are 2% of students expressed a neutral attitude towards this,

which means that they do not pay attention to or do not understand the talent training model of graphics and image technology processing. Based on the above analysis, it can be known that most students are still satisfied with the talent training model of graphics and image technology processing, which also shows that the talent training model of graphics and image technology processing will be the future development trend [30].

## V. CONCLUSION

After explaining the importance of image segmentation and its main purpose, this article reviews two types of image segmentation methods, including edge-based image segmentation methods and region-based image segmentation methods, and introduces various types of typical segmentation methods. Then, this study focuses on the methods of the active contour model, including the parametric active contour model and geometric active contour model. Among them, the Snake model, CV model, LBF model, LGDF model, etc. are explained and compared with the advantages and disadvantages of related methods.

Aiming at the shortcomings of traditional GVF models that are difficult to segment complex images, this paper proposes an active contour model algorithm based on saliency. The algorithm mainly uses the gradient descent flow vector field generated by the edge map of the image saliency map to perform a primary evolution of the active contour, and then uses the mixed gradient descent flow generated by the edge of the original image and the saliency map to perform the secondary evolution of the active contour. The first evolution can make the contour line quickly approach the edge of the target we are interested in in the image, and the second evolution can make the contour line get the precise target edge. Experiments illustrate that the algorithm in this paper can effectively improve the ability of the gradient descent flow active contour model to segment complex images.

This article describes the advantages of different active contour models. Algorithms that achieve good results in one type of problem may not work well in another type of problem. Facing a new segmentation task, it is often necessary to use a trial method to determine which algorithm to use, and there is no general solution. Most of the prior information used by current active contour models are only prior to contours. However, in practical problems, more available prior information (such as prior texture, prior color, etc.) are required and it is not convenient to obtain prior contours. Therefore, the key issue to obtain and use prior information in the active contour model more efficiently.

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