Research on Interactive Visual Communication Design System Based on Dynamic Image

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Abstract. The SVR image marine-continental segmentation algorithm on account of ameliorated CV model can segment the marine-continental image efficiently, and compare the image results with the original model, so as to continuously iterate the effectiveness of image segmentation. On account of this, this paper first analyses the concept and main methods of SAR image marine-continental segmentation algorithm, then studies the SAR image marine-continental segmentation algorithm on account of ameliorated CV model, and finally gives the process and effect analysis of SAR image marine-continental segmentation on account of ameliorated CV model.

Keywords: Marine-continental Segmentation Algorithm, SAR Image, Ameliorated CV Model

1. Introduction
With the increasing demand for energy in all walks of life, the traditional road resources have been difficult to effectively meet the growing energy demand, so countries have turned their attention to the ocean. In this context, the research on the ocean has been growing rapidly, and achieved a more significant breakthrough. As an important part of ocean research, marine-continental segmentation algorithm has important value and function for several aspects of ocean operations as shown in Figure 1, so it has been widely concerned, studied and applied [1].

Figure1. The value and function of land sea segmentation algorithm
On the other hand, marine-continental segmentation has high requirements for the accuracy and complexity of the target image, which not only needs to cover the land, but also needs to reduce the probability of false detection. At present, land sea segmentation plays an important role in promoting marine ecology, protecting marine resources, and monitoring the marine environment. SAR images can provide all-weather monitoring data to effectively guide marine management. The common methods of land sea segmentation include geographic information data segmentation and intelligent algorithm represented by SAR. The traditional method of land sea segmentation has some problems, such as inaccurate parameters and inaccurate image matching [2]. The CV model mainly relies on the global gray information to guide the curve to approach the edge of the target, which can better adapt to the detection of weak edge target. However, the traditional CV model has some problems, such as too much calculation, slow iteration speed, complex setup steps and so on, which need further improvement, so as to reduce the computational power and efficiency of CV model.

In addition, the SVR image marine-continental segmentation algorithm on account of ameliorated CV model can segment the marine-continental image efficiently, and compare the image results with the original model, so as to continuously iterate the effectiveness of image segmentation [3]. The SVR image marine-continental segmentation algorithm on account of ameliorated CV model can effectively avoid the adverse impact of land background interference on the detection accuracy, greatly release the computational power of the system, improve the accuracy and significantly promote the detection efficiency.

In a word, there are high requirements for the extraction of image semantic and spatial information in the task of SAR image marine-continental segmentation. The traditional segmentation algorithm is difficult to effectively meet the actual work needs. It is not only easy to produce the loss of spatial information, but also easy to bring the phenomenon of over fitting [4]. The SVR image marine-continental segmentation algorithm on account of ameliorated CV model can improve the segmentation performance; network prediction accuracy and segmentation speed, and improve the efficiency and quality of marine-continental segmentation. Therefore, the study of SVR image land sea segmentation algorithm on account of ameliorated CV model has important practical value.

2. Concept and main methods of marine-continental segmentation algorithm for SAR image

2.1. Concept of land sea segmentation algorithm for SAR image

The marine-continental segmentation of SAR image is mainly on account of the difference of marine-continental image in gray, color, shape and texture. According to the result, the marine-continental image is divided into non overlapping regions, so that these features show similarity in the same region, but show obvious differences between different marine-continental regions. Land and sea image segmentation is an important part of land and sea image processing and analysis, and usually includes three types of segmentation: image threshold, edge and region. In addition, the threshold segmentation is to divide the gray histogram of sea and land images into several classes, and the pixels whose gray values are in the same gray class belong to the same object [5].

2.2. Main methods of land sea segmentation for SAR image

SAR image sea land segmentation algorithms mainly include edge segmentation, region segmentation, the combination of the two algorithms and random field method. These traditional SAR image sea and land segmentation methods either rely too much on manual participation, which greatly limits the execution efficiency, operability and application range of the algorithm; or the randomness of the initial conditions of the algorithm is strong, and the real-time performance is poor. These problems make the sea and land image segmentation process too cumbersome, which is not conducive to the screening of a large number of data. In this context, CV model algorithm is widely used due to its stronger ability of weak edge image segmentation. However, the traditional CV model algorithm still has some shortcomings, such as the computational efficiency needs to be ameliorated and the initial conditions are too sensitive [6].
The ameliorated CV model image sea land segmentation algorithm proposed in this paper can first roughly segment the image and take the segmentation results as the initial input, so as to improve the segmentation efficiency, convergence speed, accuracy and adaptability. The ameliorated CV model can better meet the practical needs of accurate and fast sea and land segmentation of SAR images.

3. Marine-continental segmentation algorithm of SAR image on account of ameliorated CV model

3.1. Rough segmentation of sea land image and classical CV model

The effect of SAR sea and land image segmentation will be greatly affected by the original quality of the image, especially when the noise of SAR image is high, there will be obvious dark areas in the image. Therefore, it is necessary to roughly segment the image to ensure the real-time performance of segmentation. SAR sea land image has obvious typical characteristics, that is, the gray value of sea area is significantly lower than that of land area. The classical CV model is based on the premise that the gray level of the image is a linear piecewise function [7]. Therefore, it is helpful to find the optimal image segmentation result with the help of Heaviside and Dirac equations, and transform the image segmentation process into the solution process of energy equation.

3.2. Ameliorated CV model

As a region based active contour model, CV model uses closed curves to divide the definition domain image into different regions such as target and background [8]. Secondly, by introducing the concept of level set, the minimum value of CV model energy function is calculated, that is, the contour curve is expressed by level set function, and the sea land image is divided into different regions such as target and background. In addition, the ameliorated CV model mainly replaces the Dirac function in the classical CV model with the edge indicator function, so as to further improve the convergence efficiency of the CV model. The edge indication function uses ROEWA operator, as shown in equation 1 below. In the discrete case, the expression of \( f(x) \) is shown in equation 2 below. In which, \( A \) is the normalization constant, \( \alpha \) is the filter coefficient, and \( H(x) \) is the Heaviside function.

\[
 f(x) = A \exp(-\alpha |x|) 
\]

\[
 f(x) = \frac{1}{1 + \beta} \alpha \beta^x H(x) + \frac{\beta}{1 + \beta} \alpha \beta^{-x} H(-x) 
\]

The ameliorated CV model uses the edge indication function to replace the Dirac function to obtain the level set function with the smallest energy function, and further obtain the best massive segmentation contour boundary.

3.3. Marine-continental segmentation algorithm of SAR image on account of ameliorated CV model

The ameliorated CV model is used to describe the spatial and gray difference information of neighborhood pixels, so as to guide the adjustment of the membership of central pixels and realize the accurate clustering of noisy images. By initializing the cluster center, the number of clusters, and selecting the extreme value of the two pixels of the difference graph as the initial cluster center, the number of cluster iterations can be greatly reduced.

The set function is initialized, and the initial active contour adopts the boundary obtained by clustering to avoid the overlapping area between the background and the target curve after division [9]. To realize the sea land segmentation algorithm of SAR image, it should first need to obtain the cluster center and the best membership degree, and then obtain the best fuzzy membership degree matrix, and combine it with the Heaviside function to obtain the initial zero level set function. Secondly, based on the ameliorated partial differential equation of Heaviside function, the level set solution which minimizes the energy function is obtained. In addition, with the help of the evolution curve, the
optimal contour boundary of sea and land segmentation is obtained, and the SAR sea and land image is divided into distinct parts such as target and background.

4. Marine-continental segmentation process and effect of SAR image on account of ameliorated CV model

4.1. Application process of ameliorated CV model

As a region based active contour model, CV model mainly uses closed curve to divide the definition region into image, target region and background region [10]. In order to better carry out the marine-continental segmentation, it is necessary to eliminate the speckle effect of the image, and carry out data preprocessing, enhance the texture and regional characteristics of the marine-continental target, and reduce the adverse impact of marine-continental noise on image segmentation. The marine-continental segmentation process of SAR image on account of ameliorated CV model is shown in Figure 2 below. Secondly, the contrast features of coastline are enhanced through image preprocessing, and a clearer coastline profile is established with the help of ameliorated GV model algorithm. In addition, with the help of post-processing method, the optimized coastline curve is obtained by using morphological operator, so as to complete the whole process of marine-continental segmentation.

![Figure 2. Marine-continental segmentation process of SAR image on account of ameliorated CV model](image)

4.2. Marine-continental segmentation effect of SAR image on account of ameliorated CV model

In order to verify the sea and land segmentation effect of SAR image based on the ameliorated CV model, the optimal iteration times of the ameliorated CV model algorithm for the sea and land segmentation method are selected and compared with the experimental results of the classical CV model. Select an island to compare the segmentation algorithms. The results are shown in Figure 3 below. It can be seen from the figure that the curve evolution of the classical CV model algorithm changes greatly with the increase of the number of iterations, and is prone to false alarm; the ameliorated CV model algorithm not only has high stability, but also obtains clearer contour of sea and land segmented image.

![Figure 3. Sea land segmentation effect of SAR image based on ameliorated CV model](image)
In addition, the convergence speed advantages of the ameliorated CV model algorithm are shown in Table 1 below. It can be seen that the ameliorated CV model algorithm has better image segmentation performance.

| Model                  | Iteration numbers | Time consumptions |
|------------------------|-------------------|-------------------|
| Traditional CV model   | 10                | 27.526s           |
|                        | 20                | 48.412s           |
|                        | 30                | 79.135s           |
| Ameliorated CV model   | 10                | 19.741s           |
|                        | 20                | 36.598s           |
|                        | 30                | 66.553s           |

5. Conclusion

In summary, the traditional method of land sea segmentation has some problems, such as inaccurate parameters and inaccurate image matching. The CV model mainly relies on the global gray information to guide the curve to approach the edge of the target, which can better adapt to the detection of weak edge target. In this paper, the concept and main methods of SAR image marine-continental segmentation algorithm are studied, and the filtering processing of SAR image marine-continental segmentation is analyzed. Through the analysis of the marine-continental segmentation algorithm of SAR image on account of ameliorated CV model, the application process and effect of the marine-continental segmentation algorithm of SAR image on account of ameliorated CV model are studied.

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