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Research on Rapid Detection Method of Salient Region Detection

1st Ke Hongdi
Department of Technology, Jilin Business and Technology College
ChangChun, China
13661033@qq.com

2nd Song Xiaoze
Department of Technology, Jilin Business and Technology College
ChangChun, China
975579008@qq.com

3rd Zhao Yinan
Department of Technology, Jilin Business and Technology College
ChangChun, China
937906501@qq.com

4th Li Jinyuan
Department of Technology, Jilin Business and Technology College
ChangChun, China
19232708153@qq.com

***Abstract*—In this paper, the method of separation and detection of key components in the detection of airborne transmission lines is studied, and the separation of key components is detected by Salient Region Detection, and the feature extraction method of Salient Region Detection is closely related to the subsequent application in view of the problems in the detection of feature areas. Considering the validity of the subsequent application of the Salient Region Detection, the research we have carried out is to study the Salient Region Detection algorithm for regional matching, which is studied in this paper: Image feature extraction, image feature matching and geometric verification..**

Keywords—Visual Saliency, Salient Region Detection, Feature Extraction, Feature Matching, Geometric Validation

I. INTRODUCTION

The traditional artificial ground patrol operation has high labor intensity and large risk coefficient; especially the plateau and mountainous area are more difficult. With the wide application of UAV, the inspection of UAV instead of manual application to transmission line is the trend of transmission route inspection for the future.For the processing of inspection images, the extraction and recognition of target images is a key technology [1-2].Because of the complexity of the background and the diversity of its changes, the difference between the target image and the background image is very small, so the extraction of the target image and the removal of the background is a bottleneck problem in the inspection image processing.

In this paper, the significance is introduced into the study of feature area detection, aiming at the feature matching and target recognition in the detection of airborne transmission lines, considering the significance of the representation, differentiation and matching validity of the image region, a regional significance algorithm based on the detection of airborne transmission lines is proposed. Several key problems of regional significance are also discussed.

II. REGION MATCHING ALGORITHM

The purpose of the Salient Region Detection is mainly feature matching and target recognition, and the feature extraction method of Salient Region Detection is closely related to the subsequent application, considering the effectiveness of the subsequent application of the Salient Region Detection, the research we have carried out is a Salient Region Detection algorithm for regional matching, and our research is divided into: Image feature extraction, Image feature matching, geometric verification.

A. Image Feature Extraction

Image feature extraction is generally divided into regional detection and regional feature description, the region detection algorithm looks for representative regions in the image, and the region description algorithm extracts eigenvectors for detected feature regions. In feature extraction, the selection of feature regions is directly related to the application effect of subsequent algorithms.

The common human visual attention Prediction model is divided into two steps: first, the multiple characteristics of the image are calculated, and a variety of feature diagrams are combined into a graph by means of fusion, which is a significant graph; Then, according to the generated remarkable graph, the local limit region is selected as the initial prediction area of attention, and then the subsequent attention jump path is inferred by a certain transfer strategy.

The earliest computable visual attention Prediction model was proposed by ITTI[3-4] and others in 1998, ITTI and others used the basic characteristics of the image (such as texture, color, gradient, etc.) to estimate the attention of the human eye to the regions in the image, so as to predict the first concentration point of the human eye observation image, This predicts the first focus point when the human eye observes the image ITTI 's visual attention model algorithm flow is shown in Figure 1:

ITTI For each type of feature, the visual attention model is normalized to form a comspicuity map, which is due to the fact that there is a competitive relationship between the characteristics of the same kind, while the characteristics of the same kind of independent images are the result of the final remarkable graph.Fusion feature Map is to first normalize each feature graph, prevent the interference to locate the significant area when the noise is prominent, and then target each of the three characteristics of color, brightness and gradient direction, and synthesize the feature striking graph across scales, each of which corresponds to a feature eye-catching graph[5,10].When adding a feature graph across scales, you need to first sample the

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feature map to the same size.The algorithm then uses these striking graph fuses to generate a composite graph, which is a significant graph.

B. Image Feature Matching

The most direct way to match is to compare the features to be matched with the features in the feature library and find the closest features as matching results. However, when the number of features in the feature library becomes larger or the feature dimension is high, the computational complexity of this linear method is high or even no longer effective. As a result, researchers began to explore faster near-neighbor search algorithms.

A class of near-neighbor search algorithms directly look for close neighbors to match features, Friedman ET[5,9], proposed to kd-tree algorithm, Kulis and others [6,8] proposed to search algorithm based on hash table to find the nearest neighbor to match features. In order to further shorten the search time, Lowe[7] based on kd-tree, the optimal node priority algorithm (best bin first) is proposed to find the approximate nearest neighbor.

Another type of method, with the help of the concept of visual words (visual words), does not look for close neighbors directly in the original feature set, but rather looks for approximate visual words.With the help of the basic idea of the word bag model (bag of words), this kind of algorithm first generates a small number of visual words for all feature clustering, and directly looks for the visual times of the neighbor in the way of indexing as the final matching result, which greatly improves the matching efficiency.

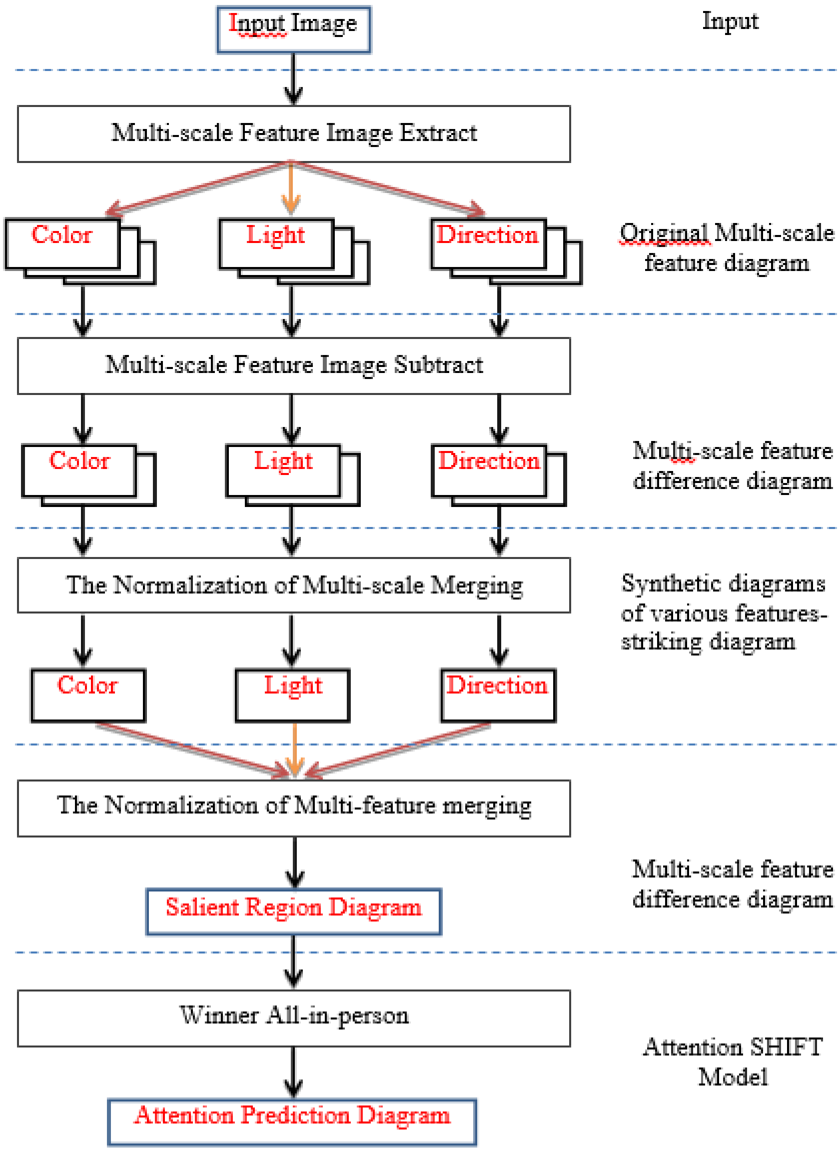

Figure 1: ITTI Model

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C. Geometric validation

Geometric verification algorithms are based on the deformation experienced by the image, such as similarity deformation (similarity transformations), affine deformation (affine transformations), Single-response deformation (homographies) and even perspective deformation (perspective), select the appropriate transformation matrix to describe it, and according to the transformation matrix to remove the matching results do not conform to the geometric consistency of the outer point.Based on the region matching pairs between the given multi-group test image and the training image, the geometric verification algorithm solves the transformation matrix and predicts the error matching in the region matching pair.

Because in practical application, it is rare for a given multi-group test image to match the characteristics between the training images, so fischer[7] and others put forward the RANSAC (Random sample Consensus) algorithm to deal with the image matching problem when there is an error match in the match.In order to deal with the situation when there are a large number of external points in the matching results, ballard[9] and others put forward the Generalized Hoff transform algorithm (generlized Hough Transform), the Generalized Hoff transform algorithm first looks for multiple matching clustering centers, Each clustering is somewhat consistent with the same target marking hypothesis and the target attitude hypothesis.Then, for each cluster that contains a matching result greater than 3, the affine transformation matrix between images is calculated using the least squares algorithm (Least-squares solution), and then the outer point that does not satisfy the transformation matrix is removed.Generalized misfortunes transform algorithm is more efficient than RANSAC calculation, and can deal with a large number of external points in the matching results.But high dimensional scalability is weak.

III. SUMMERY

By using MATLAB to extract the eigenvalues of significant regions, we can quickly separate the key components (insulators and spacer rods) of transmission lines from complex backgrounds, and establish a more efficient image segmentation algorithm, so as to identify the anomalies of key components and troubleshoot them in a timely manner. It is of great significance to improve the identification and fault detection ability of transmission lines and key components in helicopter inspection images.

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