# Research on the Design of Incomplete 3d Information Image Recognition System Based on Sift Algorithm

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**Abstract:** Image Registration is a Classic Problem in the Field of Image Recognition. It is Widely Used in Pattern Recognition, Computer Vision, Medical Image Processing and Remote Sensing Information Processing. So Far, Researchers At Home and Abroad Have Studied Image Registration Methods, and Made Many Image Registration Algorithms in the Field of Image Recognition. in Many Algorithms, Scale Invariant Feature Transformation (Feature) Has the Characteristics of Rotation Invariance, Scale Invariance, Saliency, Multiple and Stability to the Change of Visual Angle and Noise. These Characteristics Are to Propose the Local Function of the Function after the Classical Image. This Method is Widely Used in Object Recognition, 3d Reconstruction, Video Search and Other Fields. Summary Image Registration is an Important Step in Image Processing. as the Application Deepens, the Adaptability, Accuracy and Real-Time Requirements of Image Matching Become Higher. Based on Image Registration Principle, Feature Detection and Analysis, Algorithm Research, Feature Euclidean Distance Calculation and So on, the Algorithm Based on Euclidean Distance and Absolute Distance is Proposed.

### **1. Introduction**

The Best Matching Method Which Can Be Obtained by Different Sensors, Phases and Angles is to Register the Image in the Process of Image Processing[1]. Firstly, the Geometric Distortion of Each Component Image is Reduced by Using the Unified Coordinate System for Analytic Geometric Transformation. for Some Reasons, in Image Registration, the Image Used May Cause Changes in Angle, Scale, and Illumination between Matched Images. the Registration Process is Actually Looking for Common Functions between Two Images. in the Registration Process, the Standard Image Used as the Registration is Called the Reference Image, and the Other Party is Called the Registration Image.

So Far, It Has Not Been Determined Whether Two Image Benchmarks Have Been Registered. Although Different Applications Have Different Registration Technologies, There is No General Image Registration Technology. However, All the Image Registration Techniques Are Designed to Get the Best Transformation and Make the Two Images Match Best.

Image registration technology is widely used in computer vision, target tracking and medical diagnosis. In the field of remote sensing, it is an indispensable step for image registration, image correction, image mosaic and other applications[2]. In the field of remote sensing, because of a large number of remote sensing information and extensive application, it has been the goal of people to achieve fast and accurate registration. In the actual shooting process, due to different angles and camera translation, the resulting image has different degrees of angle rotation and angle change. The processing of this kind of image needs an algorithm with constant and scale invariant features. This algorithm is a local feature extraction algorithm. The functions are invariance of rotation, illumination, affine, scale, etc. This algorithm is more robust to other algorithms than noise, far and near method and rotation calibration. This algorithm is the most effective algorithm in feature detection and matching. The accuracy and precision of the algorithm are of great significance to image registration technology.

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#### 2. Research Status of Image Registration Technology At Home and Abroad

Image registration technology began in the United States in the 1970s[3]. After 1980s, the main research fields focused on pattern recognition, medical diagnosis and computer vision. Although the research fields are different, the theory of image registration is very similar, and it is easy to transplant technology in different fields. At present, the research of image registration technology at home and abroad mainly focuses on remote sensing image processing, image fusion, digital map positioning, medical image processing. In the past 10 years or so, scholars at home and abroad have proposed many classical algorithms, which directly led to the rapid development of image registration technology. Many of these technologies are used in various industries, such as fingerprint recognition, face recognition and video tracking. The methods of image registration can be roughly divided into two main types: gray information method and image feature method. Gray information method is also called image content-based registration method<sup>[4]</sup>. This uses some statistical information of the image itself to measure the similarity of the image. It is very simple to implement, but its application range is very narrow, and it is very sensitive to gray features. The common matching method is the correlation matching method, the moment invariant matching method, the sequential similarity detection method and the mutual information matching method. The basic steps of feature-based method are similar to those of gray level information method. The main differences are the function, feature extraction method, matching standard and search strategy.

Firstly, the image is segmented, the features are extracted, and the matching between the two image features is completed by using the obtained features. Finally, the login mapping relationship between the images is established by the feature matching relationship. The image features suitable for image registration are generally point features, line features and surface features. Although many registration methods are introduced in the literature, most of the applications are relatively single and need to be studied separately. Therefore, many registration methods can be obtained, but they can not form a complete system. In recent years, there are few textbooks and single charts about image registration technology in China. In particular, there are serious difficulties as described above for registration between images in the difficult situation described above.



Fig.1 Generation of Gauss Difference Pyramid

### 3. Development Trend of Image Registration Technology

In recent years, the research on gray level information method is less, but it has turned to featurebased research. In the past, the color information of image was ignored. The algorithm of color image is proposed. At the same time, research areas are changing. Medical image and remote sensing image registration account for a large proportion, and the technology is more and more mature. Feature extraction algorithms can be divided into operators, operators, operators, operators, surface feature operators and other point feature extraction operators (segmentation operators)[5]. The features of an image are unique, and it is easy to distinguish two different images, such as prominent regions, image outlines, and region angles. The registration method based on feature points has the following advantages: small algorithm calculation: the feature-based method is to solve the problem that the noise and gray matching image registration in the feature space with the same name of two image transformation model parameters but only a few characteristics are used have less impact on the registration, and the algorithm is Russian bust. The algorithm has adaptability: the feature point is that it has good adaptability to noise and image deformation, switching off and lighting changes, as long as the reference image and the registered image have sufficient corresponding functions. These two images have very complex deformations and can be registered. The feature-based image registration method has the advantages of less computation, strong robustness and wide applicability. More widely known matching algorithms are feature point detection and feature registration with scale invariant feature transformation.

#### 4. Sift Algorithm

The SIFT algorithm proposed in 2004 is a local feature extraction algorithm. Based on the scale space, the algorithm can keep the good invariance of image scaling, rotation and affine transformation[6]. At the same time, it has strong adaptability to the image deformation and illumination change, and carries on the follow-up matching. Compared with ISO algorithm, it has better stability and matching. Feature operator based matching methods are widely used in image fusion, image stitching and pattern recognition.

#### 4.1 Build Image Scale Space

Scale space theory was first proposed in 1962. The theory of scale space was applied to computer vision at the beginning. The core idea of scale space theory is to find the scale series representation series of image in multiple scales, and expand the reference image by extracting scale space features from the obtained series.

### 4.2 Detection of Spatial Extreme Points

At the same scale, the detection range of extreme points and detection points are mainly 8 points, and the adjacent upper and lower layers are 18 points. If the detection point is larger or smaller than the other 26 points, this is local extreme[7]. The set of these points detected by value points is a set of candidate feature points, but these points are not stable. For example, some points have low contrast, and the dog operator generates unstable edge points. Therefore, it is necessary to delete these points.

#### 5. Conclusion

The improvement and innovation of image processing technology is a major topic in the field of image processing. With the continuous development of modern science and technology, the emergence of a variety of new and high-tech camera equipment has also promoted the application and development of image registration technology, which requires higher and higher precision and speed of registration technology. Feature point matching algorithm is a powerful and efficient matching algorithm. In order to improve the original algorithm, this paper proposes an improved algorithm of European distance and absolute distance based on image[8]. The improved algorithm is different in image rotation, noise and illumination. It inherits the stability and efficiency of the original algorithm and is suitable for most images. The main summary of this paper is to systematically introduce the basic knowledge of image registration, clearly explain the concept and mathematical model of image registration, and explain the main classification of image registration.

In this paper, the principle of scale invariant feature algorithm and its engineering stage are systematically introduced. The extraction method of scale space poles and the generation process of feature point descriptors are studied in detail. The Euclidean distance of the image is systematically imported. Experiments show that Euclidean distance of image can better reflect the correlation between pixels in image, and compare the differences between images[9]. By embedding the Euclidean distance of the image in the matching algorithm, the accuracy of the algorithm is

effectively improved. Compared with the original algorithm, it has better matching effect for the deformed image. Absolute distance replaces traditional Euclidean distance. Although the accuracy is sacrificed, the operation speed of the algorithm is effectively improved. A new improved algorithm is proposed, but it has several disadvantages. Although the algorithm proposed in this study greatly reduces the amount of computation, it is necessary to study and improve it in the future because of the increase of detected feature information, which affects the computation speed. In order to discuss registration of consecutive images, this article has only one image[10]. If it is returned through continuous images (i.e. video), then the algorithm must be improved to adapt to larger data processing batches.

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