

## Research and Comparison of Corner Detection Algorithms in Image Matching

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*Abstract: In the field of image processing and computer vision, corner points are widely used to solve a series of problems, such as object recognition, image recognition, such as matching, visual tracking, and so on. In order to further improve the accuracy and reliability of image registration algorithm, corner detection algorithm is introduced, and the angle point and corner detection algorithm is expounded and analyzed, and then several different corner detection algorithms are researched, and the matching degree of corner detection algorithm is compared with the simulation experiment. Analysis. The results show that the Harris corner detection algorithm has the highest accuracy and matching degree for corner detection.*

*Keywords: image matching, corner detection algorithm, matching degree.*

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### 1. INTRODUCTION

The corner is one of the local features of the image. It is generally defined as a point in which the brightness changes of the two-dimensional image or the point of maximum curvature on the edge of the image. The corner is characterized by rotation invariance and not changing with the illumination conditions. It not only preserves the important features of the image at the same time, but also effectively reduces the amount of data contained in the information, improves the information content, and then improves the speed of the corner extraction, which is beneficial to the reliable matching of the later image, and makes the real-time processing possible [1]. The general angle detection algorithm only requires that an accurate result or the detection algorithm can be easily programmed, which can meet the application requirements of the later matching of the actual image. Corner detection is mainly used in the fields of feature based image matching, pattern recognition and dynamic estimation and tracking. Therefore, the extraction of corner points has become very important.

### 2. A BREIF INTRODUCTION TO CORNER OPERATOR

#### 2.1 An overview of corner points

In the process of changing the edge curve of the image, the local maximum point of curvature is the corner point. In a simple way, the corner point is the point that there is a sharp change in the gray and edge direction of the image in the two-dimensional space, and the point is also the obvious difference between the corner and its adjacent adjacent points. [2]

## 2.2 Corner detection algorithm

At the present stage, corner detection algorithms are mostly divided into two algorithms: corner extraction based on image edge and corner detection based on image gray. The idea of corner detection algorithm based on image gray level is used to calculate the curvature and gradient of the image, and detect the maximal value points of the grayscale and gradient in the local range, and use it as a corner point.

## 2.3 Harris corner detection

Harris corner detection is a corner extraction algorithm based on gray image directly. It has high stability, especially for L corner detection. However, because Gauss filtering is adopted, the speed of computation is relatively slow, the corner information is lost and the position is shifted, and the corner points are clustered. [3]

## 2.4 Shi-Tomasi corner detection

The Shi-Tomasi operator was proposed in the 1994. The Shi-Taomasi algorithm is based on the improvement of the Harris algorithm. The original definition of the algorithm is to reduce the determinant value of the matrix  $M$  to the trace of the  $M$ , and then compare the difference with the pre given threshold. Later, Shi-Tomasi proposed an improved method to get the stronger corner points with the smaller one of the two eigenvalues than the minimum threshold.

## 3. EXPERIMENT RESULT

The experimental environment is based on Microsoft Visual Studio 2010 experimental platform, the programming environment is OpenCV 2. As illustrated, figure 1 is a picture with a Harris corner detection threshold of 0, and Fig. 2 is another form of Harris corner point when the threshold is 0, and figure 3 is a picture with a threshold of Shi-Tomasi corner point of 0 and a picture 4 with a Shi-Tomasi corner threshold of 200.



Fig 1. Harris detection (a)



Fig 3. Shi-Tomasi detection (a)

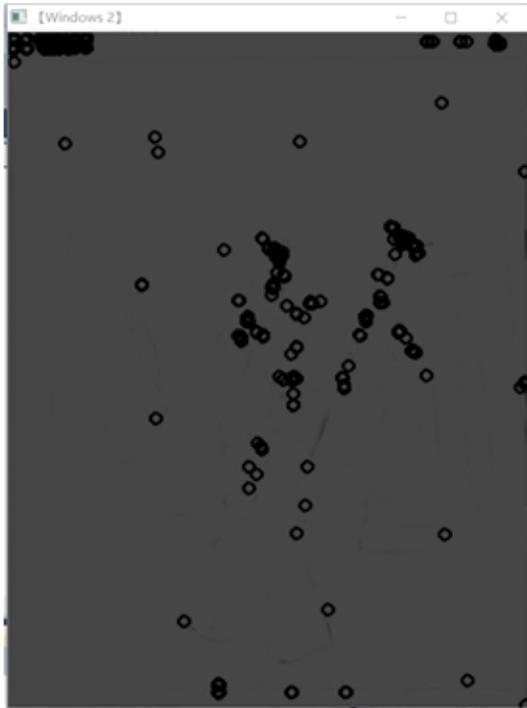


Fig 2. Harris detection(b)



Fig 4. Shi-Tomasi detection(b)

#### 4. CONCLUSION

This paper expounds and analyzes the corner point machine detection algorithm, and then explains the basic ideas and principles of the Harris corner detection algorithm and the Shi-Tomasi corner detection algorithm. The experimental results show that the Harris corner detection algorithm has the highest correct rate and matching degree to the corner detection, and it improves the speed of the image registration algorithm. It is of great practical significance to meet the needs of image registration.

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