3D Moving Object Tracking Using Multiple Cameras

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1 Introduction

Detecting, tracking and recognizing the moving object which exist in the image from the camera are an important theme in the Computer Vision research field. The image processing technology these researches give is expected to apply many fields such as the automatically observation system, the automatically measurement of human or vehicle, the human interface and the visual tele-communication.

The old method of tracking moving object is almost using the single camera. But when we aim at the wide and complex scene, the single camera is difficult to watch over whole scene. The other side, the method using multiple cameras is proposed. The problem as using the images from the multiple cameras is matching object in the images from the multiple cameras. Old research apply the method proposed under stereopsis. It is a cause necessary many constraint to target environment and object.

In this research, I match the objects in the images regarded as the image stream not using usual stereopsis method to the images from the multiple cameras.

2 Images from multiple viewpoints

In this chapter, I will state the definition and character of the images from the multiple viewpoints, explain the formal matching method of target object and make clear that method's strong point and problem point.

The images from multiple viewpoints is extension the stereopsis. Then I explain the principle and the disposition of stereopsis and the representative matching method using stereopsis before explain the principle and the disposition of the images from the multiple viewpoints.

The problem using the images from multiple viewpoints and the images from stereopsis is matching between images from different camera. Using the matching method of stereopsis is not realistic under the images from multiple viewpoints because many limitation is necessary. I introduce some researches of the images from multiple viewpoints. But these researches are not realistic because they have strong limitations.

Nest chapter, base these arguments, I suggest the new matching method using the image sequences from the multiple cameras.

3 The matching method using image sequences from multiple viewpoints

The matching method using the stereopsis's one under the images from multiple view points is a lack of reliance. Then I think the matching between images is not simple extension stereopsis's one but the image sequence's one from the multiple cameras. And I describe the new matching method.

The method I suggest in this chapter is constructed the policy; no limitation of scene and target object, not use the no suitable appearance feature which is problem at old researches. I select the object's center of gravity whose appearance similarity is big as matching feature quantity among multiple viewpoints. The matching method is not target only the one time images as usual method but using global object moving as time. The matching method which target is human can do without using rigid model as constructing based to this notion.

I apply suggesting method to real image and consider result in next chapter.

4 Experiment

I supply the experiment result to tested the suggesting method implementation to computer based on th arguments till before is proper or not and consideration chapter. And the images from multiple viewpoints treat this research is regarded as stereopsis. Then, camera parameter is found using camera calibration using stereopsis.

I select human using matching target so object's moving orbit is vary widely at through the whole. And because object moved on epipolar plane at head and tail time, matching at that time is very difficult. But through the whole, matching object can do. So matching based on moving orbit of object is valid.

5 Conclusion

In this research, matching among the images from multiple viewpoints is not extension the stereopsis but the the image sequences from the cameras. I select the feature quantity using matching object is an only object's center of gravity whose appearance similarity is big as matching feature quantity among the multiple viewpoints. I remove the limitation for object since using without the feature quantity which matching become vagueness using. And constructing the plane containing the object's center of gravity on image and two camera's center of lens, I suggest the feature quantity using common object matching between two cameras. And I proposed the matching method using the object's moving orbit using the feature quantity.

In the forth chapter, this method apply to the real image and confirm. Then, the matching target is human, and the object center of gravity as matching feaster quantity vary widely. But I show matching can do when that case.

One of the future theme is developing the efficiency matching method under more than three viewpoints situation. And the dealing method under occurring occlusion and overlap objects is necessary to be examined.