Generation of Roadside Panoramic Images without Obstacles

Shunichiro Tsuji
School of Science & Technology
Kwansei Gakuin University
2-1 Gakuen, Sanda, Japan
coi29394@kwansei.ac.jp

Yasuyuki Kono
School of Science & Technology
Kwansei Gakuin University
2-1 Gakuen, Sanda, Japan
kono@kwansei.ac.jp

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1. INTRODUCTION

This paper presents the method for generating panoramic image(s) from plural in-vehicle camera images. Our real-world map system employing the proposed method has the following features: 1) it puts the generated panoramic images of the real-world to an existing web map, e.g., GoogleMaps, 2) partial regions in the images are classified according to the depth from the camera by tracking each partial region employing the SIFT feature, so that 3) it can obtain panoramic background images that exclude obstacles, e.g., parked vehicles. Our updatable real-world map system can offer up-to-date information to map-based systems, e.g., car navigation system or web interface any time.

2. DEPTH-BASED CLASSIFICATION

A monocular video camera is mounted in the center of the left side window of a test vehicle and faced towards the left side of the car. The in-vehicle camera captures the scenery of the road side while driving. A GPS receiver is also mounted in the vehicle and each captured image is annotated by its location information. Figure 1 shows sample images of every 5 frames. Two pickup trucks are parked on the roadside and occludes the background buildings as shown in Figure 1.

Our idea is to cluster feature points into similar depth regions according to their movement speed between frames.

Figure 1: In-vehicle camera images.

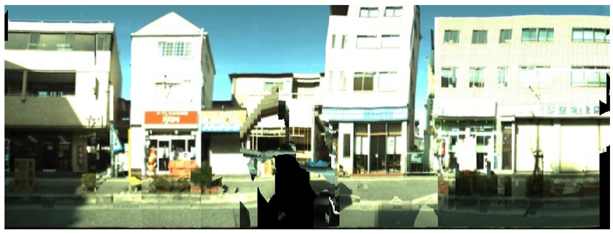

Figure 2: A generated panoramic image.

The distance of corresponding feature points between two frame images reflects the depth to the region they belong to, i.e., a feature point moves faster if it is nearer to the camera. We can classify the projected objects in the captured images into similar depth regions by grouping feature points according to their movement speed. We employ the SIFT feature extraction method to correctly associate corresponding feature points between frames.

Figure 2 shows the panoramic image of the background buildings generated by unifying the slowest regions according to the amount of movement of feature points. The unification is overall successful, although the system could not recover the region where the obstacles fully occluded. Also some part of the background was misclassified as vehicle region and some of the vehicle as the background mainly around the border of the regions.

3. FUTURE WORKS

This paper presented the method for generating panoramic image by classifying regions in frame images according to the amount of movement. The method is simple and was overall successful. However, it is necessary to accurately divide regions on the border of the subjects. Also to update the generated images by following the change of the real-world, the system should detect the changes of the background.