Background Subtraction for Stationary and Moving Object Detection

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Abstract: Background subtraction is a technique for separating out the foreground elements from the background.Background subtraction is a major pre-processing step for moving object detection in video surveillance systems. It segments moving objects by using the difference between the background and input images. It is very useful in many computer vision applications as it is the first important step for subsequent recognition, classication, and activity analysis tasks. It can be used for extracting information about particular vehicle with the help of traffic camera, or to keep a track of person, and further it can be used in autonomous vehicles, etc. Here as part of our course project we will investigate some key findings for the foreground/background separation when the depth of the image is also provided.The dataset chosen to perform the investigation is SBM-RGBD dataset as it contains inputs,ground-truth(GT) and depth.It sizes 1.11 GB.

Index Terms: computer vision, background subtraction, color and depth data, dynamic background environments.

1. Introduction

Background modeling is a critical component for motion detection tasks.Here with this proposal we propose a background subtraction method based on frame differencing of the current image with the background image.The idea behind this project is to investigate whether adding one more dimension as depth to the given image can the accuracy for object detection can be enhanced.The normal RGB images contain 3 channel information per pixel in the form of 3x1 vector. The novelty of RGBD dataset is that it not only provides the color details per pixel but also provides the depth information corresponding to that pixel. To measure the object detection accuracy we take Percentage Correct Classification(PCC) and Jaccard Coefficient(JC).The difference between this two metric is that JC does not take into the consideration of True Negative(TN) values.

We will first analyse and investigate the stationary object detection task with the help of simple RGB image then we will compare the object detection ground truth(GT) results and then with RGB+depth we will try to detect the object and then again compare the results against the given ground truth(GT). For stationary object detection we are planning to use SBM-RGBD/ IntermittentMotion/ abandoned2 image sequence(size:138 MB). For this purpose we will use the frame differencing method for background subtraction.

Secondly we will analyse and investigate the moving object detection task with the help of averaing filter for simple RGB images and then we will compare its results to given ground truth(GT). After that we will take depth into the consideration and using RGB+depth we will detect the moving object. Then using the above similar procedure we will compare its results to the ground truth(GT). For moving object detection we are planning to use SBM-RGBD/IntermittentMotion/Sleeping-ds image sequence(size:222 MB). For this purpose we will use the average filtering (mean filtering) method for background subtraction.

As per our last discussion we will also try to investigate the case when the inclusion of depth may lead to removal of shadow effects and produce finer details of the detected object. This will be another aspect of this project key findings if we are able to successfully remove the shadows with the help of depth in the moving/stationary object detection.

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