University of Edinburgh
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AV Assignment 3

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Abstract: This report details the work done and algorithms used in the creation of a Matlab program that would manipulate data taken from a Kinect Sensor as instructed inthe third assignment for the Advanced Vision course at Edinburgh University

Contents

1. Introduction

We have been given the task of processing data taken from a Kinect [1] sensor and using this to make changes to the video. In the 36 frame video a man is shown walking past a wall holding a black leaverarch folder in his swinging arm as he walks. This video is to be adapted firstly to change the bakground the man walks across to an image of a field of poppies. This given image would be placed within the section of wall shown in red in figure 1.1. The second adaptation is to place a video, of our choice, within the bounds of the folder the man is carrying in each frame so that video plays as he walks. For that reason we have chosen a video called Dramatic Chipmunk, frames in figure 1.2.

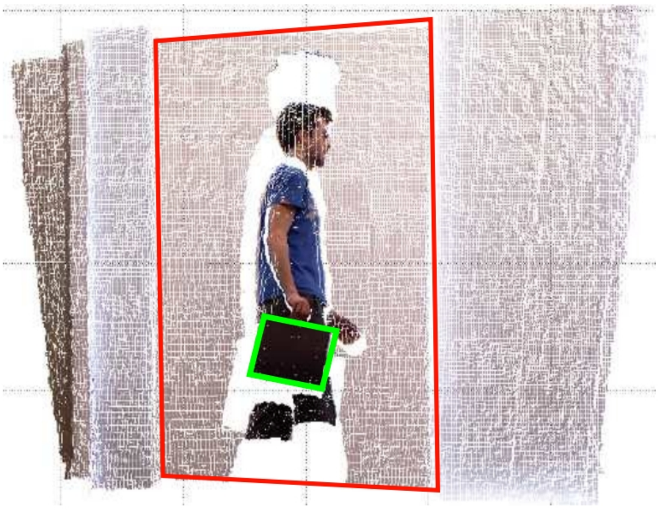

Figure 1.1: Section of wall highlighted in red

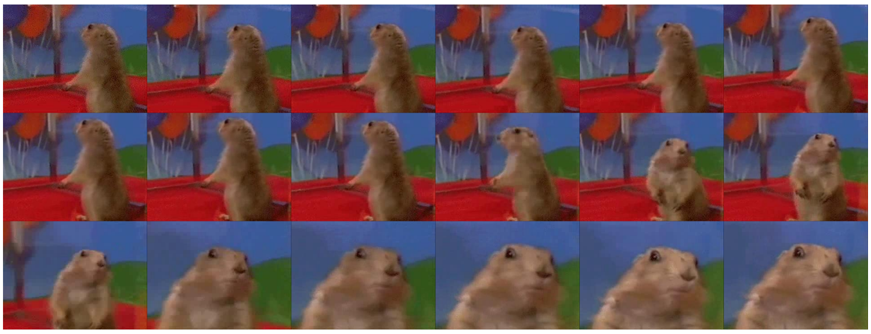

Figure 1.2: Dramatic Chipmunk frames

1.1 Data Structure Modification

2. Extracting the Man

Background subtraction using depth data

3. Overlaying the Field Image

4. Extracting the Black Quadrilateral

Background subtraction using depth data

5. Overlaying the Black Quadrilateral

5.1 Corner Finding

1. Find leftmost point A
2. Find rightmost point B
3. Split points into the line from A to B and the line from B to A (using the ordering obtained by boundary tracking)
4. For each line
    (a) Find straight line between endpoints X and Y
    (b) Find point Z in the set of points which is furthest from the straight line by distance d (in pixels)
    (c) If d is less than a threshold, add this line
    (d) Else, split the set of points into the points between X and Z and the points from Z to Y and recursively perform this line splitting algorithm on those new lines
5. For each line, calculate and store its gradient
6. For each set of 2 lines that share an endpoint
    (a) Decide if gradients of lines are similar
    (b) If they are, merge them by replacing both lines with a line from the endpoints the lines did not have in common, recalculate the gradient for this line, and go back to 6, and recurse through all lines again

6. Conclusion

7. Inclusion of Code

Bibliography

[1] Kinect website. http://www.xbox.com/en-US/kinect