14 Image Capture Program

14.1 Introduction

In the last chapter we saw that vision is one of the important human senses and this is also the case for robots. In this chapter we will discuss how to capture the gray and color images using a camera from the surroundings. Here the image is captured by the camera fitted to the robot and controlled from a remote client. The program is developed in a client–server paradigm. During the run session, the color images are continuously being sent to the client. When the user at the client requests a color image, the color image displayed on the client screen is selected, and when the grayscale image is required the color image is converted to grayscale in the client. As the color images have larger bandwidth, transmitting them directly would require a substantial amount of time and memory as well. Therefore, run-time encoding is used in the server program, which is discussed below.

14.2 Algorithm for Image Capture

The run-length encoding and server and client algorithm is given below. The server program and the client program are given in Listings 14.1 and 14.2 respectively at the website of the book. The program log session is given below and the output is illustrated in Figs. 14.1 and 14.2.

Run Length Encoding Algorithm

Step 1: The color and grayscale images are obtained.
Step 2: C(x) – color pixel at location x.
G(x) – grayscale pixel at location x.
Count = 0, x = 0, x_cur = 0;
Step 3: x_cur = x_cur + 1

If x_cur > Max
Goto step 5.
Step 4: If Absolute(G(x_cur) – G(x)) > range
Count ++
x++
Goto Step 3.
Else
The RGB values of location "x" and count are sent from the server to the client.
Count =0, x = x_cur;
Goto Step 3.
Step 5: The RGB values of location "x" and count are sent from the server to the client.
Step 6: Continue with next image, i.e. Goto Step 1.

Server Program Algorithm

Step 1: Open the server socket and wait for the client to join.
Step 2: Once the client has joined start the run-length algorithm.
Step 3: When the user interrupts, close the sockets and stop the program.

Client Program Algorithm

Step 1: Connect to the server socket if opened.
x = 0, max = 320 × 240 (size of the image)
flag = true, (for color image)
Image() = image pixel array.
Step 2: Keep reading the socket till four integer values are received (RGB and count) from the socket.
Step 3: for I = 0 , I < count , I ++
If flag = true
Image(x)(0) = R,
Image(x)(1) = G,
Image(x)(2) = B,
x++;
Else
Image(x) = 0.11*R+0.56*G+0.33*B
Step 4: If x = max
Display the image.
Else goto Step 2.
Step 5: On user interruption
If color button