

16 Program for 3D Perception

16.1 Introduction

A client–server program for 3D perception of a planar object using a Kalman filter will be covered in this chapter. The program has been designed to take snaps within an arc of 120 degrees at any number of intermediate points defined by the user (say n) and a regular polygon with $(3n)$ number of sides is estimated from the given radius. Then the path is generated by trisecting the regular polygon. For example, if the number of images required is 6 and the radius as 1000 mm, then the path is defined by trisecting a regular 18 sided polygon of radius 1000 mm. The robot moves along each side of the polygon and takes snaps at each vertex point facing towards the polygon. The sample image thus obtained is used to obtain 3D information about the planar object in the robot's environment. This is achieved by using a recursive formulation of the Kalman filter discussed in chapter 15.

The program was developed for the client–server architecture, where the server program is written in C++ using the ARIA and SVS libraries, already discussed in Chap. 5 and the client is written in JAVA.

The necessary input is provided to the robot through the client program. The server then samples the images and sends them to the client along with other required information such as the robot position, the camera span angle, tilt, heights etc. In the client, 2D information of the images along with the camera parameters are used by another program called `Kalman.jav` to estimate the 3D information of the planar object using the Kalman filter.

16.2 Flow Chart and Source Code for 3D Perception

The client and server flow charts used for the 3D perception program are illustrated in Figs. 16.1 and 16.2 and their sample programs written in C++ and Java are given in Listings 16.1 and 16.2 respectively at the website of

the book. The program output with log session is depicted in Figs. 16.3 through 16.9.

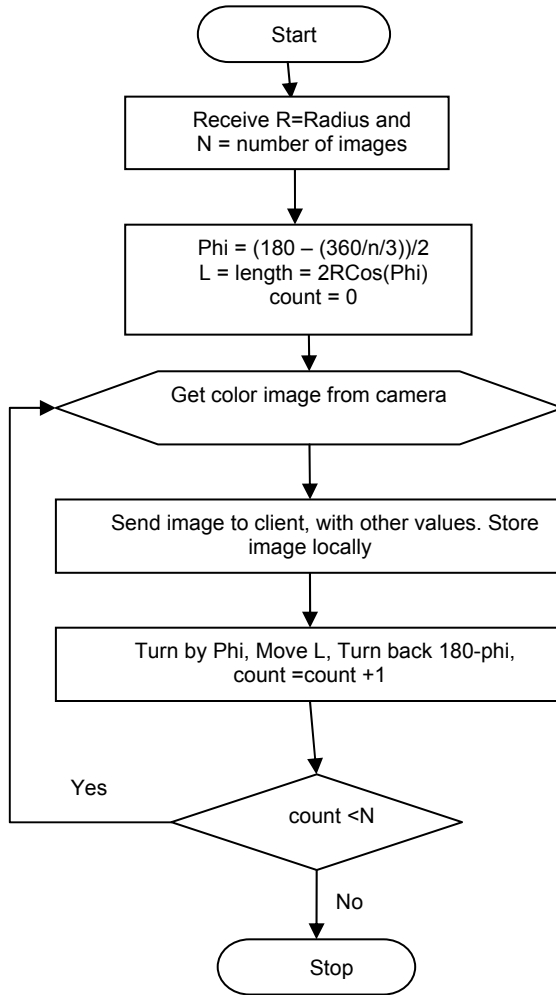


Fig. 16.1. Flowchart for client program