Sample Report

Treasure map solver

Problem Statement:

We are given some values. The values are stored in a text file. Our objectives are to:

- Take input from the user and open the corresponding text file.
- Read the text file and save values in separate arrays.
- Understand the values in the arrays. The values are co-ordinates of a map.
- Plot the map with a circle and X on the starting and finishing points.

Inputs and Outputs:

The inputs of the program are co-ordinate files which consist of angles and amplitudes. There are two such files given. The file which is used as input depends on the input from the user. The data of input files is tabulated below:

Table 1 Treasure_map1.txt input

Length	**40.0000**	**20.2000**	**19.5000**	**28.6000**	**20.0000**	**49.4000**	**19.5000**
Angles	19.7000	12.0000	3.0000	1.0000	12.0000	9.0000	6.0000

The data of treasure_map is similar to this but with 67 co-ordinate pairs.

The output of the program is essentially the map plots. The plots of both maps are shown below:

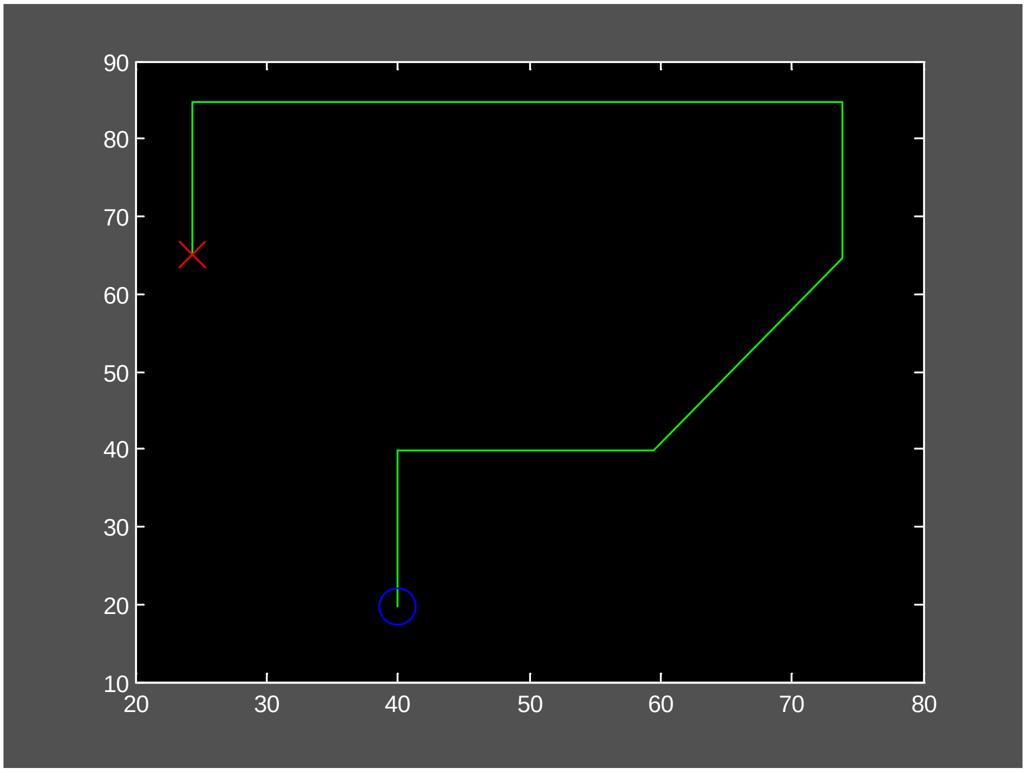


Figure 1 Treasure Map 1

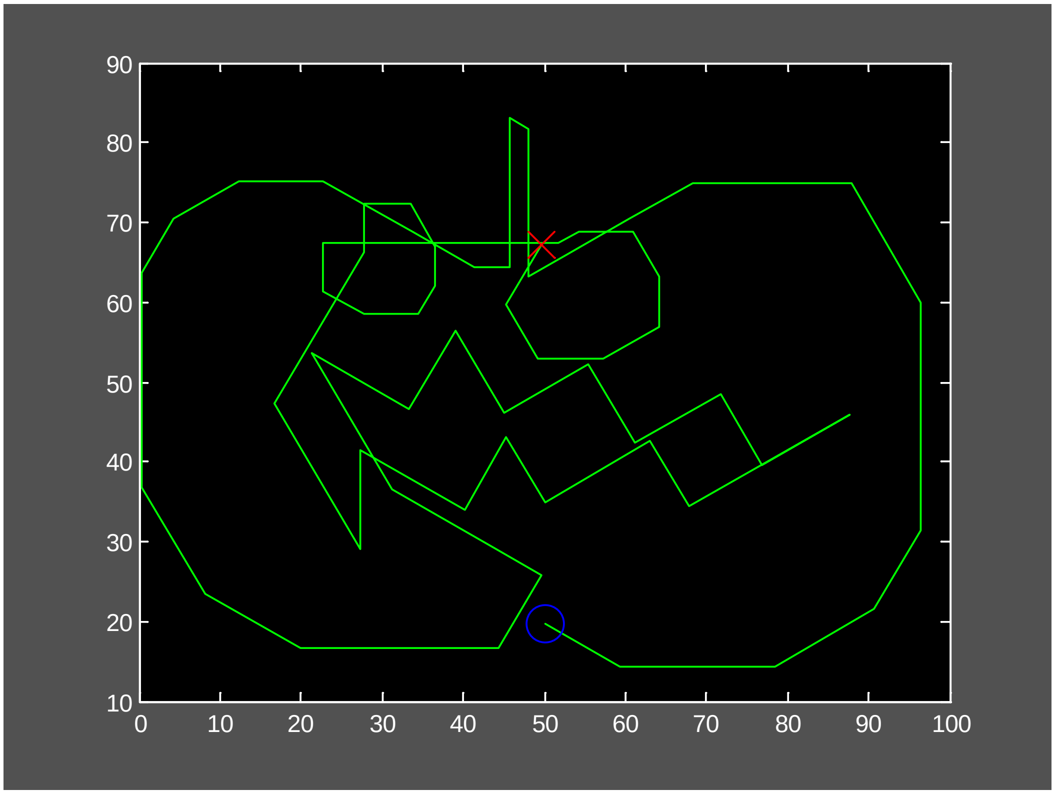


Figure 2Treasure Map 2

Math Verification:

The data of the map needs to be de-coded prior to implementation. The data in the map are amplitudes and angles. Given below is the equation corresponding the decoding.

```
x = x + cos(theta)*(pi/180))* length;
y = y + sin(theta)*(pi/180))* length;
```

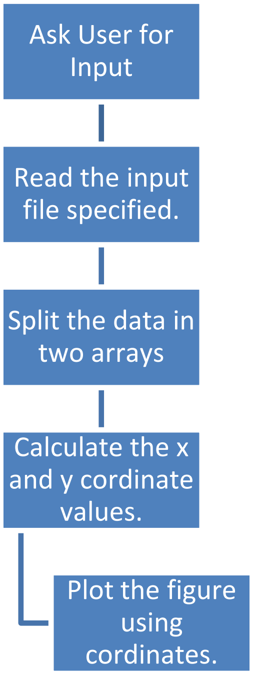
- The values of theta and length vary from second value to last stored in array.

For example, calculating the first co ordinate of the treasure map 1:

X = 40 + cos(12) * (pi/180) * 20 = 40;

Y = 40 + sin(12) * (pi/180) * 20 =39;

Flow chart:



Ask User for Input

Read the input file specified.

Split the data in two arrays

Calculate the x and y cordinate values.

Plot the figure using cordinates.

Figure 3 Chart of the process flow

Implementation:

Given below is the code written for the program:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
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% Resetting Everything (Clearing variables and screen)
clear all
clc

%Get the filename from the user and save as string
filename=input('Enter the map file name with Quotes('')');
fid=fopen(filename,'r');

% Array of angles possible.
angle=[60 30 0 -30 -60 -90 -120 -150 180 150 120 90];

% Reading and separating lengths and angles in two files
i=1;
while ~feof(fid)
    len(i)=fscanf(fid,'%f',1);
    ang(i)=fscanf(fid,'%f',1);
    i=i+1;
end
```

```
% Different values to be used
sizex=size(len);
sizex=sizex(1,2);
x_ax=len(1);
y_ax=ang(1);
x_cor=len(1);
y_cor=ang(1);
temp=0;
dist=x_ax;



% For Loop to calculate x and y co-ordinates
for k=2:sizex

    % Calculating x-coordinate
    x_cor = x_cor + cos(angle(ang(k))*(pi/180))*len(k);
    x_ax=[x_ax x_cor];
    % Calculating y-coordinate
    y_cor = y_cor + sin(angle(ang(k))*(pi/180))*len(k);
    y_ax=[y_ax y_cor];

end

figure;
whitebg('black');
% Plots for Path, Starting/Finish Point
plot(x_ax,y_ax,'g');
hold on;
plot(x_ax(1),y_ax(1),'bO','MarkerSize',15);
hold on;
plot(x_ax(sizex),y_ax(sizex),'rx','MarkerSize',15);
hold on;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

Results:

The data is read from the file depending on the user input and the graphs are plotted after calculation of the coordinates. The plots are shown above in the **Inputs and Outputs** section. The coordinates calculated for the treasure_map1 re shown below:

Table 2 Decoded coordinates of treasure map 1

X	**40.0000**	**40.0000**	**59.5000**	**73.8000**	**73.8000**	**24.4000**	**24.4000**
Y	19.7000	39.9000	39.9000	64.6683	84.6683	84.6683	65.1683