

MATLAB Code for Hurricane Tracking Model Using the Distance Formula

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% MATLAB CODE FOR HURRICANE TRACKING MODEL USING THE DISTANCE FORMULA
% Initial Location of the City of Interest may be defined as the Origin
(x1,y1)
% where X1 = 0 and Y1 = 0.
% If a different city is selected as the origin, the student may enter any
% values they wish for X1 and Y1.
x1 = 0;
y1 = 0;
speed = 0;

% Student uses the scale of the map to calculate the exact (x1, y1)and(x2,
y2)
% location of the hurricane. Note: This program does not use the latitude
% nor longitude values. Part of the lesson is to have students use the
% scale of the map instead to determine horizontal and vertical distances in
miles.
%
x1 = input ('Enter the X1 value in miles (X1) = ');
y1 = input ('Enter the Y1 value in miles (Y1) = ');
x2 = input ('Enter the X2 value in miles (X2) = ');
y2 = input ('Enter the Y2 value in miles (Y2) = ');
City = [x1,y1];
hurricanepoint = [x2,y2];
    disp ('The initial linear distance in miles of the hurricane to our
        city is');

% This section of the code uses the Distance Formula to calculate and
% display the linear distance based on the input. This code may be used to
% calculate the distance between any two points.
aPointMatrix = repmat(City,size(hurricanepoint,1),1);
LinearDistance = (sum(((aPointMatrix-hurricanepoint).^2),2)).^0.5
format short g

% The code now prompts the student to enter the travelling speed and time
% interval they wish to calculated.
speed = input ('Enter the travelling speed of the hurricane in mph (SPEED) =
');
time = input ('Enter the time interval in hours (HOURS) = ');

% The code uses simple formulas to calculate and display the initial
% accumulated time, distance, and time to landfall. The xlswrite command
% opens an Excel 2010 spreadsheet.
j=LinearDistance-(speed*time);
accumtime=0;
nextlocation=LinearDistance;
timeland=LinearDistance/speed;
initialdata = {accumtime LinearDistance timeland};
xlswrite ('hurricane.xlsx',initialdata,'data','A3');

disp ('From this distance, the HURRICANE WILL HIT LAND in exactly');
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disp(timeland);
disp ('HOURS');

fid = fopen('hurricane.dat','w');

% The i=1:j is the counter command. It defines how many times the FOR-IF-END
% loop will run. The conditional FOR-IF-END loop calculates the accumulated
% time, distance, and time to landfall for the time interval entered.
for i=1:j;
    newdistance = nextlocation - (speed*time);
    if newdistance > 0
        accumtime = accumtime + time;
        nextlocation = nextlocation - (speed*time);
        timeland = timeland -time;
    end

    % The fprintf command inside this LOOP creates the hurricane.dat file.
    fprintf(fid,'%4.8f %4.8f %4.8f\n',accumtime,nextlocation,timeland);

end

% The following commands display various interesting data calculations.
disp ('IF THE HOURS ELAPSED = ');
disp(accumtime);
disp (' ');
disp ('BE PREPARED! THERE ARE ONLY THIS MANY HOURS LEFT BEFORE THE HURRICANE
MAKES LANDFALL');
disp (timeland);
disp (' ');
disp ('The data on the hurricane.dat file and Excel Spreadsheet show
distances from our city and time to landfall every ');
disp (time);
disp ('HOUR INTVERVAL');
disp ('Enter the word "hurricane" at the prompt to start over');
fclose(fid);

% The following commands load the data from the FOR-IF-END LOOP into the
% hurricane.dat file and the Excel 2010 spreadsheet. The code produces
% hundreds of calculations but once the results start repeating, only the
% initial data points are usable.
hurricane_data = load('hurricane.dat');
heading1 = {'HURRICANE TRACKING RESULTS'};
xlswrite('hurricane.xlsx',heading1,'data','A1');
heading2 = {'Accumulated Time (hours)', 'Distance to Landfall (miles)', 'Time
to Landfall (hours)'};
xlswrite('hurricane.xlsx',heading2,'data','A2');
xlswrite ('hurricane.xlsx',hurricane_data,'data','A4');

% This command creates the plot that pops up on the screen.
plot(hurricane_data(:,1),hurricane_data(:,2),'b-*');
xlabel('ELAPSED TIME'); ylabel('DISTANCE BEFORE LANDFALL');
%
% THANK YOU FOR USING THIS MATLAB CODE FOR YOUR LESSON.
% From: Armando Vital, math teacher, Veterans HS, Brownsville ISD, TX
% If you have any questions, email me at avital@bisd.us
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