Analysis of Temperature Readings

Project 2, CSE1010 Fall 2012

Date: 9/10/2012

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Section: 009L

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1. **Introduction**

In this assignment you will write a Matlab program to perform some analytical

calculations on a vector of numbers. The numbers are a collection of temperature

readings from an airport in Birmingham AL in 2003. You will create a graph of the

data in order to visualize the data.

1. **Data**

This data represents readings of Temperature in degrees Fahrenheit

function T = allTemps

T = [59 57 57 57 57 57 56 55 55 55 55 54 54 54 54 54 54 54 54 52 50 50 50 ...

50 50 50 49 48 49 48 48 48 47 47 47 46 46 46 46 46 46 46 46 46 46 46 ...

46 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 45 ...

45 46 46 47 48 48 48 49 49 49 48 50 48 49 48 46 45 45 43 43 42 42 39 ...

38 37 36 35 35 34 34 34 34 34 34 34 34 34 34 33 34 34 34 34 35 34 34 ...

33 33 34 32 31 29 29 28 28 26 27 26 25 25 28 31 35 38 40 44 45 48 48 ...

46 44 44 43 42 43 43 43 44 45 46 46 44 42 40 45 46 49 52 55 58 60 60 ...

59 55 54 51 46 43 41 40 39 37 36 36 36 34 32 32 35 40 43 43 43 43 43 ...

42 42 42 41 38 38 35 34 34 33 31 31 29 30 28 25 27 23 28 31 34 38 41 ...

45 47 47 47 45 42 41 40 38 37 37 36 36 35 34 35 35 33 35 37 40 44 48 ...

52 57 60 60 60 57 56 54 52 53 52 51 49 48 49 49 48 48 48 48 49 53 57 ...

59 62 66 68 67 63 62 62 59 58 55 55 55 55 54 54 54 54 53 54 52 51 50 ...

50 48 45 43 38 37 38 40 42 43 45 47 48 48 47 45 43 41 38 37 34 32 31 ...

30 28 28 27 27 27 25 28 29 31 35 37 39 40 39 38 37 35 35 35 34 34 32 ...

31 29 30 30 28 27 27 26 27 28 29 30 32 33 34 34 34 33 32 32 31 28 29 ...

29 29 29 29 30 30 30 30 30 31 32 34 37 38 42 45 47 47 43 40 35 33 33 ...

30 30 29 29 27 29 27 27 27 27 31 37 42 46 49 53 54 54 54 51 48 41 38 ...

37 37 36 34 33 32 29 28 26 26 26 24 28 31 35 38 40 43 44 45 45 40 40 ...

38 31 33 32 34 34 34 35 31 32 29 34 37 38 40 41 40 39 40 39 41 41 41 ...

41 NaN 41 NaN 43 44 45 45 45 44 45 43 40 37 37 37 35 34 32 31 30 29 29 ...

29 28 28 27 27 27 28 28 28 28 28 28 30 31 32 34 35 36 35 33 31 30 27 ...

23 23 22 20 19 18 17 17 17 14 15 18 21 25 27 30 33 35 36 36 37 35 36 ...

36 36 35 31 29 27 26 25 27 25 25 22 28 30 34 37 39 43 45 47 46 45 41 ...

41 41 41 43 44 44 44 42 42 41 40 41 41 43 42 43 45 48 53 56 57 57 58 ...

59 60 60 58 58 58 58 58 58 58 57 57 57 57 56 55 55 55 56 55 55 56 57 ...

58 60 61 61 63 63 64 64 63 55 54 52 48 47 46 46 45 45 45 45 45 43 43 ...

43 43 43 43 42 42 41 39 40 39 39 37 38 37 37 36 36 36 35 35 36 40 43 ...

46 49 50 51 50 45 41 38 36 34 32 31 29 28 26 25 23 21 21 19 18 16 17 ...

18 17 19 21 23 23 24 23 23 20 19 18 17 16 15 14 12 11 10 9 8 7 7 7 9 ...

13 18 21 24 26 29 32 32 30 27 25 24 25 24 24 23 24 25 24 21 22 23 23 ...

23 27 30 33 34 36 37 38 37 37 36 36 36 36 35 35 35 34 34 34 34 34 34 ...

34 34 35 37 40 44 46 48 49 48 47 44 43 42 39 37 32 30 28 28 26 25 22 ...

21 20 19 18 21 26 29 33 36 39 41 43 43 43 41 38 29 32 30 30 33 33 30 ...

28 31 34 36 38 40 41 44 47 50 53 55 56 56 55 55 54 55 53 55 56 55 53 ...

53 53 53 53 53 53 53 54 55 55 55 55 56 56 57 56 55 55 55 55 55 55 55 ...

55 55 55 56 55 56 56 55 55 56 56 55 NaN 55 NaN 55 NaN 52 51 48 48 46 46 ...

47 45 45 45 44 45 43 43 42 41 39 40 39 40 39 40 40 41 41 42 43 42 43 ...

43 40 39 39 39 39 39 38 38 38 37 37 39 39 38 38 38 38 38 39 40 39 43 ...

43 47 50 53 55 55 52 49];

End

1. **Output**

Number of temperature readings:

ans =

884

Maximum temperature:

ans =

68

Minimum temperature:

ans =

7

Mean temperature:

ans =

39.9338

Number of temperature readings below freezing:

ans =

208

Maximum consecutive readings above freezing:

ans =

112

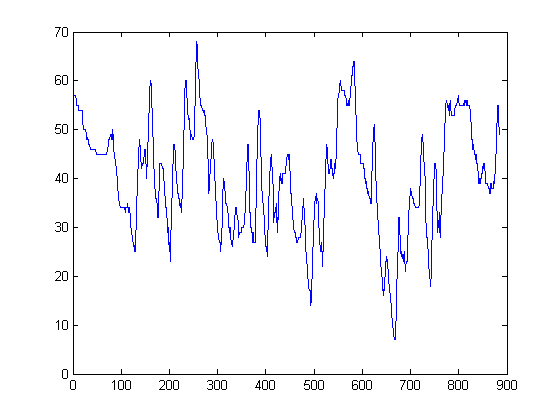
Mean consecutive readings above freezing:

ans =

24.2222

1. **Graphs**

Plot of Temperature Data



1. **Source Code**

% Analysis of Temperature Readings

% Project 2, CSE1010 Fall 2012

% Date: 9/10/2012

% Name: William Dickson

% Section: 009L

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clc % clear command window

clear % clear all variables

% Start of Program - Call allTemps and assign to Temps

Temps = allTemps;

% Display number of tmperature readings

disp('Number of temperature readings:')

length(Temps)

% Find Non-number vector locations and store to "Nans" variable

Nans = find(isnan(Temps));

% Use the means of previous and next values to create real numbers

Means = mean([Temps(Nans-1); Temps(Nans+1)]);

% Reaplace the NaNs

Temps(Nans) = Means;

% Calculate and Show Max, Min, and Mean Temperatures

disp('Maximum temperature:')

max(Temps)

disp('Minimum temperature:')

min(Temps)

disp('Mean temperature:')

mean(Temps)

% Find Temperatures below freezing

disp('Number of temperature readings below freezing:')

Freezing = find(Temps<32);

length(Freezing)

% Store durations between freezing values in a vector

Nonfreezing = Freezing(2:end)-Freezing(1:end-1)-1;

% Find longest above freezing duration

disp('Maximum consecutive readings above freezing:')

max(Nonfreezing)

% Determine mean number of consecutive readings above freezing

Nonzero\_freezing\_durations = Nonfreezing(find(Nonfreezing));

disp('Mean consecutive readings above freezing:')

mean(Nonzero\_freezing\_durations)

% Plot the temperatures (uncomment next line to run)

plot(Temps)