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```matlab
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ENGR 132
% Program Description
%You must perform a regression analysis on two sets of data, one which
%records sea level overtime, and one which records sattelite altimeter
%data.
%
% Assigment Information
%   Assignment:     PS 04, Problem 3
%   Author:         Ethan Hotson, ehotson@purdue.edu
%   Team ID:        009-01
%   Contributor:    N/A
%   My contributor(s) helped me:
%     [ ] understand the assignment expectations without
%         telling me how they will approach it.
%     [ ] understand different ways to think about a solution
%         without helping me plan my solution.
%     [ ] think through the meaning of a specific error or
%         bug present in my code without looking at my code.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

INITIALIZATION

```matlab
dataNASA=csvread('Data_NASA_altimeter_gmsl_meas.csv',1,0); %Reads data
 from NASA sattelite csv file
dataCSIRO=csvread('Data_CSIRO_gmsl_mo_2013.csv',1,0); %Reads data from
 CSIRO relative sea level file

csiroYear=dataCSIRO(1358:1608,1); %Creates column of years 1993-2013
 from CSIRO
```

```
csiroLvl=dataCSIRO(1358:1608,2); %Creates column of sea level data
 from CSIRO

nasaYear=dataNASA(1:784,1); %Creates column of years 1993-2013 from
 NASA
nasaLvl=dataNASA(1:784,2);%Creates column of sea level data from NASA
```

CALCULATIONS

```
regNASA=polyfit(nasaYear,nasaLvl,1);%Performs linear regression on
 NASA data
nasaPredVals=nasaYear*regNASA(1)+regNASA(2);%Creates predicted values
 based on NASA linear regression
nasaSSE=sum((nasaLvl-nasaPredVals).^2);%Calculates NASA SSE
nasaSST=sum((nasaLvl-mean(nasaLvl)).^2);%Calculates NASA SST
nasaRSqr=1-nasaSSE/nasaSST;%Calculates NASA R^2 value

regCSIRO=polyfit(csiroYear,csiroLvl,1);%Performs linear regression on
 CSIRO data
csiroPredVals=csiroYear*regCSIRO(1)+regCSIRO(2);%Creates predicted
 values based on CSIRO linear regression
csiroSSE=sum((csiroLvl-csiroPredVals).^2);%Calculates CSIRO SSE
csiroSST=sum((csiroLvl-mean(csiroLvl)).^2);%Calculates CSIRO SST
csiroRSqr=1-csiroSSE/csiroSST;%Calculates CSIRO R^2 value
```

FIGURE DISPLAY

```
figure(1)%Creates figure
subplot(2,1,1)%Creates subplot for NASA data
plot(nasaYear,nasaLvl,'+b');%plots NASA data
title('Change in Sea Level, 1993-2013, NASA')%Titles the figure
xlabel('Year')%Labels x axis
ylabel('Sea Level relative to mean of 1996-2016')%Labels y axis
grid on%Turns on grid
refline(regNASA(1),regNASA(2));%Graphs NASA linear regression

subplot(2,1,2)%Creates subplot for CSIRO data
plot(csiroYear,csiroLvl,'*r');%plots CSIRO data
title('Change in Sea Level, 1993-2013, NASA')%Titles the figure
xlabel('Year')%Labels x axis
ylabel('Sea Level relative to 1990 midpoint')%Labels y axis
grid on%Turns on grid
refline(regCSIRO(1),regCSIRO(2));%Graphs CSIRO linear regression
```

TEXT DISPLAY

```
fprintf('The equation for the NASA linear regression model is y=%0.5fx
+%0.5f.\n',regNASA(1),regNASA(2))
fprintf('The SSE, SST and R^2 values for the NASA linear regression
 are %0.5f,%0.5f and %0.5f, respectively.\n',nasaSSE,nasaSST,nasaRSqr)

fprintf('The equation for the CSIRO linear regression model is y=
%0.5fx+%0.5f.\n',regCSIRO(1),regCSIRO(2))
fprintf('The SSE, SST and R^2 values for the CSIRO linear
 regression are %0.5f,%0.5f and %0.5f, respectively.
\n',csiroSSE,csiroSST,csiroRSqr)

The equation for the NASA linear regression model is y=0.02715x
+1992.71389.
The SSE, SST and R^2 values for the NASA linear regression are
 0.00028,29698.71609 and 1.00000, respectively.
The equation for the CSIRO linear regression model is y=3.56278x
+-7102.78641.
The SSE, SST and R^2 values for the CSIRO linear regression are
 9188.83346,125346.92996 and 0.92669, respectively.
```

ANALYSIS

```
% -- Q1
% It seems as though the NASA sattelite data is more accurate, as
 there is
% a known error consideration, which the CSIRO data lacks.

% -- Q2
%The NASA linear regression is far more representative of its dataset,
 with
%a nearly perfect R^2 value of effectively 1.

% -- Q3
% The CSIRO shows a higher sea level growth rate of 3.56278 as opposed
 to
% 0.02715.

% -- Q4
% According to the NASA linear regression model, the 2019 sea level
 will be
% 2047.52974ft above the 1996-2016 mean level. According to the CSIRO
% linear regression model, the 2019 sea level will be 90.46641 ft
 above the
% 1990 midpoint. However, it would be dangerous to make this
 assumption, as
```

```
% it would be likely to be an innacurate extrapolation on data which
 does
% not reflect this future period.
```

ACADEMIC INTEGRITY STATEMENT

I have not used source code obtained from any other unauthorized source, either modified or unmodified. Neither have I provided access to my code to another. The script I am submitting is my own original work.

Published with MATLAB® R2018b