Contents


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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ENGR 132
% Program Description
% perform linear regression to determine how each of the four conditions affects the plant
’s net electrical power output
%
% Assigment Information
%   Assignment:     PS 04, Problem 3
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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

INITIALIZATION

```
%import all data from csv file for future use
allData=importdata('Data_CCPP_measurements.csv');
temperatureRaw=allData.data(:,1);
atmPressureRaw=allData.data(:,2);
humidityRaw=allData.data(:,3);
vacPressureRaw=allData.data(:,4);
powerRaw=allData.data(:,5);
```

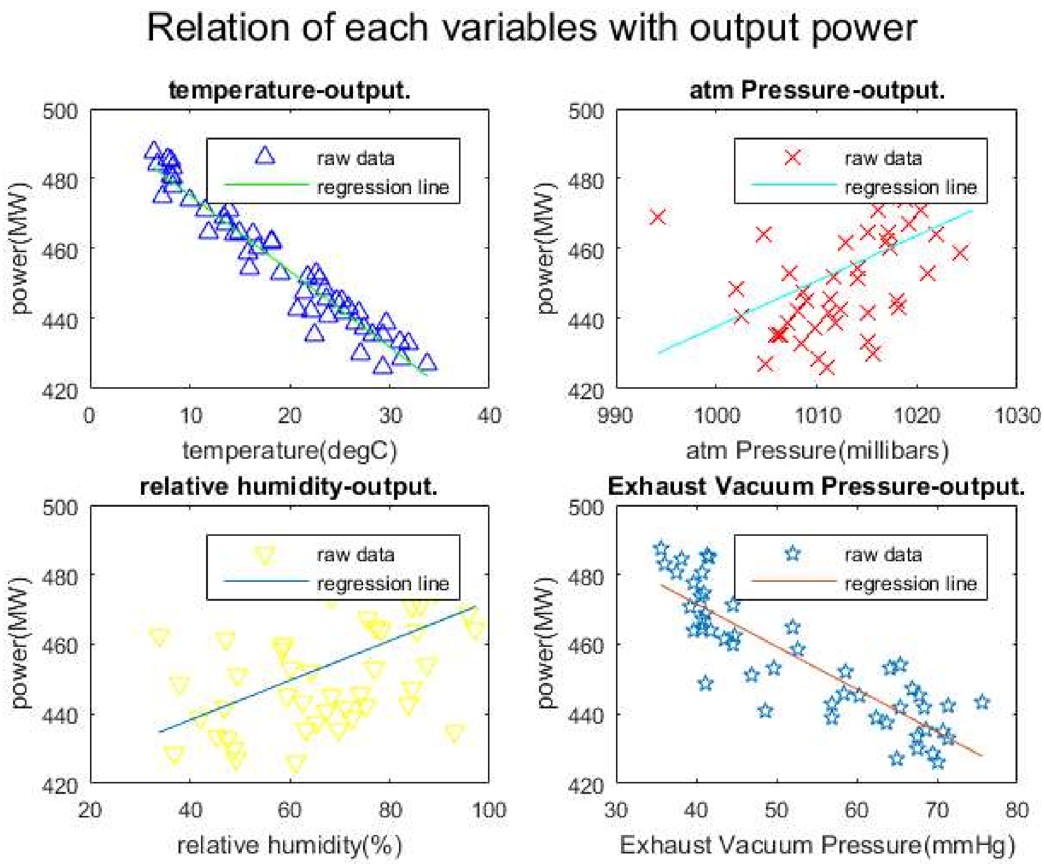
CALCULATIONS

```
%calculate regression line for each model
temperatureFit=polyfit(temperatureRaw,powerRaw,1);
atmPressureFit=polyfit(atmPressureRaw,powerRaw,1);
humidityFit=polyfit(humidityRaw,powerRaw,1);
vacPressureFit=polyfit(vacPressureRaw,powerRaw,1);
%calculate R^2
%temperature
tempSST=sum((powerRaw-mean(powerRaw)).^2);
```

```
tempSSE=sum((powerRaw-temperatureFit(1)*temperatureRaw-temperatureFit(2)).^2);
r2Temp=1-tempSSE/tempSST;
%atm Pressure
atmSST=sum((powerRaw-mean(powerRaw)).^2);
atmSSE=sum((powerRaw-atmPressureFit(1)*atmPressureRaw-atmPressureFit(2)).^2);
r2Atm=1-atmSSE/atmSST;
%humidity
humSST=sum((powerRaw-mean(powerRaw)).^2);
humSSE=sum((powerRaw-humidityFit(1)*humidityRaw-humidityFit(2)).^2);
r2hum=1-humSSE/humSST;
%vacPressure
vacSST=sum((powerRaw-mean(powerRaw)).^2);
vacSSE=sum((powerRaw-vacPressureFit(1)*vacPressureRaw-vacPressureFit(2)).^2);
r2vac=1-vacSSE/vacSST;
```

FIGURE DISPLAY

```
%temperature plot
subplot(2,2,1);
plot(temperatureRaw,powerRaw,'b^');
hold on;
plot(temperatureRaw,temperatureRaw*temperatureFit(1)+temperatureFit(2),'g');
title('temperature-output.');
xlabel('temperature(degC)');
ylabel('power(MW)');
legend('raw data','regression line');
set(gca,'FontSize',8);
%atm pressure plot
subplot(2,2,2);
plot(atmPressureRaw,powerRaw,'rx');
hold on;
plot(atmPressureRaw,atmPressureRaw*atmPressureFit(1)+atmPressureFit(2),'c');
title('atm Pressure-output.');
xlabel('atm Pressure(millibars)');
ylabel('power(MW)');
legend('raw data','regression line');
set(gca,'FontSize',8);
%Relative Humidty plot
subplot(2,2,3);
plot(humidityRaw,powerRaw,'yv');
hold on;
plot(humidityRaw,humidityRaw*humidityFit(1)+humidityFit(2));
title('relative humidity-output.');
xlabel('relative humidity(%)');
ylabel('power(MW)');
legend('raw data','regression line');
set(gca,'FontSize',8);
%Exhaust Vacuum Pressure plot
subplot(2,2,4);
plot(vacPressureRaw,powerRaw,'p');
hold on;
plot(vacPressureRaw,vacPressureRaw*vacPressureFit(1)+vacPressureFit(2));
title('Exhaust Vacuum Pressure-output.');
xlabel('Exhaust Vacuum Pressure(mmHg)');
ylabel('power(MW)');
legend('raw data','regression line');
set(gca,'FontSize',8);
suptitle('Relation of each variables with output power')
```



TEXT DISPLAY

```
fprintf('The equation for temperature with output is power = %.2f temperature + %.2f.\n',t
emperatureFit);
fprintf('The equation for Atmospheric Pressure with output is power = %.2f pressure %.2f.\
n',atmPressureFit);
fprintf('The equation for Relative Humidty with output is power = %.2f humidity + %.2f.\n'
,humidityFit);
fprintf('The equation for Exhaust Vacuum Pressure with output is power = %.2f vacPressure
+ %.2f.\n',vacPressureFit);
fprintf('\ncoefficient of determination of temperature with output is %.4f\n',r2Temp);
fprintf('coefficient of determination of Atmospheric Pressur with output is %.4f\n',r2Atm)
;
fprintf('coefficient of determination of Relative Humidty with output is %.4f\n',r2hum);
fprintf('coefficient of determination of Exhaust Vacuum Pressure with output is %.4f\n',r2
vac);
```

```
The equation for temperature with output is power = -2.17 temperature + 497.03.
The equation for Atmospheric Pressure with output is power = 1.30 pressure -862.18.
The equation for Relative Humidty with output is power = 0.57 humidity + 415.41.
The equation for Exhaust Vacuum Pressure with output is power = -1.23 vacPressure + 520.80
.

coefficient of determination of temperature with output is 0.9364
coefficient of determination of Atmospheric Pressur with output is 0.2170
coefficient of determination of Relative Humidty with output is 0.2831
coefficient of determination of Exhaust Vacuum Pressure with output is 0.7577
```

ANALYSIS

```
% -- Q1
%  The larger R^2 value is, the better a linear model explain a existing
%  data set

% -- Q2
% the model of Ambient temperature with output power is the best model to
% explain the data beacuse it has the highest R^2 value.
```

ACADEMIC INTEGRITY STATEMENT

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