# CSI-777 Homework 2

September 5, 2019

## 0.1 CSI-777 Homework 2

### 0.1.1 Jericho McLeod

**Import the data**

```
In [4]: import csv
        import matplotlib.pyplot as plt

        data = []
        with open('hw1.csv') as csvfile:
            csv_r = csv.reader(csvfile,delimiter=',')
            for row in csv_r:
                data.append(row)
```

**Show the data**

```
In [5]: data[0][0]='outlook'
        for i in data:
            print("%10s %10s %10s %10s %10s"%(i[0],i[1],i[2],i[3],i[4]))
```

```
   outlook temperature   humidity      windy       play
     sunny          85         85      FALSE         no
     sunny          80         90       TRUE         no
  overcast          83         86          0        yes
     rainy          70         96      FALSE
     rainy          68         80      FALSE        yes
     rainz          65         70       TRUE         no
  overcast                     65       TRUE        yes
     sunny          72         95      FALSE         no
     sunny         -40         70      FALSE        yes
     rainy          75         80      FALSE        yes
     sunny          75         70       TRUE        yes
  overcast          72         90       TRUE        yes
  overcast          81         75      FALSE        yes
     rainy          71         91       TRUE         no
```

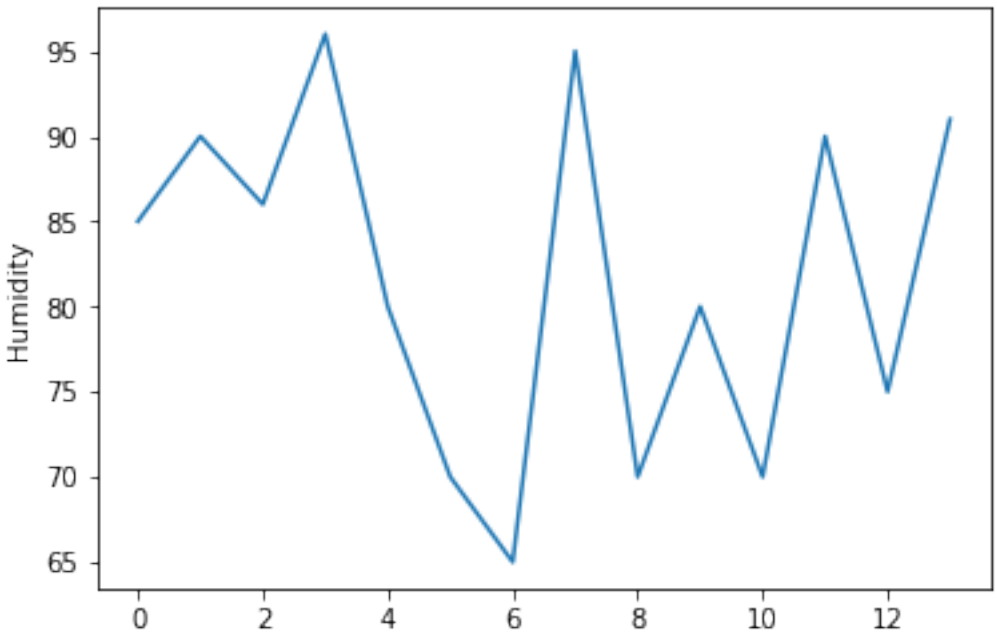
**Examine the Humidity data a bit more:**

```
In [6]: humidity = []
        for i in data:
            try:
                humidity.append(int(i[2]))
            except:
                pass

        humidity_mean = 0
        for i in humidity:
            humidity_mean+=i
        humidity_mean/=len(humidity)
        print("Mean humidity: %f"%(humidity_mean))
        ss = 0
        for i in humidity:
            var = i-humidity_mean
            var_sq = var**2
            ss+=var_sq
        st_dev = ((1/(len(humidity)-1))*ss)**0.5
        print("Standard Deviation: %f"%(st_dev))


        plt.plot(humidity)
        plt.ylabel('Humidity')
        plt.show()
```

```
Mean humidity: 81.642857
Standard Deviation: 10.285218
```



**Look at the split on 1 Standard Deviation:**

```
In [7]: high = []
        mid  = []
        low  = []
        standard_dev_output = []

        for i in range(len(data)):
            if i==0:
                high.append(data[i])
                mid.append(data[i])
                low.append(data[i])
                standard_dev_output.append(data[i])
            else:
                if int(data[i][2])>humidity_mean+st_dev:
                    high.append(data[i])
                elif int(data[i][2])<=humidity_mean+st_dev and int(data[i][2])>humidity_mean-st
                    mid.append(data[i])
                    standard_dev_output.append(data[i])
                elif int(data[i][2]) <= humidity_mean-st_dev:
                    low.append(data[i])
                    standard_dev_output.append(data[i])

        print("\nHigh Humidity Instances:")
        for i in high:
            print("%10s %10s %10s %10s %10s"%(i[0],i[1],i[2],i[3],i[4]))

        print("\nMid Humidity Instances:")
        for i in mid:
            print("%10s %10s %10s %10s %10s"%(i[0],i[1],i[2],i[3],i[4]))

        print("\nLow Humidity Instances:")
        for i in low:
            print("%10s %10s %10s %10s %10s"%(i[0],i[1],i[2],i[3],i[4]))


High Humidity Instances:
   outlook temperature   humidity      windy       play
     rainy          70         96      FALSE
     sunny          72         95      FALSE         no

Mid Humidity Instances:
   outlook temperature   humidity      windy       play
     sunny          85         85      FALSE         no
     sunny          80         90       TRUE         no
```

```
  overcast          83          86           0        yes
     rainy          68          80       FALSE        yes
     rainy          75          80       FALSE        yes
  overcast          72          90        TRUE        yes
  overcast          81          75       FALSE        yes
     rainy          71          91        TRUE         no

Low Humidity Instances:
    outlook temperature   humidity      windy       play
      rainz          65          70       TRUE         no
  overcast                      65       TRUE        yes
     sunny         -40          70       FALSE       yes
     sunny          75          70       TRUE        yes
```

**Eliminating instances with Standard Deviations > 1 removes 2.**

**Let's look at removing the top 1/3 and compare datasets:**

```
In [8]: q_remove = len(humidity)//3
        humidity_trunc = sorted(humidity)[:-q_remove]
        bottom_66_output = []
        for i in range(len(data)):
            if i == 0:
                bottom_66_output.append(data[i])
            else:
                if int(data[i][2]) in humidity_trunc:
                    bottom_66_output.append(data[i])

        print("Original Data:")
        for i in data:
            print("%10s %10s %10s %10s %10s"%(i[0],i[1],i[2],i[3],i[4]))

        print("\nData with the top 1/3rd removed:")
        for i in bottom_66_output:
            print("%10s %10s %10s %10s %10s"%(i[0],i[1],i[2],i[3],i[4]))

        print("\nData < 1 Standard Deviation above the mean:")
        for i in standard_dev_output:
            print("%10s %10s %10s %10s %10s"%(i[0],i[1],i[2],i[3],i[4]))

Original Data:
    outlook temperature   humidity      windy       play
      sunny          85          85       FALSE        no
      sunny          80          90        TRUE        no
  overcast          83          86           0        yes
     rainy          70          96       FALSE
     rainy          68          80       FALSE        yes
```

```
     rainz          65          70        TRUE          no
  overcast                      65        TRUE         yes
     sunny          72          95       FALSE          no
     sunny         -40          70       FALSE         yes
     rainy          75          80       FALSE         yes
     sunny          75          70        TRUE         yes
  overcast          72          90        TRUE         yes
  overcast          81          75       FALSE         yes
     rainy          71          91        TRUE          no

Data with the top 1/3rd removed:
   outlook temperature   humidity      windy       play
     sunny          85          85       FALSE          no
     sunny          80          90        TRUE          no
  overcast          83          86           0         yes
     rainy          68          80       FALSE         yes
     rainz          65          70        TRUE          no
  overcast                      65        TRUE         yes
     sunny         -40          70       FALSE         yes
     rainy          75          80       FALSE         yes
     sunny          75          70        TRUE         yes
  overcast          72          90        TRUE         yes
  overcast          81          75       FALSE         yes

Data < 1 Standard Deviation above the mean:
   outlook temperature   humidity      windy       play
     sunny          85          85       FALSE          no
     sunny          80          90        TRUE          no
  overcast          83          86           0         yes
     rainy          68          80       FALSE         yes
     rainz          65          70        TRUE          no
  overcast                      65        TRUE         yes
     sunny         -40          70       FALSE         yes
     rainy          75          80       FALSE         yes
     sunny          75          70        TRUE         yes
  overcast          72          90        TRUE         yes
  overcast          81          75       FALSE         yes
     rainy          71          91        TRUE          no
```

Removing the top 1/3 (rounded down) trims 4 observations from the dataset of 4 instances.

Without knowing the reason for removing 'High' humidity instances, it is impossible to know if either measure is sufficient. For instance, high could be the only alternative to low humidity, in which case 7 instances should be removed.

Based on the chart of humidity, I prefer the standard deviation method, as it removes the two that I would label 'high points,' despite being added to this notebook after writing most of this conclusion (I went with the 'Ed Tufte' method of deciding which measure made sense to me).

```
In [9]: print("\nFinal Data:")
```

```
        for i in standard_dev_output:
            print("%10s %10s %10s %10s %10s"%(i[0],i[1],i[2],i[3],i[4]))
```

```
Final Data:
   outlook temperature   humidity      windy       play
     sunny          85         85      FALSE         no
     sunny          80         90       TRUE         no
  overcast          83         86          0        yes
     rainy          68         80      FALSE        yes
     rainz          65         70       TRUE         no
  overcast                     65       TRUE        yes
     sunny         -40         70      FALSE        yes
     rainy          75         80      FALSE        yes
     sunny          75         70       TRUE        yes
  overcast          72         90       TRUE        yes
  overcast          81         75      FALSE        yes
     rainy          71         91       TRUE         no
```

In [ ]:

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