

Autocorrelation in weather

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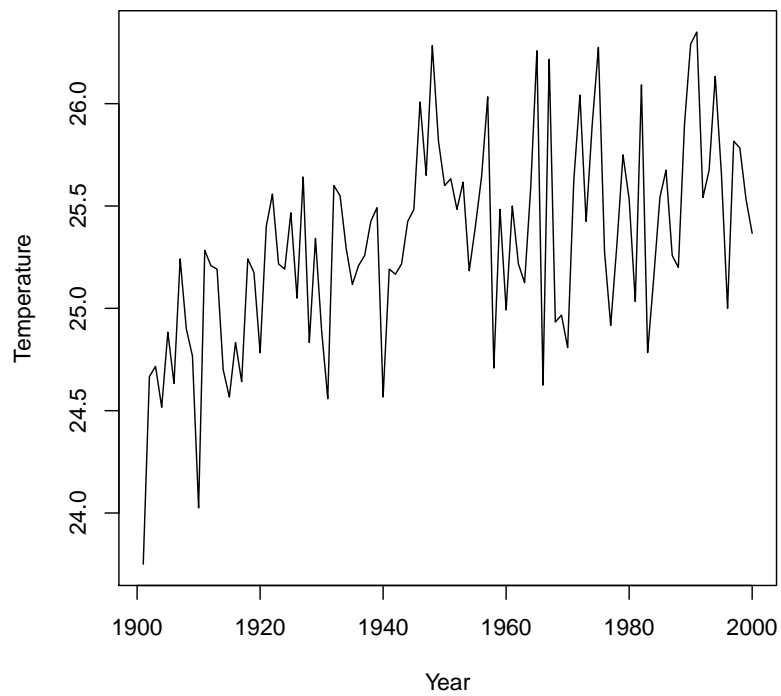
1. Calculate the correlation coefficient

First, I loaded the file, shifted the temperature data and cut them to same length, and worked out the correlation coefficient with following codes.

```
> load("/home/yige/Documents/CMEECoursework/WEEK3/data/KeyWestAnnualMeanTemperat  
> y1901<-ats$Temp[-100]  
> y1902<-ats$Temp[-1]  
> corcoe<-cor(y1901,y1902)
```

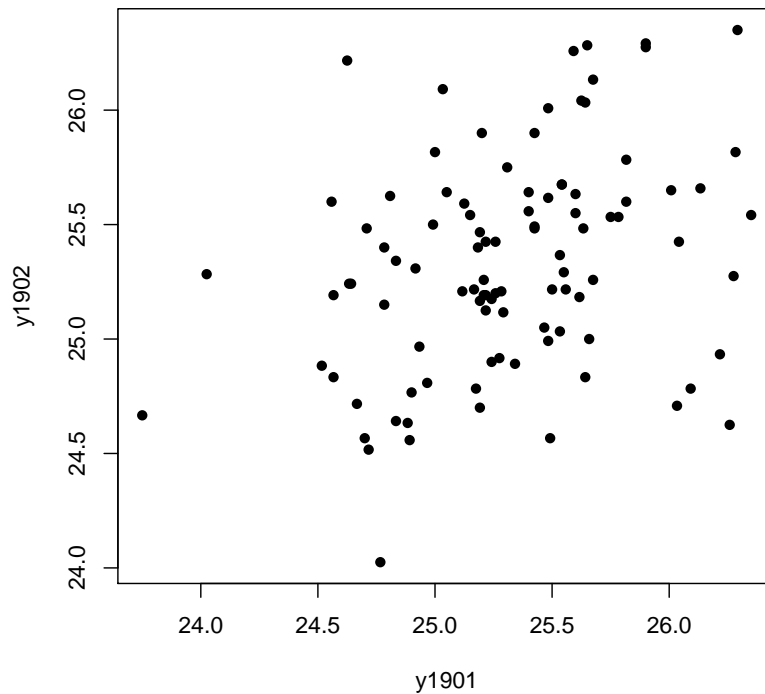
The temperature fluctuation over years is shown in the plot below

```
> plot(Temp~Year, data = ats, type="l",ylab="Temperature")
```



And the correlation looks like;

```
> plot(y1902~y1901, pch=16)
```



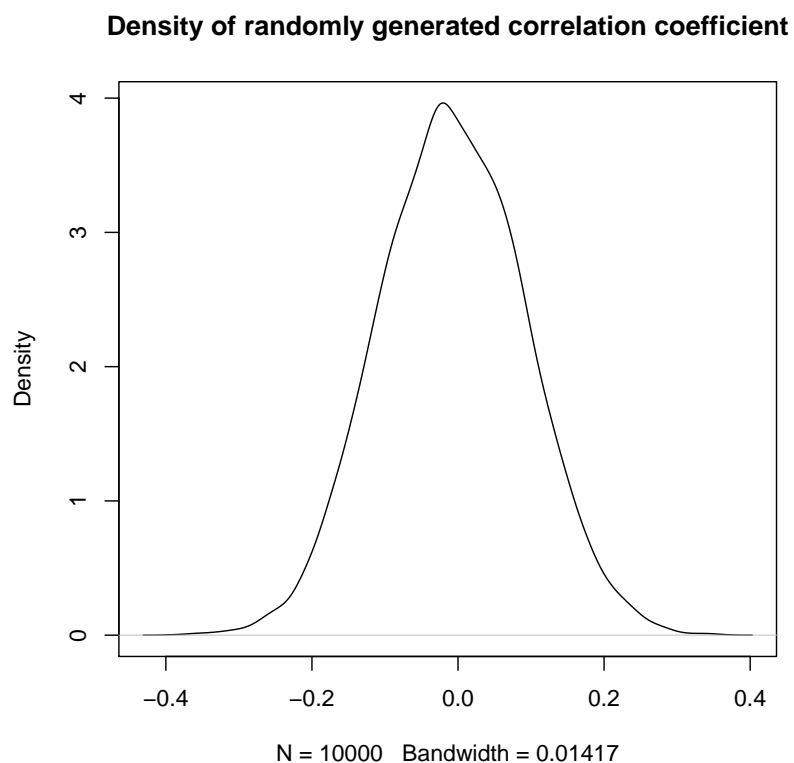
2. Randomize the data, and repeat the calculation

Here, I created a empty list, and randomize the data, generate correlation coefficients for 10000 times and store them to the list.

```
> rcorcoe <- c()
> for (i in 1:10000){
+   rtemp<- sample(ats$Temp,size = length(ats$Temp),replace = FALSE)
+   ry1901<-rtemp[-100]
+   ry1902<-rtemp[-1]
+   rcorcoe[i]<- cor(ry1901,ry1902)
+ }
```

The density of randomly generated correlation coefficient are:

```
> plot(density(rcorcoe),main = "Density of randomly generated correlation coeffi
```



3. Calculate p value

Finally, I compared the each random correlation coefficient with the actual one which a loop, and work out how many of them are greater that the actual one with following codes:

```
> for (i in rcorcoe){  
+   a <- 0  
+   if(i>corcoe){a = a+1}  
+   p=a/length(rcorcoe)  
+ }  
> print(paste("p-value=",p))  
[1] "p-value= 0"
```

The p value is 0

Conclusion

The p value is 0 means none of the randomly generated correlation coefficient is greater than the actual one, and temperature growth is not randomly occurred, there is a significant correlation between current and previous year.