

Assignment 1

Statistical Modelling: Theory and Practice

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10/4/2020

Project 1

Wind Power Forecast

```
setwd(wd)
raw_wp <- read.csv("project_data/tuno.txt", sep=" ")
```

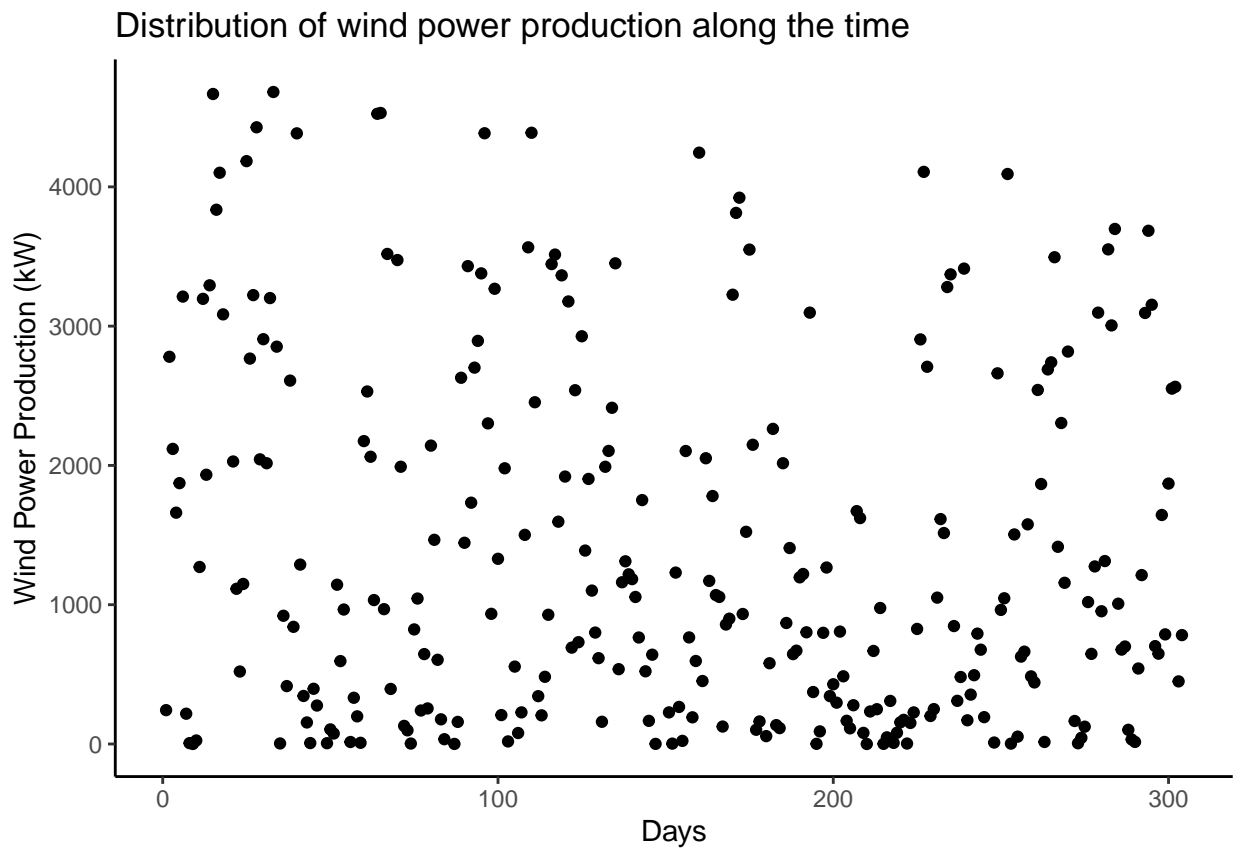
Summary statistics

```
summary(raw_wp)
```

##	r.day	month	day	pow.obs
##	Min. : 1.00	Min. : 1.000	Min. : 1.00	Min. : 0.123
##	1st Qu.: 78.75	1st Qu.: 3.000	1st Qu.: 8.00	1st Qu.: 254.158
##	Median :156.50	Median : 6.000	Median :15.00	Median : 964.123
##	Mean :154.30	Mean : 5.594	Mean :15.47	Mean :1381.196
##	3rd Qu.:229.25	3rd Qu.: 8.000	3rd Qu.:23.00	3rd Qu.:2196.579
##	Max. :304.00	Max. :10.000	Max. :31.00	Max. :4681.062
##	ws30	wd30		
##	Min. : 1.139	Min. :0.000095		
##	1st Qu.: 5.779	1st Qu.:2.474999		
##	Median : 8.498	Median :4.079297		
##	Mean : 9.112	Mean :3.602390		
##	3rd Qu.:11.202	3rd Qu.:4.945443		
##	Max. :24.950	Max. :6.274642		

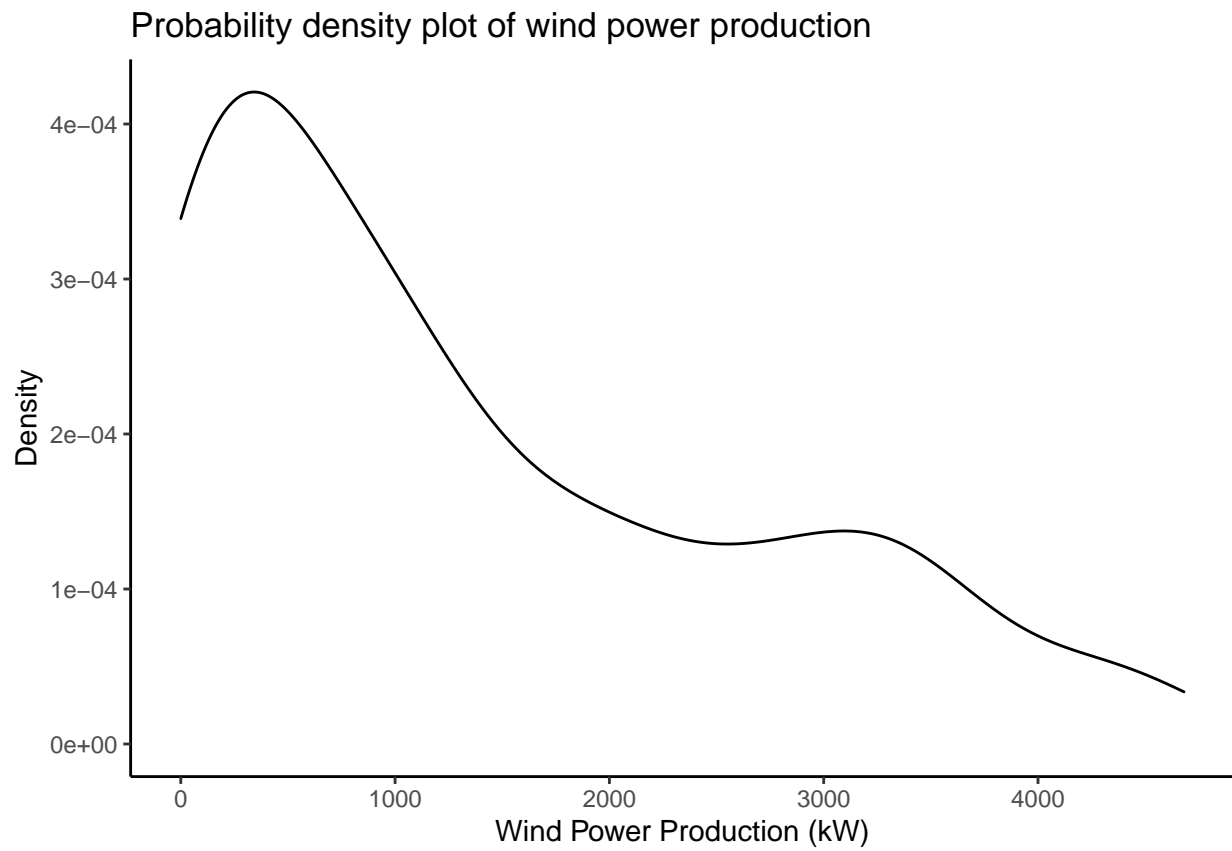
Distribution of wind power production along the time

```
ggplot(data=raw_wp, aes(x=r.day, y=pow.obs)) + geom_point() + labs(title= "Distribution of wind power p
```



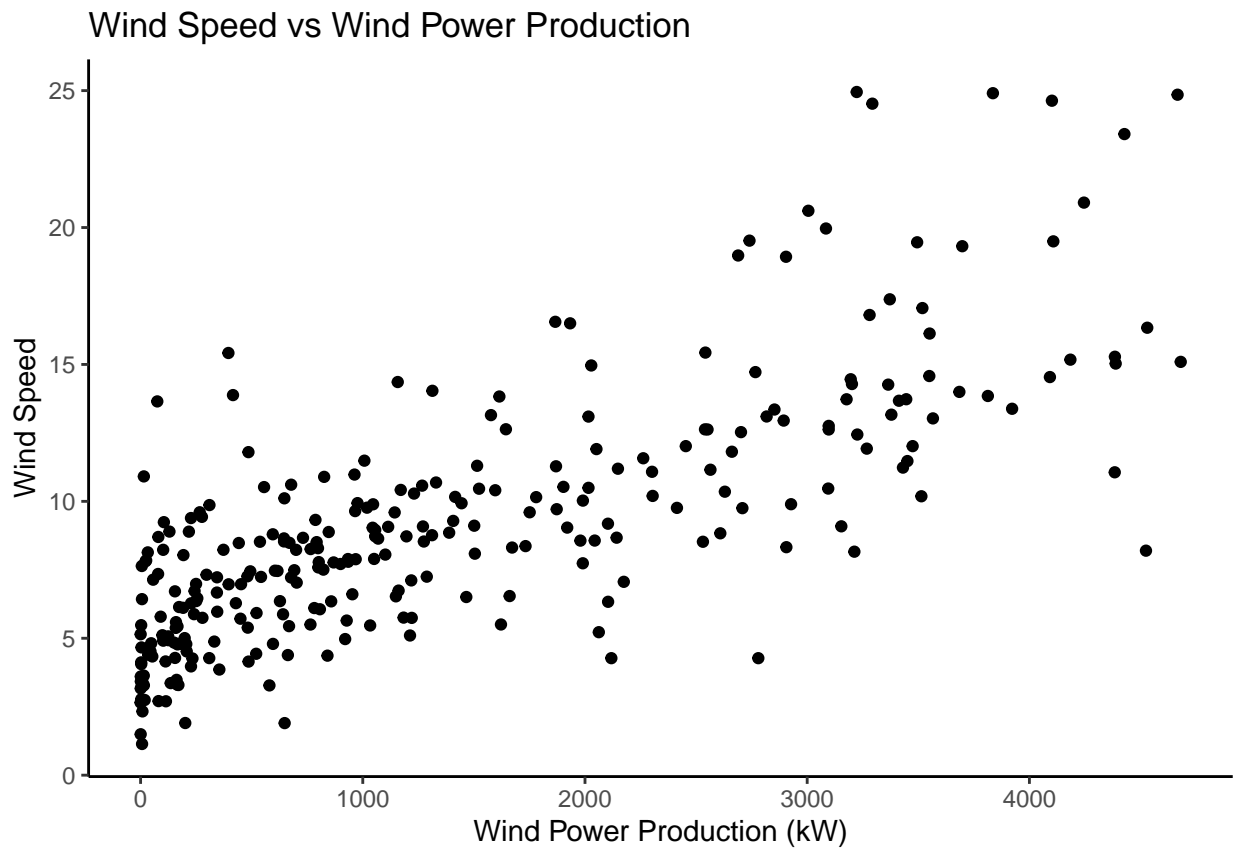
Probability density function of the Wind Power Production

```
ggplot(data = raw_wp, aes(x=pow.obs)) + geom_density() + labs(title= "Probability density plot of wind
```



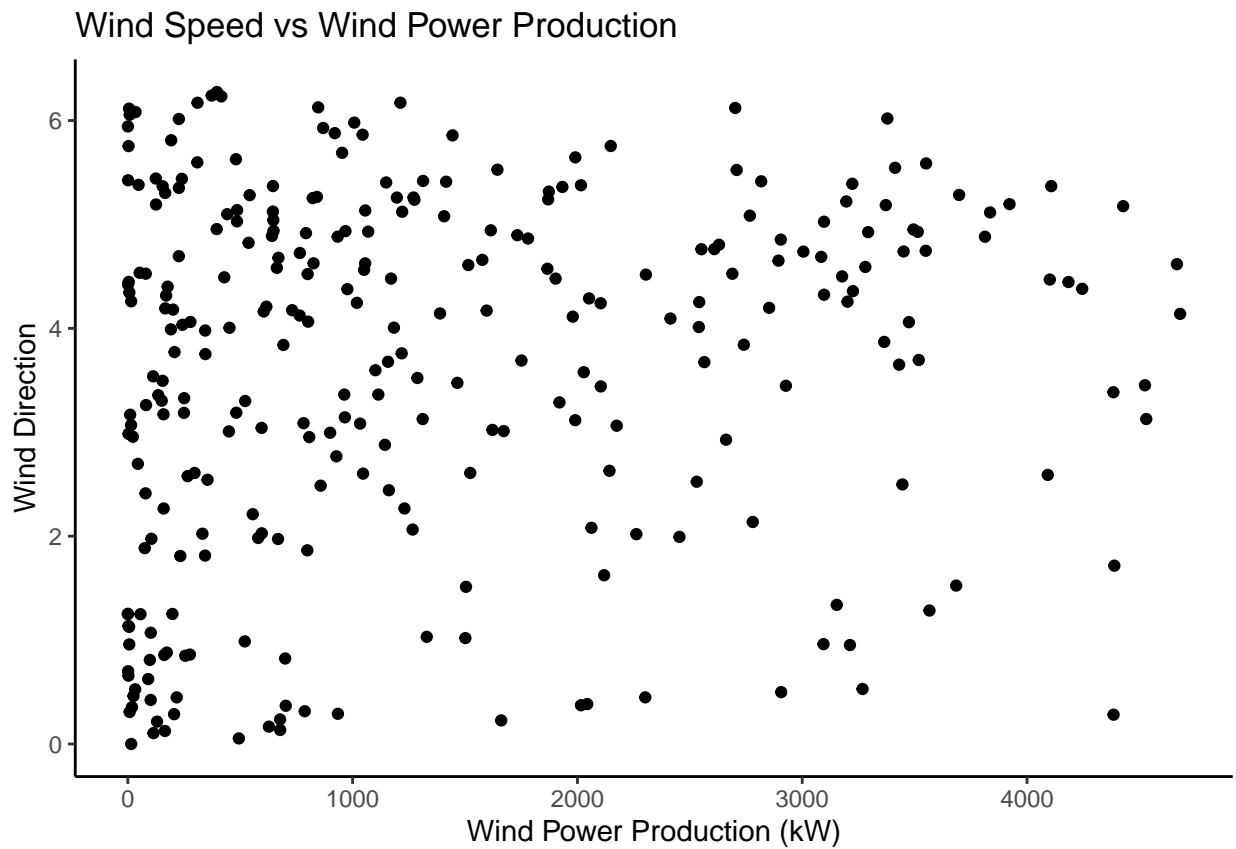
Wind Speed vs Wind Power Production

```
ggplot(data = raw_wp, aes(x=pow.obs, y=ws30)) + geom_point() + labs(title= "Wind Speed vs Wind Power Production")
```



Wind direction vs Wind Power Production

```
# NOT SUPER INFORMATIVE  
ggplot(data = raw_wp, aes(x=pow.obs, y=wd30)) + geom_point() + labs(title= "Wind Speed vs Wind Power Production")
```



```
# use case when
```

```
wp <- raw_wp %>%
```

```
  mutate(direction = case_when( pi/4 >= wd30 ~ "N",
                                (7*pi)/4 < wd30 ~ "N",
                                (3*pi)/4 >= wd30 & wd30 > pi/4 ~ "W",
                                (5*pi)/4 >= wd30 & wd30 > (3*pi)/4 ~ "S",
                                (7*pi)/4 >= wd30 & wd30 > (5*pi)/4 ~ "E"))
```

```
ggplot(data=wp, aes(x=direction, y=pow.obs)) + geom_violin(color=NA, fill="black", alpha= 0.3, draw_quantiles=c(0.25, 0.5, 0.75))
```

Wind direction effects on Wind Power Production

