Assignment 1

Statistical Modelling: Theory and Practice

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Project 1

WIND POWER FORECAST

1. Descriptive statistics

Set working directory and read the space-separated file

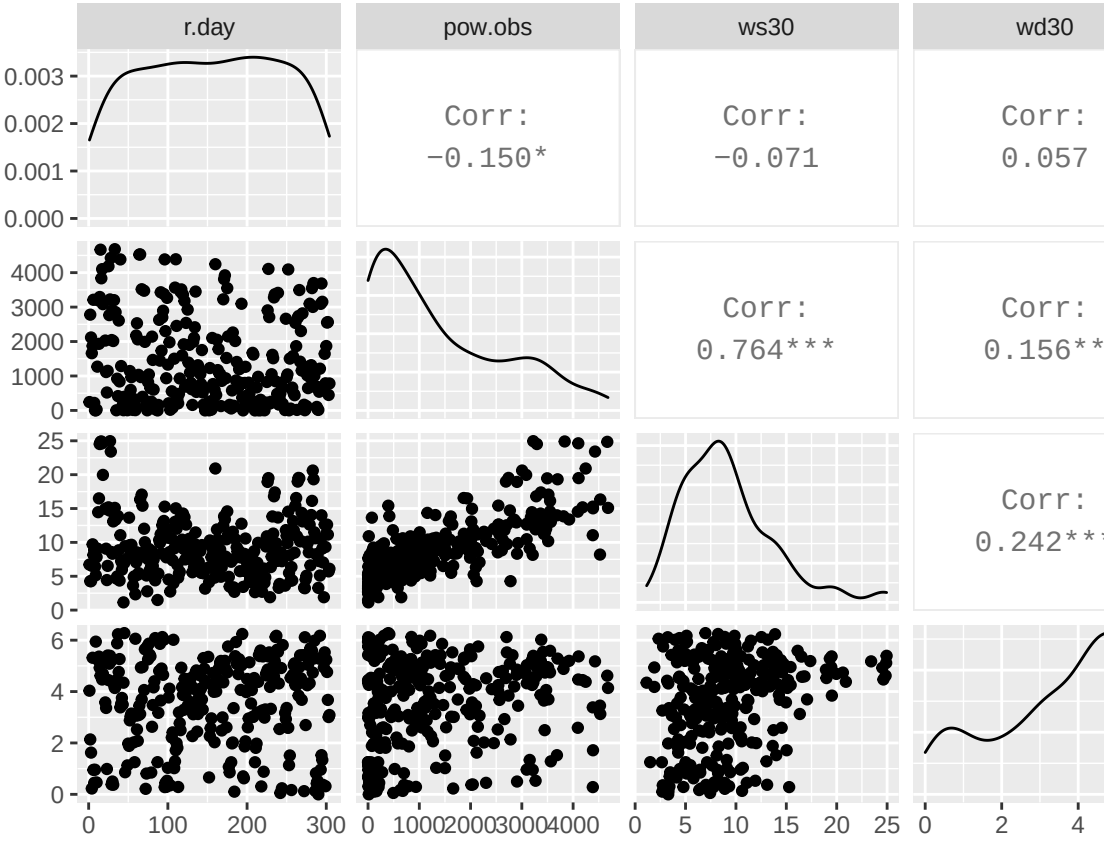
```
setwd(wd)
raw_wp <- read.csv("project_data/tuno.txt", sep=" ")
```

Summary statistics Below, the summary statistics for the Wind power production (pow.obs), the wind speed (ws30) and wind direction (wd30). The other three variables are categorical: r-days corresponds to the number of days from the start of the measurement. Month and day correspond to the date of the measurement. The start date is the 1st of January 2003 and the last day is 31st of October 2003, a total of 304 days.

```
summary(raw_wp[c("pow.obs", "ws30", "wd30")])
```

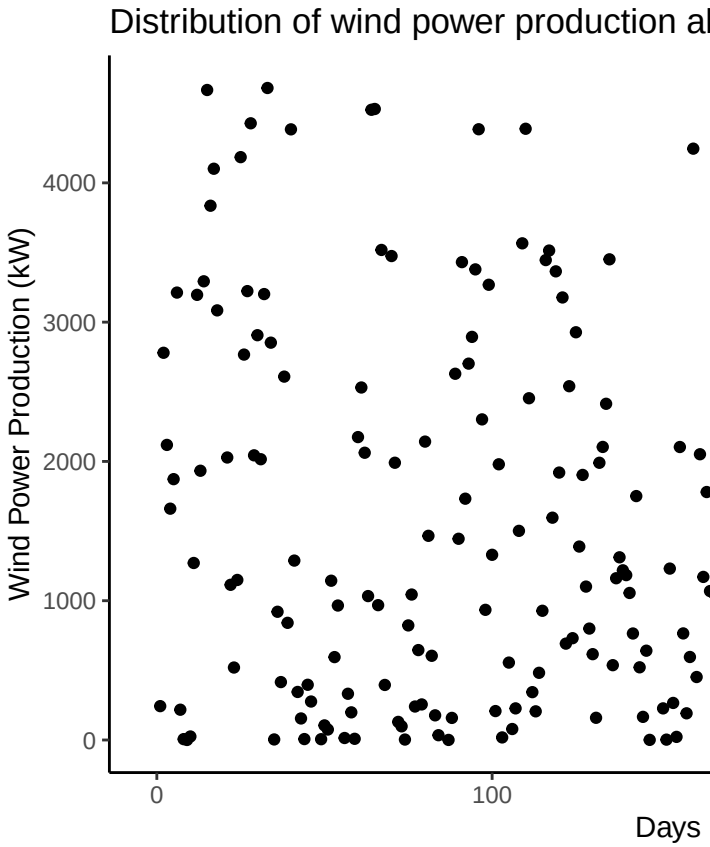
```
##     pow.obs              ws30             wd30
##  Min.   :   0.123   Min.   : 1.139   Min.   :0.000095
##  1st Qu.: 254.158   1st Qu.: 5.779   1st Qu.:2.474999
##  Median : 964.123   Median : 8.498   Median :4.079297
##  Mean   :1381.196   Mean   : 9.112   Mean   :3.602390
##  3rd Qu.:2196.579   3rd Qu.:11.202   3rd Qu.:4.945443
##  Max.   :4681.062   Max.   :24.950   Max.   :6.274642
```

```
wp <- raw_wp %>% mutate_at(vars(month, day), factor)

ggpairs(data = wp[c("r.day","pow.obs", "ws30", "wd30")],)
```



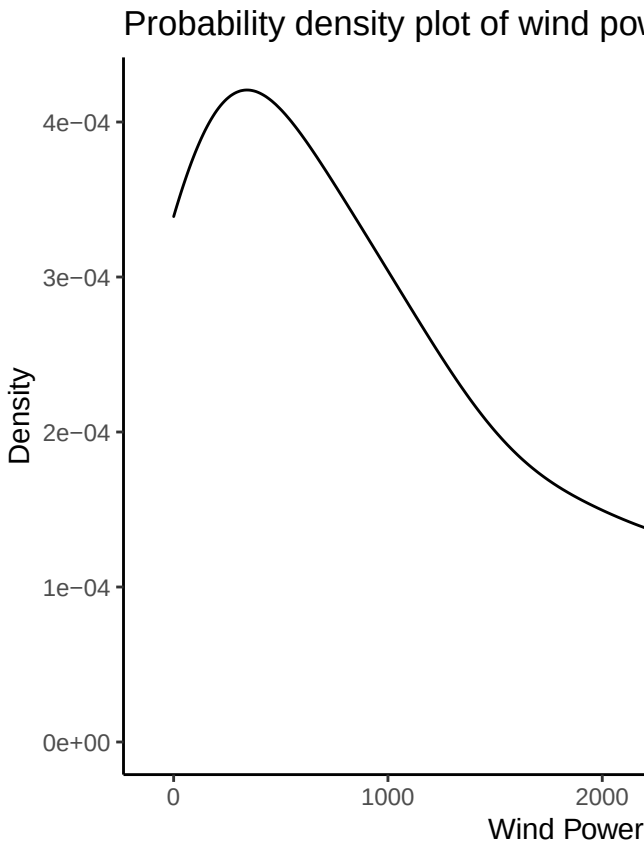
Pairs plot of all the data

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



Distribution of wind power production along the time

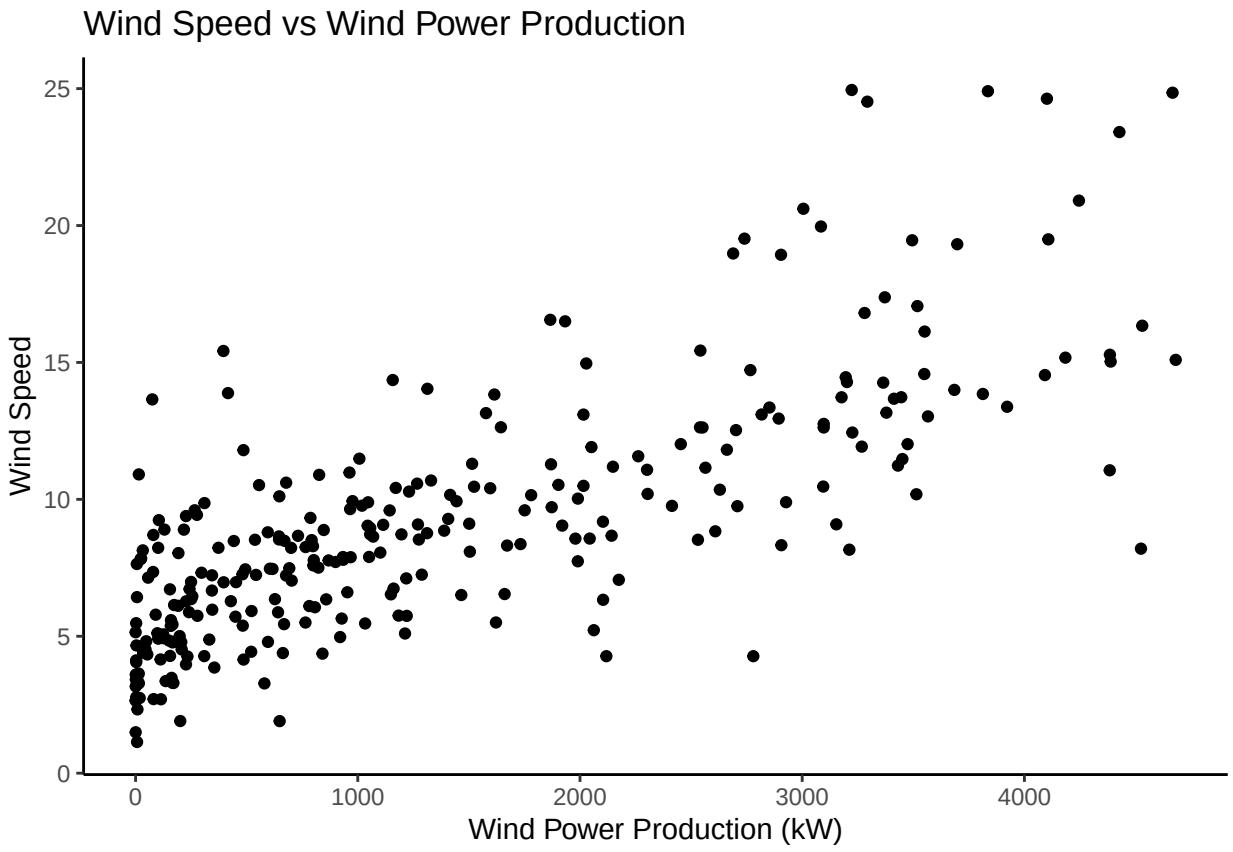
```
ggplot(data = wp, aes(x=pow.obs)) + geom_density()  + labs(title= "Probability density plot of wind powe
```



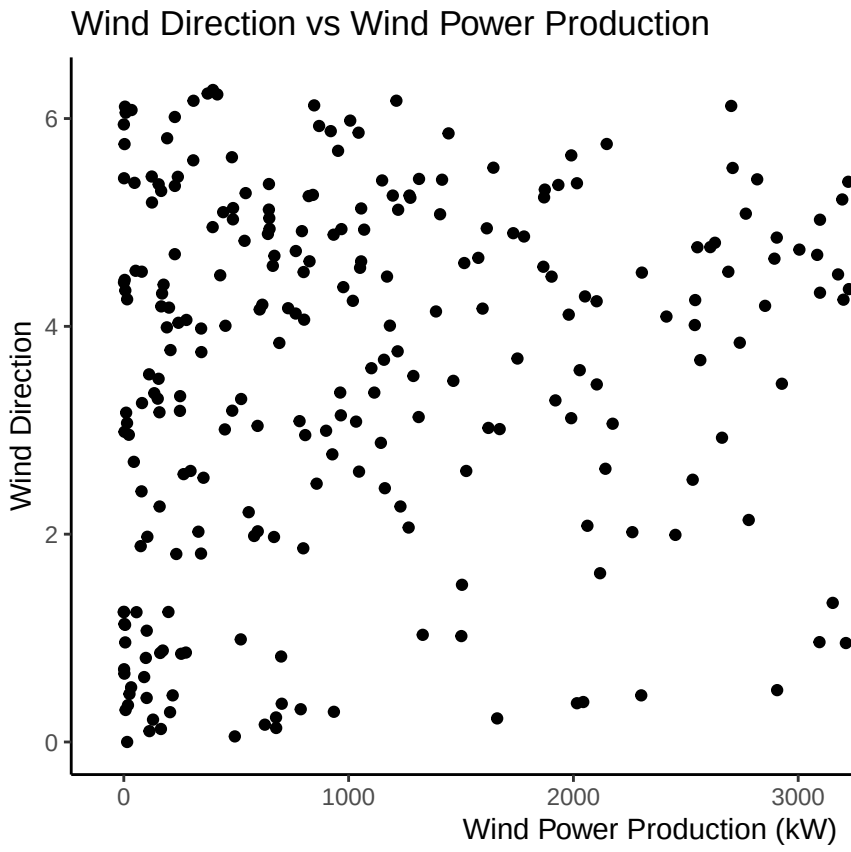
Probability density function of the Wind Power Production

Wind Speed vs Wind Power Production

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

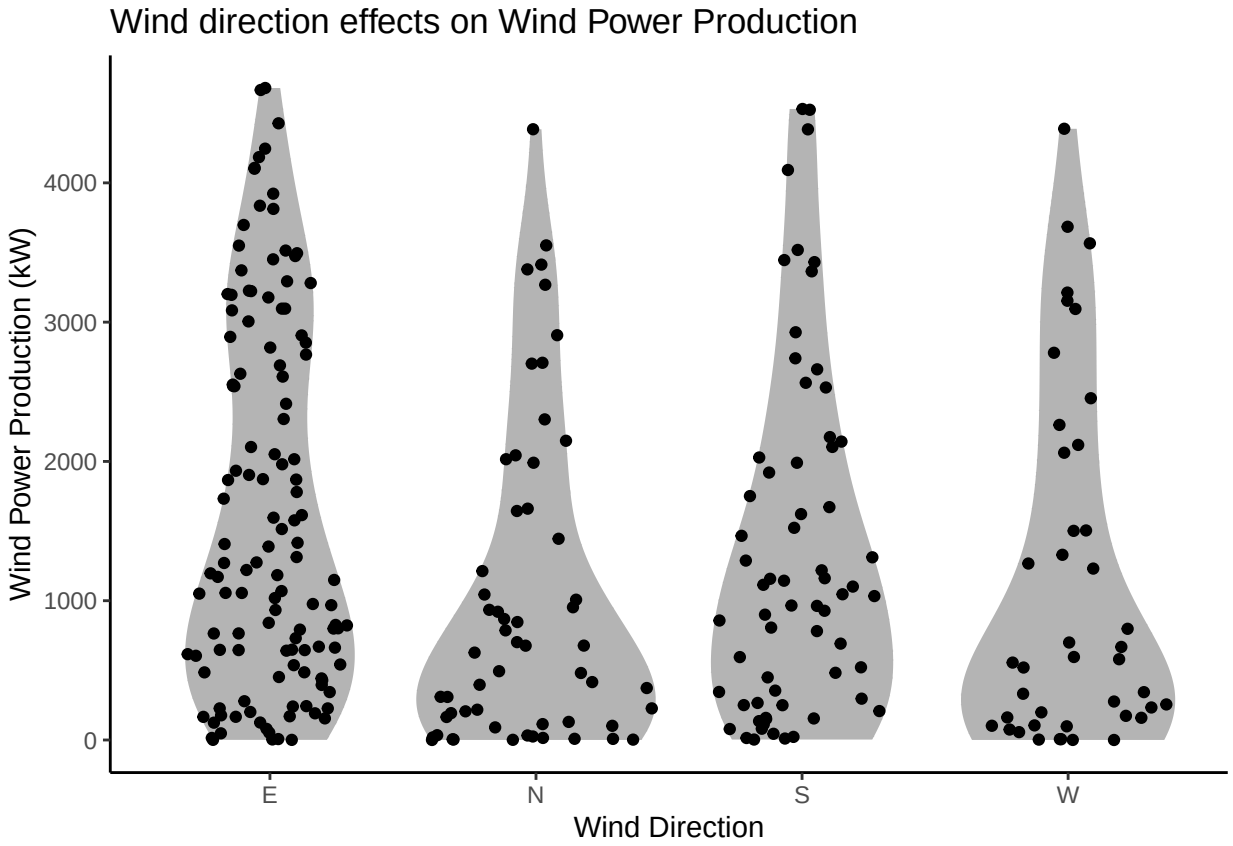



```
 # NOT SUPER INFORMATIVE
ggplot(data = wp, aes(x=pow.obs, y=wd30)) + geom_point() + labs(title= "Wind Direction vs Wind Power Pr
```



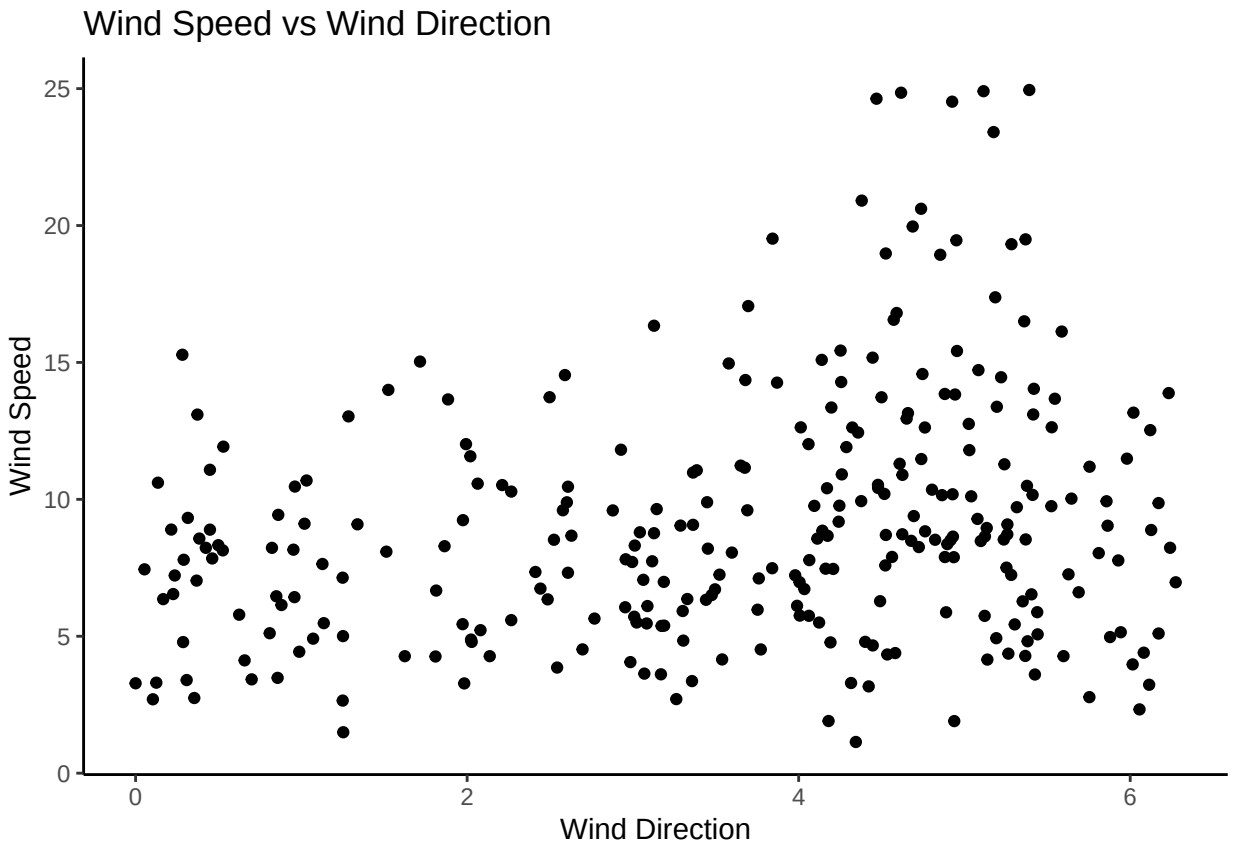
Wind direction vs Wind Power Production

```
# use case when

wp <- 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_quar
```

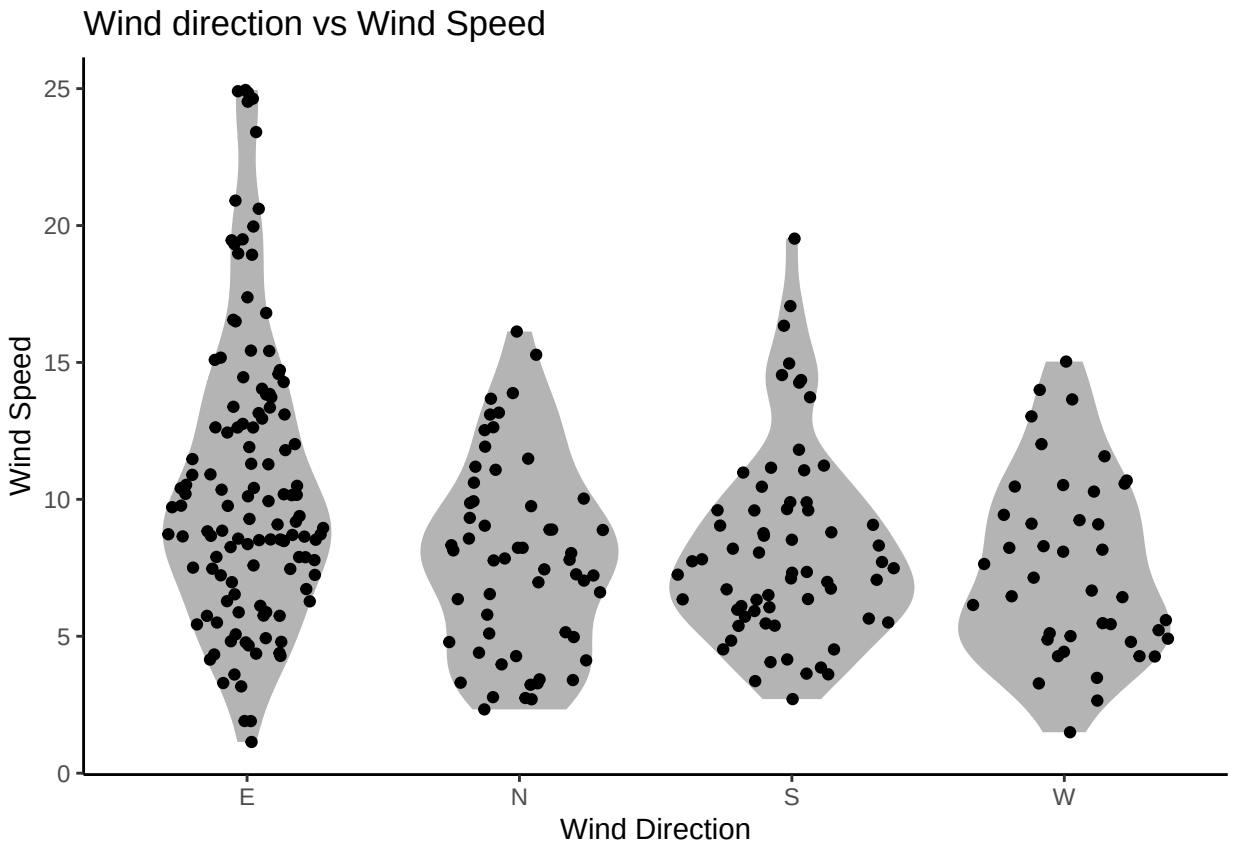


Other plots with wind direction

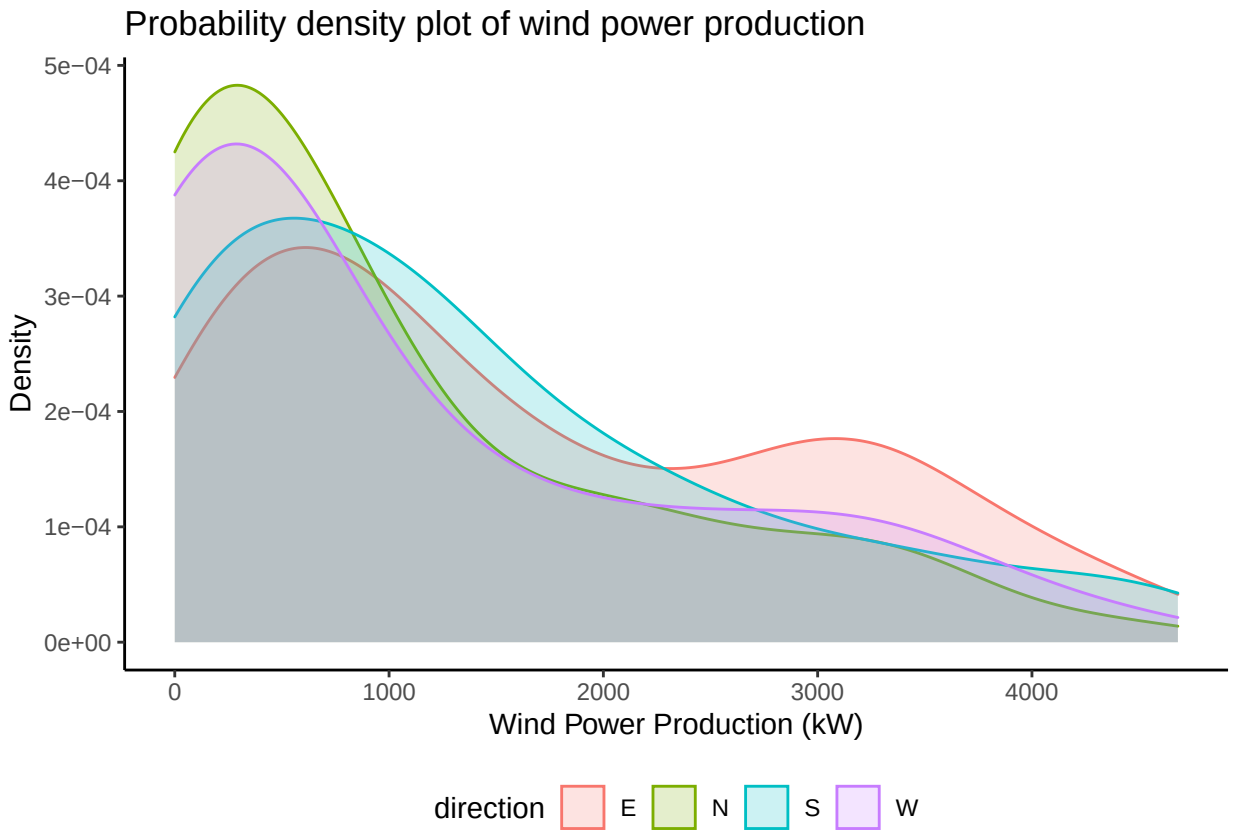
```
ggplot(data = wp, aes(y=ws30, x=wd30)) + geom_point() + labs(title= "Wind Speed vs Wind Direction", x =
```




```
ggplot(data=wp, aes(x=direction, y=ws30)) + geom_violin(color=NA, fill="black", alpha= 0.3, draw_quanti
```




```
ggplot(data = wp, aes(x=pow.obs, fill=direction, color = direction)) + geom_density(alpha =0.2)  + labs
```




```
# summary by direction
wp %>%  group_by(direction) %>% count()
```

```
## # A tibble: 4 x 2
## # Groups:   direction [4]
##   direction     n
##   <chr>     <int>
## 1 E           124
## 2 N            57
## 3 S            65
## 4 W            42
```

```
wp %>%  group_by(direction) %>% summarise(max = max(pow.obs))
```

```
## `summarise()` ungrouping output (override with `.groups` argument)
```

```
## # A tibble: 4 x 2
##   direction   max
##   <chr>     <dbl>
## 1 E         4681.
## 2 N         4385.
## 3 S         4530.
## 4 W         4388.
```

2. Simple models

Project 2

SURVIVAL DATA

Project 3

FINANCIAL DATA

1. DESCRIPTIVE STATISTICS AND SIMPLE MODELS