R Assignment

Team 7

2023-06-11

R Markdown

Including Plots

#code needed to prind output in console

```
# Load the airquality dataset
data(airquality)

# Print the structure of the dataset
str(airquality)
```

```
## 'data.frame':    153 obs. of  6 variables:
##  $ Ozone  : int  41 36 12 18 NA 28 23 19 8 NA ...
##  $ Solar.R: int  190 118 149 313 NA NA 299 99 19 194 ...
##  $ Wind   : num  7.4 8 12.6 11.5 14.3 14.9 8.6 13.8 20.1 8.6 ...
##  $ Temp   : int  67 72 74 62 56 66 65 59 61 69 ...
##  $ Month  : int  5 5 5 5 5 5 5 5 5 5 ...
##  $ Day    : int  1 2 3 4 5 6 7 8 9 10 ...
```

```
# List the variables in the dataset
variables <- names(airquality)
print(variables)
```

```
## [1] "Ozone"   "Solar.R" "Wind"    "Temp"    "Month"   "Day"
```

```
# Print the top 15 rows of the dataset
head(airquality, 15)
```

```
##    Ozone Solar.R Wind Temp Month Day
## 1     41     190  7.4   67     5   1
## 2     36     118  8.0   72     5   2
## 3     12     149 12.6   74     5   3
## 4     18     313 11.5   62     5   4
## 5     NA      NA 14.3   56     5   5
## 6     28      NA 14.9   66     5   6
## 7     23     299  8.6   65     5   7
## 8     19      99 13.8   59     5   8
## 9      8      19 20.1   61     5   9
```

```
## 10    NA     194  8.6   69     5  10
## 11     7      NA  6.9   74     5  11
## 12    16     256  9.7   69     5  12
## 13    11     290  9.2   66     5  13
## 14    14     274 10.9   68     5  14
## 15    18      65 13.2   58     5  15
```

```r
# Define a user-defined function using a variable from the dataset
customFunction <- function(temp) {
  if (temp > 80) {
    return("Hot")
  } else if (temp > 60) {
    return("Moderate")
  } else {
    return("Cool")
  }
}

# Example usage of the user-defined function
temperature <- airquality$Temp[1]  # Using the "Temp" variable from the dataset
result <- customFunction(temperature)
print(result)
```

```
## [1] "Moderate"
```

```r
library(datasets)
data(airquality)
View(airquality)
# Load the datasets package
library(datasets)

# Load the airquality dataset
data(airquality)

# Filter rows with ozone level above 30
filtered_data <- airquality[airquality$Ozone > 30, ]

# View the filtered dataset
head(filtered_data)
```

```
##      Ozone Solar.R Wind Temp Month Day
## 1       41     190  7.4   67     5   1
## 2       36     118  8.0   72     5   2
## NA      NA      NA   NA   NA    NA  NA
## NA.1    NA      NA   NA   NA    NA  NA
## 17      34     307 12.0   66     5  17
## 24      32      92 12.0   61     5  24
```

```r
View(airquality)
View(filtered_data)

# Load the datasets package
```

```r
library(datasets)

# Load the airquality dataset
data(airquality)

# Select the dependent and independent variables
dependent_var <- airquality$Ozone
independent_vars <- airquality[, c("Solar.R", "Wind", "Temp", "Month")]

# Create a new data frame by joining the variables
new_df <- cbind(dependent_var, independent_vars)

# View the new data frame
head(new_df)
```

```
##   dependent_var Solar.R Wind Temp Month
## 1            41     190  7.4   67     5
## 2            36     118  8.0   72     5
## 3            12     149 12.6   74     5
## 4            18     313 11.5   62     5
## 5            NA      NA 14.3   56     5
## 6            28      NA 14.9   66     5
```

```r
View(independent_vars)
View(new_df)
View(new_df)
View(independent_vars)
View(new_df)

# Load the datasets package
library(datasets)

# Print the dataset or any desired information
print(airquality)
```

```
##     Ozone Solar.R Wind Temp Month Day
## 1      41     190  7.4   67     5   1
## 2      36     118  8.0   72     5   2
## 3      12     149 12.6   74     5   3
## 4      18     313 11.5   62     5   4
## 5      NA      NA 14.3   56     5   5
## 6      28      NA 14.9   66     5   6
## 7      23     299  8.6   65     5   7
## 8      19      99 13.8   59     5   8
## 9       8      19 20.1   61     5   9
## 10     NA     194  8.6   69     5  10
## 11      7      NA  6.9   74     5  11
## 12     16     256  9.7   69     5  12
## 13     11     290  9.2   66     5  13
## 14     14     274 10.9   68     5  14
## 15     18      65 13.2   58     5  15
## 16     14     334 11.5   64     5  16
```

```
## 17    34     307 12.0   66     5  17
## 18     6      78 18.4   57     5  18
## 19    30     322 11.5   68     5  19
## 20    11      44  9.7   62     5  20
## 21     1       8  9.7   59     5  21
## 22    11     320 16.6   73     5  22
## 23     4      25  9.7   61     5  23
## 24    32      92 12.0   61     5  24
## 25    NA      66 16.6   57     5  25
## 26    NA     266 14.9   58     5  26
## 27    NA      NA  8.0   57     5  27
## 28    23      13 12.0   67     5  28
## 29    45     252 14.9   81     5  29
## 30   115     223  5.7   79     5  30
## 31    37     279  7.4   76     5  31
## 32    NA     286  8.6   78     6   1
## 33    NA     287  9.7   74     6   2
## 34    NA     242 16.1   67     6   3
## 35    NA     186  9.2   84     6   4
## 36    NA     220  8.6   85     6   5
## 37    NA     264 14.3   79     6   6
## 38    29     127  9.7   82     6   7
## 39    NA     273  6.9   87     6   8
## 40    71     291 13.8   90     6   9
## 41    39     323 11.5   87     6  10
## 42    NA     259 10.9   93     6  11
## 43    NA     250  9.2   92     6  12
## 44    23     148  8.0   82     6  13
## 45    NA     332 13.8   80     6  14
## 46    NA     322 11.5   79     6  15
## 47    21     191 14.9   77     6  16
## 48    37     284 20.7   72     6  17
## 49    20      37  9.2   65     6  18
## 50    12     120 11.5   73     6  19
## 51    13     137 10.3   76     6  20
## 52    NA     150  6.3   77     6  21
## 53    NA      59  1.7   76     6  22
## 54    NA      91  4.6   76     6  23
## 55    NA     250  6.3   76     6  24
## 56    NA     135  8.0   75     6  25
## 57    NA     127  8.0   78     6  26
## 58    NA      47 10.3   73     6  27
## 59    NA      98 11.5   80     6  28
## 60    NA      31 14.9   77     6  29
## 61    NA     138  8.0   83     6  30
## 62   135     269  4.1   84     7   1
## 63    49     248  9.2   85     7   2
## 64    32     236  9.2   81     7   3
## 65    NA     101 10.9   84     7   4
## 66    64     175  4.6   83     7   5
## 67    40     314 10.9   83     7   6
## 68    77     276  5.1   88     7   7
## 69    97     267  6.3   92     7   8
## 70    97     272  5.7   92     7   9
```

```
## 71      85      175  7.4   89      7  10
## 72      NA      139  8.6   82      7  11
## 73      10      264 14.3   73      7  12
## 74      27      175 14.9   81      7  13
## 75      NA      291 14.9   91      7  14
## 76       7       48 14.3   80      7  15
## 77      48      260  6.9   81      7  16
## 78      35      274 10.3   82      7  17
## 79      61      285  6.3   84      7  18
## 80      79      187  5.1   87      7  19
## 81      63      220 11.5   85      7  20
## 82      16        7  6.9   74      7  21
## 83      NA      258  9.7   81      7  22
## 84      NA      295 11.5   82      7  23
## 85      80      294  8.6   86      7  24
## 86     108      223  8.0   85      7  25
## 87      20       81  8.6   82      7  26
## 88      52       82 12.0   86      7  27
## 89      82      213  7.4   88      7  28
## 90      50      275  7.4   86      7  29
## 91      64      253  7.4   83      7  30
## 92      59      254  9.2   81      7  31
## 93      39       83  6.9   81      8   1
## 94       9       24 13.8   81      8   2
## 95      16       77  7.4   82      8   3
## 96      78       NA  6.9   86      8   4
## 97      35       NA  7.4   85      8   5
## 98      66       NA  4.6   87      8   6
## 99     122      255  4.0   89      8   7
## 100     89      229 10.3   90      8   8
## 101    110      207  8.0   90      8   9
## 102     NA      222  8.6   92      8  10
## 103     NA      137 11.5   86      8  11
## 104     44      192 11.5   86      8  12
## 105     28      273 11.5   82      8  13
## 106     65      157  9.7   80      8  14
## 107     NA       64 11.5   79      8  15
## 108     22       71 10.3   77      8  16
## 109     59       51  6.3   79      8  17
## 110     23      115  7.4   76      8  18
## 111     31      244 10.9   78      8  19
## 112     44      190 10.3   78      8  20
## 113     21      259 15.5   77      8  21
## 114      9       36 14.3   72      8  22
## 115     NA      255 12.6   75      8  23
## 116     45      212  9.7   79      8  24
## 117    168      238  3.4   81      8  25
## 118     73      215  8.0   86      8  26
## 119     NA      153  5.7   88      8  27
## 120     76      203  9.7   97      8  28
## 121    118      225  2.3   94      8  29
## 122     84      237  6.3   96      8  30
## 123     85      188  6.3   94      8  31
## 124     96      167  6.9   91      9   1
```

```
## 125    78      197  5.1   92     9   2
## 126    73      183  2.8   93     9   3
## 127    91      189  4.6   93     9   4
## 128    47       95  7.4   87     9   5
## 129    32       92 15.5   84     9   6
## 130    20      252 10.9   80     9   7
## 131    23      220 10.3   78     9   8
## 132    21      230 10.9   75     9   9
## 133    24      259  9.7   73     9  10
## 134    44      236 14.9   81     9  11
## 135    21      259 15.5   76     9  12
## 136    28      238  6.3   77     9  13
## 137     9       24 10.9   71     9  14
## 138    13      112 11.5   71     9  15
## 139    46      237  6.9   78     9  16
## 140    18      224 13.8   67     9  17
## 141    13       27 10.3   76     9  18
## 142    24      238 10.3   68     9  19
## 143    16      201  8.0   82     9  20
## 144    13      238 12.6   64     9  21
## 145    23       14  9.2   71     9  22
## 146    36      139 10.3   81     9  23
## 147     7       49 10.3   69     9  24
## 148    14       20 16.6   63     9  25
## 149    30      193  6.9   70     9  26
## 150    NA      145 13.2   77     9  27
## 151    14      191 14.3   75     9  28
## 152    18      131  8.0   76     9  29
## 153    20      223 11.5   68     9  30
```

```r
clean_airquality <- na.omit(airquality)

# Remove missing values from the airquality dataset
clean_airquality <- na.omit(airquality)

# Identify duplicate rows
duplicated_rows <- duplicated(airquality)

# Print the duplicate rows
duplicate_data <- airquality[duplicated_rows, ]
print(duplicate_data)
```

```
## [1] Ozone   Solar.R Wind    Temp    Month   Day
## <0 rows> (or 0-length row.names)
```

```r
# Remove duplicate rows
clean_airquality <- unique(airquality)
print(clean_airquality)
```

```
##     Ozone Solar.R Wind Temp Month Day
## 1      41     190  7.4   67     5   1
## 2      36     118  8.0   72     5   2
## 3      12     149 12.6   74     5   3
```

```
## 4       18     313 11.5   62      5   4
## 5       NA      NA 14.3   56      5   5
## 6       28      NA 14.9   66      5   6
## 7       23     299  8.6   65      5   7
## 8       19      99 13.8   59      5   8
## 9        8      19 20.1   61      5   9
## 10      NA     194  8.6   69      5  10
## 11       7      NA  6.9   74      5  11
## 12      16     256  9.7   69      5  12
## 13      11     290  9.2   66      5  13
## 14      14     274 10.9   68      5  14
## 15      18      65 13.2   58      5  15
## 16      14     334 11.5   64      5  16
## 17      34     307 12.0   66      5  17
## 18       6      78 18.4   57      5  18
## 19      30     322 11.5   68      5  19
## 20      11      44  9.7   62      5  20
## 21       1       8  9.7   59      5  21
## 22      11     320 16.6   73      5  22
## 23       4      25  9.7   61      5  23
## 24      32      92 12.0   61      5  24
## 25      NA      66 16.6   57      5  25
## 26      NA     266 14.9   58      5  26
## 27      NA      NA  8.0   57      5  27
## 28      23      13 12.0   67      5  28
## 29      45     252 14.9   81      5  29
## 30     115     223  5.7   79      5  30
## 31      37     279  7.4   76      5  31
## 32      NA     286  8.6   78      6   1
## 33      NA     287  9.7   74      6   2
## 34      NA     242 16.1   67      6   3
## 35      NA     186  9.2   84      6   4
## 36      NA     220  8.6   85      6   5
## 37      NA     264 14.3   79      6   6
## 38      29     127  9.7   82      6   7
## 39      NA     273  6.9   87      6   8
## 40      71     291 13.8   90      6   9
## 41      39     323 11.5   87      6  10
## 42      NA     259 10.9   93      6  11
## 43      NA     250  9.2   92      6  12
## 44      23     148  8.0   82      6  13
## 45      NA     332 13.8   80      6  14
## 46      NA     322 11.5   79      6  15
## 47      21     191 14.9   77      6  16
## 48      37     284 20.7   72      6  17
## 49      20      37  9.2   65      6  18
## 50      12     120 11.5   73      6  19
## 51      13     137 10.3   76      6  20
## 52      NA     150  6.3   77      6  21
## 53      NA      59  1.7   76      6  22
## 54      NA      91  4.6   76      6  23
## 55      NA     250  6.3   76      6  24
## 56      NA     135  8.0   75      6  25
## 57      NA     127  8.0   78      6  26
```

```
## 58      NA       47 10.3   73      6  27
## 59      NA       98 11.5   80      6  28
## 60      NA       31 14.9   77      6  29
## 61      NA      138  8.0   83      6  30
## 62     135      269  4.1   84      7   1
## 63      49      248  9.2   85      7   2
## 64      32      236  9.2   81      7   3
## 65      NA      101 10.9   84      7   4
## 66      64      175  4.6   83      7   5
## 67      40      314 10.9   83      7   6
## 68      77      276  5.1   88      7   7
## 69      97      267  6.3   92      7   8
## 70      97      272  5.7   92      7   9
## 71      85      175  7.4   89      7  10
## 72      NA      139  8.6   82      7  11
## 73      10      264 14.3   73      7  12
## 74      27      175 14.9   81      7  13
## 75      NA      291 14.9   91      7  14
## 76       7       48 14.3   80      7  15
## 77      48      260  6.9   81      7  16
## 78      35      274 10.3   82      7  17
## 79      61      285  6.3   84      7  18
## 80      79      187  5.1   87      7  19
## 81      63      220 11.5   85      7  20
## 82      16        7  6.9   74      7  21
## 83      NA      258  9.7   81      7  22
## 84      NA      295 11.5   82      7  23
## 85      80      294  8.6   86      7  24
## 86     108      223  8.0   85      7  25
## 87      20       81  8.6   82      7  26
## 88      52       82 12.0   86      7  27
## 89      82      213  7.4   88      7  28
## 90      50      275  7.4   86      7  29
## 91      64      253  7.4   83      7  30
## 92      59      254  9.2   81      7  31
## 93      39       83  6.9   81      8   1
## 94       9       24 13.8   81      8   2
## 95      16       77  7.4   82      8   3
## 96      78       NA  6.9   86      8   4
## 97      35       NA  7.4   85      8   5
## 98      66       NA  4.6   87      8   6
## 99     122      255  4.0   89      8   7
## 100     89      229 10.3   90      8   8
## 101    110      207  8.0   90      8   9
## 102     NA      222  8.6   92      8  10
## 103     NA      137 11.5   86      8  11
## 104     44      192 11.5   86      8  12
## 105     28      273 11.5   82      8  13
## 106     65      157  9.7   80      8  14
## 107     NA       64 11.5   79      8  15
## 108     22       71 10.3   77      8  16
## 109     59       51  6.3   79      8  17
## 110     23      115  7.4   76      8  18
## 111     31      244 10.9   78      8  19
```

```
## 112    44     190 10.3   78     8  20
## 113    21     259 15.5   77     8  21
## 114     9      36 14.3   72     8  22
## 115    NA     255 12.6   75     8  23
## 116    45     212  9.7   79     8  24
## 117   168     238  3.4   81     8  25
## 118    73     215  8.0   86     8  26
## 119    NA     153  5.7   88     8  27
## 120    76     203  9.7   97     8  28
## 121   118     225  2.3   94     8  29
## 122    84     237  6.3   96     8  30
## 123    85     188  6.3   94     8  31
## 124    96     167  6.9   91     9   1
## 125    78     197  5.1   92     9   2
## 126    73     183  2.8   93     9   3
## 127    91     189  4.6   93     9   4
## 128    47      95  7.4   87     9   5
## 129    32      92 15.5   84     9   6
## 130    20     252 10.9   80     9   7
## 131    23     220 10.3   78     9   8
## 132    21     230 10.9   75     9   9
## 133    24     259  9.7   73     9  10
## 134    44     236 14.9   81     9  11
## 135    21     259 15.5   76     9  12
## 136    28     238  6.3   77     9  13
## 137     9      24 10.9   71     9  14
## 138    13     112 11.5   71     9  15
## 139    46     237  6.9   78     9  16
## 140    18     224 13.8   67     9  17
## 141    13      27 10.3   76     9  18
## 142    24     238 10.3   68     9  19
## 143    16     201  8.0   82     9  20
## 144    13     238 12.6   64     9  21
## 145    23      14  9.2   71     9  22
## 146    36     139 10.3   81     9  23
## 147     7      49 10.3   69     9  24
## 148    14      20 16.6   63     9  25
## 149    30     193  6.9   70     9  26
## 150    NA     145 13.2   77     9  27
## 151    14     191 14.3   75     9  28
## 152    18     131  8.0   76     9  29
## 153    20     223 11.5   68     9  30
```

```r
# Load the required package
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
```

```
##
##     intersect, setdiff, setequal, union
```

```
reordered_airquality <- airquality %>% arrange(desc(Ozone))

# Print the reordered dataset
print(reordered_airquality)
```

```
##     Ozone Solar.R Wind Temp Month Day
## 1     168     238  3.4   81     8  25
## 2     135     269  4.1   84     7   1
## 3     122     255  4.0   89     8   7
## 4     118     225  2.3   94     8  29
## 5     115     223  5.7   79     5  30
## 6     110     207  8.0   90     8   9
## 7     108     223  8.0   85     7  25
## 8      97     267  6.3   92     7   8
## 9      97     272  5.7   92     7   9
## 10     96     167  6.9   91     9   1
## 11     91     189  4.6   93     9   4
## 12     89     229 10.3   90     8   8
## 13     85     175  7.4   89     7  10
## 14     85     188  6.3   94     8  31
## 15     84     237  6.3   96     8  30
## 16     82     213  7.4   88     7  28
## 17     80     294  8.6   86     7  24
## 18     79     187  5.1   87     7  19
## 19     78      NA  6.9   86     8   4
## 20     78     197  5.1   92     9   2
## 21     77     276  5.1   88     7   7
## 22     76     203  9.7   97     8  28
## 23     73     215  8.0   86     8  26
## 24     73     183  2.8   93     9   3
## 25     71     291 13.8   90     6   9
## 26     66      NA  4.6   87     8   6
## 27     65     157  9.7   80     8  14
## 28     64     175  4.6   83     7   5
## 29     64     253  7.4   83     7  30
## 30     63     220 11.5   85     7  20
## 31     61     285  6.3   84     7  18
## 32     59     254  9.2   81     7  31
## 33     59      51  6.3   79     8  17
## 34     52      82 12.0   86     7  27
## 35     50     275  7.4   86     7  29
## 36     49     248  9.2   85     7   2
## 37     48     260  6.9   81     7  16
## 38     47      95  7.4   87     9   5
## 39     46     237  6.9   78     9  16
## 40     45     252 14.9   81     5  29
## 41     45     212  9.7   79     8  24
## 42     44     192 11.5   86     8  12
## 43     44     190 10.3   78     8  20
## 44     44     236 14.9   81     9  11
## 45     41     190  7.4   67     5   1
```

```
## 46      40      314 10.9   83      7   6
## 47      39      323 11.5   87      6  10
## 48      39       83  6.9   81      8   1
## 49      37      279  7.4   76      5  31
## 50      37      284 20.7   72      6  17
## 51      36      118  8.0   72      5   2
## 52      36      139 10.3   81      9  23
## 53      35      274 10.3   82      7  17
## 54      35       NA  7.4   85      8   5
## 55      34      307 12.0   66      5  17
## 56      32       92 12.0   61      5  24
## 57      32      236  9.2   81      7   3
## 58      32       92 15.5   84      9   6
## 59      31      244 10.9   78      8  19
## 60      30      322 11.5   68      5  19
## 61      30      193  6.9   70      9  26
## 62      29      127  9.7   82      6   7
## 63      28       NA 14.9   66      5   6
## 64      28      273 11.5   82      8  13
## 65      28      238  6.3   77      9  13
## 66      27      175 14.9   81      7  13
## 67      24      259  9.7   73      9  10
## 68      24      238 10.3   68      9  19
## 69      23      299  8.6   65      5   7
## 70      23       13 12.0   67      5  28
## 71      23      148  8.0   82      6  13
## 72      23      115  7.4   76      8  18
## 73      23      220 10.3   78      9   8
## 74      23       14  9.2   71      9  22
## 75      22       71 10.3   77      8  16
## 76      21      191 14.9   77      6  16
## 77      21      259 15.5   77      8  21
## 78      21      230 10.9   75      9   9
## 79      21      259 15.5   76      9  12
## 80      20       37  9.2   65      6  18
## 81      20       81  8.6   82      7  26
## 82      20      252 10.9   80      9   7
## 83      20      223 11.5   68      9  30
## 84      19       99 13.8   59      5   8
## 85      18      313 11.5   62      5   4
## 86      18       65 13.2   58      5  15
## 87      18      224 13.8   67      9  17
## 88      18      131  8.0   76      9  29
## 89      16      256  9.7   69      5  12
## 90      16        7  6.9   74      7  21
## 91      16       77  7.4   82      8   3
## 92      16      201  8.0   82      9  20
## 93      14      274 10.9   68      5  14
## 94      14      334 11.5   64      5  16
## 95      14       20 16.6   63      9  25
## 96      14      191 14.3   75      9  28
## 97      13      137 10.3   76      6  20
## 98      13      112 11.5   71      9  15
## 99      13       27 10.3   76      9  18
```

```
## 100    13     238 12.6   64      9  21
## 101    12     149 12.6   74      5   3
## 102    12     120 11.5   73      6  19
## 103    11     290  9.2   66      5  13
## 104    11      44  9.7   62      5  20
## 105    11     320 16.6   73      5  22
## 106    10     264 14.3   73      7  12
## 107     9      24 13.8   81      8   2
## 108     9      36 14.3   72      8  22
## 109     9      24 10.9   71      9  14
## 110     8      19 20.1   61      5   9
## 111     7      NA  6.9   74      5  11
## 112     7      48 14.3   80      7  15
## 113     7      49 10.3   69      9  24
## 114     6      78 18.4   57      5  18
## 115     4      25  9.7   61      5  23
## 116     1       8  9.7   59      5  21
## 117    NA      NA 14.3   56      5   5
## 118    NA     194  8.6   69      5  10
## 119    NA      66 16.6   57      5  25
## 120    NA     266 14.9   58      5  26
## 121    NA      NA  8.0   57      5  27
## 122    NA     286  8.6   78      6   1
## 123    NA     287  9.7   74      6   2
## 124    NA     242 16.1   67      6   3
## 125    NA     186  9.2   84      6   4
## 126    NA     220  8.6   85      6   5
## 127    NA     264 14.3   79      6   6
## 128    NA     273  6.9   87      6   8
## 129    NA     259 10.9   93      6  11
## 130    NA     250  9.2   92      6  12
## 131    NA     332 13.8   80      6  14
## 132    NA     322 11.5   79      6  15
## 133    NA     150  6.3   77      6  21
## 134    NA      59  1.7   76      6  22
## 135    NA      91  4.6   76      6  23
## 136    NA     250  6.3   76      6  24
## 137    NA     135  8.0   75      6  25
## 138    NA     127  8.0   78      6  26
## 139    NA      47 10.3   73      6  27
## 140    NA      98 11.5   80      6  28
## 141    NA      31 14.9   77      6  29
## 142    NA     138  8.0   83      6  30
## 143    NA     101 10.9   84      7   4
## 144    NA     139  8.6   82      7  11
## 145    NA     291 14.9   91      7  14
## 146    NA     258  9.7   81      7  22
## 147    NA     295 11.5   82      7  23
## 148    NA     222  8.6   92      8  10
## 149    NA     137 11.5   86      8  11
## 150    NA      64 11.5   79      8  15
## 151    NA     255 12.6   75      8  23
## 152    NA     153  5.7   88      8  27
## 153    NA     145 13.2   77      9  27
```

```r
# Rename some column names in airquality dataset
names(airquality)[names(airquality)=="Temp"]<-"Temperature"
names(airquality)[names(airquality)=="Wind"]<-"Wind Level"

# Check airquality data set column names
colnames(airquality)
```

```
## [1] "Ozone"       "Solar.R"     "Wind Level"  "Temperature" "Month"
## [6] "Day"
```

```r
# Add a new variable by multiplying an existing column by 5
airquality$Temp_Double <- airquality$Temp * 5
# Print the updated data frame
print(airquality)
```

```
##     Ozone Solar.R Wind Level Temperature Month Day Temp_Double
## 1      41     190        7.4          67     5   1         335
## 2      36     118        8.0          72     5   2         360
## 3      12     149       12.6          74     5   3         370
## 4      18     313       11.5          62     5   4         310
## 5      NA      NA       14.3          56     5   5         280
## 6      28      NA       14.9          66     5   6         330
## 7      23     299        8.6          65     5   7         325
## 8      19      99       13.8          59     5   8         295
## 9       8      19       20.1          61     5   9         305
## 10     NA     194        8.6          69     5  10         345
## 11      7      NA        6.9          74     5  11         370
## 12     16     256        9.7          69     5  12         345
## 13     11     290        9.2          66     5  13         330
## 14     14     274       10.9          68     5  14         340
## 15     18      65       13.2          58     5  15         290
## 16     14     334       11.5          64     5  16         320
## 17     34     307       12.0          66     5  17         330
## 18      6      78       18.4          57     5  18         285
## 19     30     322       11.5          68     5  19         340
## 20     11      44        9.7          62     5  20         310
## 21      1       8        9.7          59     5  21         295
## 22     11     320       16.6          73     5  22         365
## 23      4      25        9.7          61     5  23         305
## 24     32      92       12.0          61     5  24         305
## 25     NA      66       16.6          57     5  25         285
## 26     NA     266       14.9          58     5  26         290
## 27     NA      NA        8.0          57     5  27         285
## 28     23      13       12.0          67     5  28         335
## 29     45     252       14.9          81     5  29         405
## 30    115     223        5.7          79     5  30         395
## 31     37     279        7.4          76     5  31         380
## 32     NA     286        8.6          78     6   1         390
## 33     NA     287        9.7          74     6   2         370
## 34     NA     242       16.1          67     6   3         335
## 35     NA     186        9.2          84     6   4         420
## 36     NA     220        8.6          85     6   5         425
## 37     NA     264       14.3          79     6   6         395
```

```
## 38     29     127          9.7          82     6    7          410
## 39     NA     273          6.9          87     6    8          435
## 40     71     291         13.8          90     6    9          450
## 41     39     323         11.5          87     6   10          435
## 42     NA     259         10.9          93     6   11          465
## 43     NA     250          9.2          92     6   12          460
## 44     23     148          8.0          82     6   13          410
## 45     NA     332         13.8          80     6   14          400
## 46     NA     322         11.5          79     6   15          395
## 47     21     191         14.9          77     6   16          385
## 48     37     284         20.7          72     6   17          360
## 49     20      37          9.2          65     6   18          325
## 50     12     120         11.5          73     6   19          365
## 51     13     137         10.3          76     6   20          380
## 52     NA     150          6.3          77     6   21          385
## 53     NA      59          1.7          76     6   22          380
## 54     NA      91          4.6          76     6   23          380
## 55     NA     250          6.3          76     6   24          380
## 56     NA     135          8.0          75     6   25          375
## 57     NA     127          8.0          78     6   26          390
## 58     NA      47         10.3          73     6   27          365
## 59     NA      98         11.5          80     6   28          400
## 60     NA      31         14.9          77     6   29          385
## 61     NA     138          8.0          83     6   30          415
## 62    135     269          4.1          84     7    1          420
## 63     49     248          9.2          85     7    2          425
## 64     32     236          9.2          81     7    3          405
## 65     NA     101         10.9          84     7    4          420
## 66     64     175          4.6          83     7    5          415
## 67     40     314         10.9          83     7    6          415
## 68     77     276          5.1          88     7    7          440
## 69     97     267          6.3          92     7    8          460
## 70     97     272          5.7          92     7    9          460
## 71     85     175          7.4          89     7   10          445
## 72     NA     139          8.6          82     7   11          410
## 73     10     264         14.3          73     7   12          365
## 74     27     175         14.9          81     7   13          405
## 75     NA     291         14.9          91     7   14          455
## 76      7      48         14.3          80     7   15          400
## 77     48     260          6.9          81     7   16          405
## 78     35     274         10.3          82     7   17          410
## 79     61     285          6.3          84     7   18          420
## 80     79     187          5.1          87     7   19          435
## 81     63     220         11.5          85     7   20          425
## 82     16       7          6.9          74     7   21          370
## 83     NA     258          9.7          81     7   22          405
## 84     NA     295         11.5          82     7   23          410
## 85     80     294          8.6          86     7   24          430
## 86    108     223          8.0          85     7   25          425
## 87     20      81          8.6          82     7   26          410
## 88     52      82         12.0          86     7   27          430
## 89     82     213          7.4          88     7   28          440
## 90     50     275          7.4          86     7   29          430
## 91     64     253          7.4          83     7   30          415
```

```
## 92     59     254          9.2           81      7  31            405
## 93     39      83          6.9           81      8   1            405
## 94      9      24         13.8           81      8   2            405
## 95     16      77          7.4           82      8   3            410
## 96     78      NA          6.9           86      8   4            430
## 97     35      NA          7.4           85      8   5            425
## 98     66      NA          4.6           87      8   6            435
## 99    122     255          4.0           89      8   7            445
## 100    89     229         10.3           90      8   8            450
## 101   110     207          8.0           90      8   9            450
## 102    NA     222          8.6           92      8  10            460
## 103    NA     137         11.5           86      8  11            430
## 104    44     192         11.5           86      8  12            430
## 105    28     273         11.5           82      8  13            410
## 106    65     157          9.7           80      8  14            400
## 107    NA      64         11.5           79      8  15            395
## 108    22      71         10.3           77      8  16            385
## 109    59      51          6.3           79      8  17            395
## 110    23     115          7.4           76      8  18            380
## 111    31     244         10.9           78      8  19            390
## 112    44     190         10.3           78      8  20            390
## 113    21     259         15.5           77      8  21            385
## 114     9      36         14.3           72      8  22            360
## 115    NA     255         12.6           75      8  23            375
## 116    45     212          9.7           79      8  24            395
## 117   168     238          3.4           81      8  25            405
## 118    73     215          8.0           86      8  26            430
## 119    NA     153          5.7           88      8  27            440
## 120    76     203          9.7           97      8  28            485
## 121   118     225          2.3           94      8  29            470
## 122    84     237          6.3           96      8  30            480
## 123    85     188          6.3           94      8  31            470
## 124    96     167          6.9           91      9   1            455
## 125    78     197          5.1           92      9   2            460
## 126    73     183          2.8           93      9   3            465
## 127    91     189          4.6           93      9   4            465
## 128    47      95          7.4           87      9   5            435
## 129    32      92         15.5           84      9   6            420
## 130    20     252         10.9           80      9   7            400
## 131    23     220         10.3           78      9   8            390
## 132    21     230         10.9           75      9   9            375
## 133    24     259          9.7           73      9  10            365
## 134    44     236         14.9           81      9  11            405
## 135    21     259         15.5           76      9  12            380
## 136    28     238          6.3           77      9  13            385
## 137     9      24         10.9           71      9  14            355
## 138    13     112         11.5           71      9  15            355
## 139    46     237          6.9           78      9  16            390
## 140    18     224         13.8           67      9  17            335
## 141    13      27         10.3           76      9  18            380
## 142    24     238         10.3           68      9  19            340
## 143    16     201          8.0           82      9  20            410
## 144    13     238         12.6           64      9  21            320
## 145    23      14          9.2           71      9  22            355
```

```
## 146    36      139        10.3            81      9  23           405
## 147     7       49        10.3            69      9  24           345
## 148    14       20        16.6            63      9  25           315
## 149    30      193         6.9            70      9  26           350
## 150    NA      145        13.2            77      9  27           385
## 151    14      191        14.3            75      9  28           375
## 152    18      131         8.0            76      9  29           380
## 153    20      223        11.5            68      9  30           340
```

```r
# Set a seed for reproducibility
set.seed(123)

# Create a training set using a random number generator
train_indices <- sample(1:nrow(airquality), size = 100, replace = FALSE)
training_set <- airquality[train_indices, ]

# Print the training set
print(training_set)
```

```
##     Ozone Solar.R Wind Level Temperature Month Day Temp_Double
## 14     14     274       10.9          68     5  14         340
## 50     12     120       11.5          73     6  19         365
## 118    73     215        8.0          86     8  26         430
## 43     NA     250        9.2          92     6  12         460
## 153    20     223       11.5          68     9  30         340
## 151    14     191       14.3          75     9  28         375
## 90     50     275        7.4          86     7  29         430
## 91     64     253        7.4          83     7  30         415
## 146    36     139       10.3          81     9  23         405
## 92     59     254        9.2          81     7  31         405
## 137     9      24       10.9          71     9  14         355
## 99    122     255        4.0          89     8   7         445
## 72     NA     139        8.6          82     7  11         410
## 26     NA     266       14.9          58     5  26         290
## 7      23     299        8.6          65     5   7         325
## 143    16     201        8.0          82     9  20         410
## 78     35     274       10.3          82     7  17         410
## 81     63     220       11.5          85     7  20         425
## 150    NA     145       13.2          77     9  27         385
## 103    NA     137       11.5          86     8  11         430
## 117   168     238        3.4          81     8  25         405
## 76      7      48       14.3          80     7  15         400
## 32     NA     286        8.6          78     6   1         390
## 109    59      51        6.3          79     8  17         395
## 139    46     237        6.9          78     9  16         390
## 9       8      19       20.1          61     5   9         305
## 41     39     323       11.5          87     6  10         435
## 74     27     175       14.9          81     7  13         405
## 23      4      25        9.7          61     5  23         305
## 27     NA      NA        8.0          57     5  27         285
## 60     NA      31       14.9          77     6  29         385
## 53     NA      59        1.7          76     6  22         380
## 129    32      92       15.5          84     9   6         420
## 122    84     237        6.3          96     8  30         480
```

```
## 124    96     167      6.9       91    9   1       455
## 96     78      NA      6.9       86    8   4       430
## 38     29     127      9.7       82    6   7       410
## 89     82     213      7.4       88    7  28       440
## 34     NA     242     16.1       67    6   3       335
## 93     39      83      6.9       81    8   1       405
## 69     97     267      6.3       92    7   8       460
## 141    13      27     10.3       76    9  18       380
## 132    21     230     10.9       75    9   9       375
## 63     49     248      9.2       85    7   2       425
## 13     11     290      9.2       66    5  13       330
## 82     16       7      6.9       74    7  21       370
## 97     35      NA      7.4       85    8   5       425
## 145    23      14      9.2       71    9  22       355
## 25     NA      66     16.6       57    5  25       285
## 133    24     259      9.7       73    9  10       365
## 21      1       8      9.7       59    5  21       295
## 79     61     285      6.3       84    7  18       420
## 127    91     189      4.6       93    9   4       465
## 47     21     191     14.9       77    6  16       385
## 147     7      49     10.3       69    9  24       345
## 123    85     188      6.3       94    8  31       470
## 95     16      77      7.4       82    8   3       410
## 16     14     334     11.5       64    5  16       320
## 94      9      24     13.8       81    8   2       405
## 6      28      NA     14.9       66    5   6       330
## 112    44     190     10.3       78    8  20       390
## 86    108     223      8.0       85    7  25       425
## 144    13     238     12.6       64    9  21       320
## 39     NA     273      6.9       87    6   8       435
## 31     37     279      7.4       76    5  31       380
## 136    28     238      6.3       77    9  13       385
## 152    18     131      8.0       76    9  29       380
## 115    NA     255     12.6       75    8  23       375
## 4      18     313     11.5       62    5   4       310
## 130    20     252     10.9       80    9   7       400
## 113    21     259     15.5       77    8  21       385
## 105    28     273     11.5       82    8  13       410
## 52     NA     150      6.3       77    6  21       385
## 22     11     320     16.6       73    5  22       365
## 131    23     220     10.3       78    9   8       390
## 108    22      71     10.3       77    8  16       385
## 35     NA     186      9.2       84    6   4       420
## 40     71     291     13.8       90    6   9       450
## 30    115     223      5.7       79    5  30       395
## 12     16     256      9.7       69    5  12       345
## 116    45     212      9.7       79    8  24       395
## 75     NA     291     14.9       91    7  14       455
## 64     32     236      9.2       81    7   3       405
## 149    30     193      6.9       70    9  26       350
## 67     40     314     10.9       83    7   6       415
## 125    78     197      5.1       92    9   2       460
## 37     NA     264     14.3       79    6   6       395
## 8      19      99     13.8       59    5   8       295
```

```
## 51      13      137        10.3           76      6   20           380
## 10      NA      194         8.6           69      5   10           345
## 87      20       81         8.6           82      7   26           410
## 42      NA      259        10.9           93      6   11           465
## 44      23      148         8.0           82      6   13           410
## 106     65      157         9.7           80      8   14           400
## 71      85      175         7.4           89      7   10           445
## 80      79      187         5.1           87      7   19           435
## 126     73      183         2.8           93      9    3           465
## 20      11       44         9.7           62      5   20           310
## 46      NA      322        11.5           79      6   15           395
## 17      34      307        12.0           66      5   17           330
```

```
# display airquality dataset statistics summary
summary(airquality)
```

```
##      Ozone            Solar.R        Wind Level       Temperature
##  Min.   :  1.00   Min.   :  7.0   Min.   : 1.700   Min.   :56.00
##  1st Qu.: 18.00   1st Qu.:115.8   1st Qu.: 7.400   1st Qu.:72.00
##  Median : 31.50   Median :205.0   Median : 9.700   Median :79.00
##  Mean   : 42.13   Mean   :185.9   Mean   : 9.958   Mean   :77.88
##  3rd Qu.: 63.25   3rd Qu.:258.8   3rd Qu.:11.500   3rd Qu.:85.00
##  Max.   :168.00   Max.   :334.0   Max.   :20.700   Max.   :97.00
##  NA's   :37       NA's   :7
##      Month            Day         Temp_Double
##  Min.   :5.000   Min.   : 1.0   Min.   :280.0
##  1st Qu.:6.000   1st Qu.: 8.0   1st Qu.:360.0
##  Median :7.000   Median :16.0   Median :395.0
##  Mean   :6.993   Mean   :15.8   Mean   :389.4
##  3rd Qu.:8.000   3rd Qu.:23.0   3rd Qu.:425.0
##  Max.   :9.000   Max.   :31.0   Max.   :485.0
##
```

```
# Calculate the mean
mean_value <- mean(airquality$Ozone)

# Print summary of the airquality dataset
summary(airquality)
```

```
##      Ozone            Solar.R        Wind Level       Temperature
##  Min.   :  1.00   Min.   :  7.0   Min.   : 1.700   Min.   :56.00
##  1st Qu.: 18.00   1st Qu.:115.8   1st Qu.: 7.400   1st Qu.:72.00
##  Median : 31.50   Median :205.0   Median : 9.700   Median :79.00
##  Mean   : 42.13   Mean   :185.9   Mean   : 9.958   Mean   :77.88
##  3rd Qu.: 63.25   3rd Qu.:258.8   3rd Qu.:11.500   3rd Qu.:85.00
##  Max.   :168.00   Max.   :334.0   Max.   :20.700   Max.   :97.00
##  NA's   :37       NA's   :7
##      Month            Day         Temp_Double
##  Min.   :5.000   Min.   : 1.0   Min.   :280.0
##  1st Qu.:6.000   1st Qu.: 8.0   1st Qu.:360.0
##  Median :7.000   Median :16.0   Median :395.0
##  Mean   :6.993   Mean   :15.8   Mean   :389.4
##  3rd Qu.:8.000   3rd Qu.:23.0   3rd Qu.:425.0
```

```
##  Max.   :9.000   Max.   :31.0   Max.   :485.0
##
```

```r
# Extract the "Ozone" variable from the airquality dataset
ozone <- airquality$Ozone

# Calculate the mean
mean_value <- mean(ozone, na.rm = TRUE)

# Calculate the median
median_value <- median(ozone, na.rm = TRUE)

# Calculate the mode
mode_value <- as.numeric(names(which.max(table(ozone))))

# Calculate the range
range_value <- range(ozone, na.rm = TRUE)

# Print the mean, median, mode, and range for Ozone
cat("Mean:", mean_value, "\n")
```

```
## Mean: 42.12931
```

```r
cat("Median:", median_value, "\n")
```

```
## Median: 31.5
```

```r
cat("Mode:", mode_value, "\n")
```

```
## Mode: 23
```

```r
cat("Range:", range_value[2] - range_value[1], "\n")
```

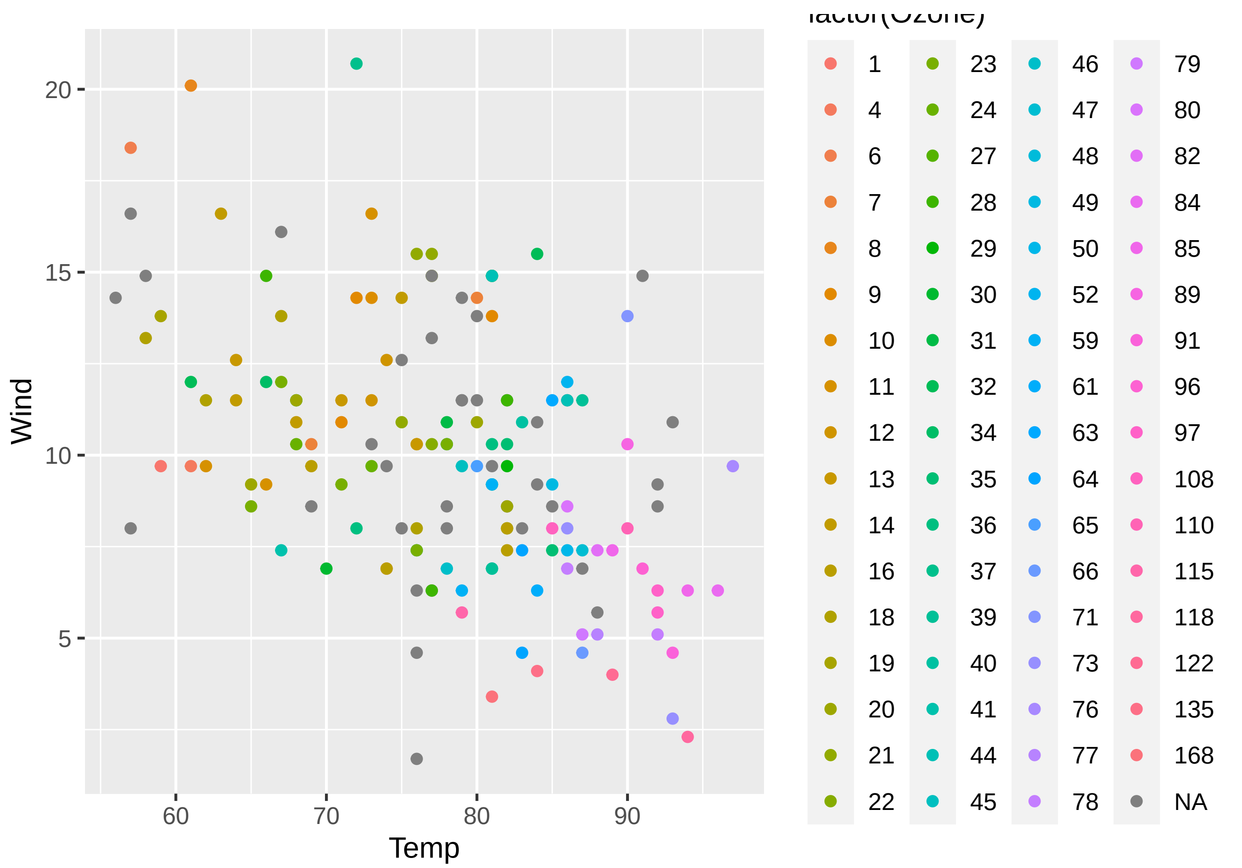
```
## Range: 167
```

```r
options(repos = "https://cloud.r-project.org")

install.packages("ggpubr")
```

```
##
## The downloaded binary packages are in
##  /var/folders/xf/bsjz_jjd1cxblf864fdysqmc0000gn/T//Rtmp1hee1U/downloaded_packages
```

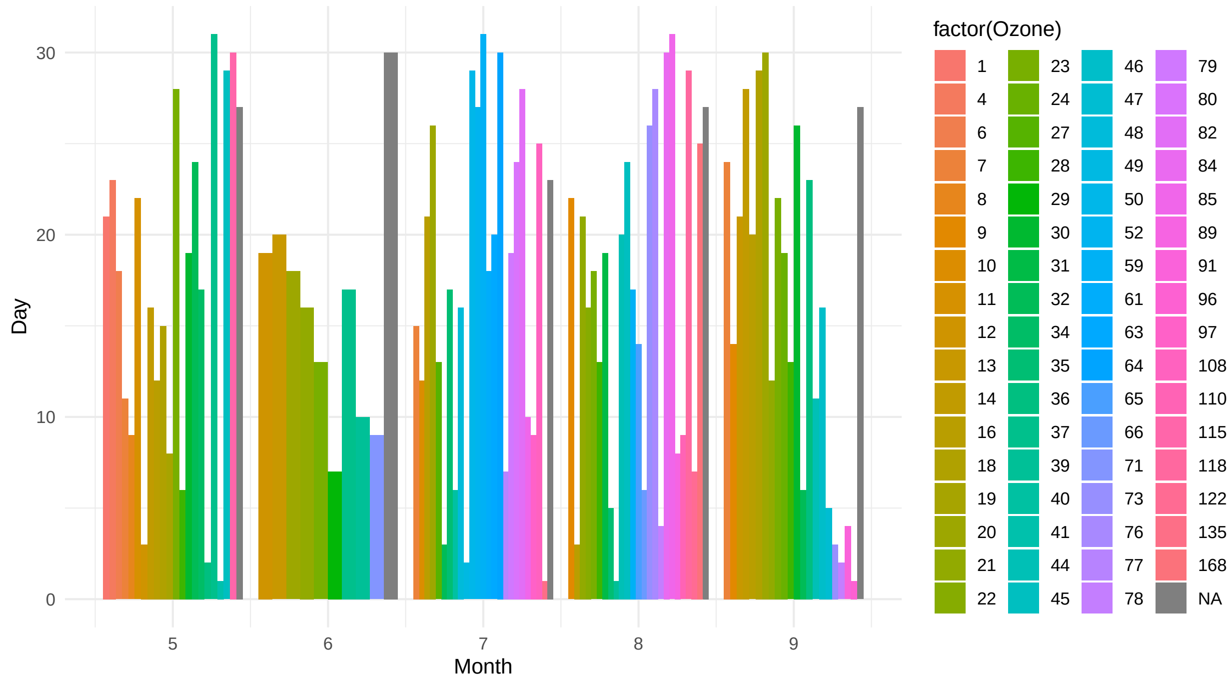
```r
library(ggplot2)
library(ggpubr)
#Plot a scatter plot for any 2 variables in your dataset
# Load the airquality dataset
data(airquality)

# Generate the scatter plot
```

```
ScatterPlot<-ggplot(data = airquality,aes(x = Temp,y = Wind,col = factor(Ozone)))+geom_point()

# Print the scatter plot
print(ScatterPlot)
```

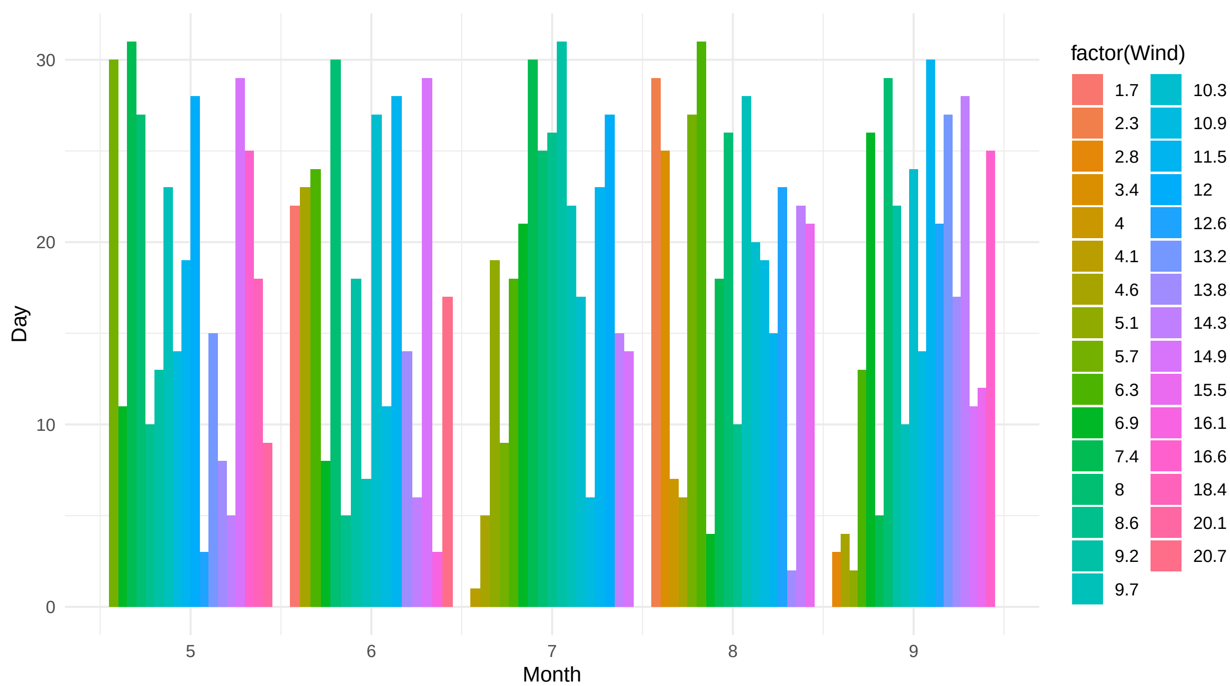



```
# Plot a bar plot for any 2 variables in your dataset
## Barplot Version 1 Factor Ozone
BarplotV1<-ggplot(data = airquality,aes(x = Month,y=Day, fill = factor(Ozone)))+geom_bar(stat="identity

## Barplot Version 1 Factor Wind
BarplotV2<-ggplot(data = airquality,aes(x = Month,y=Day, fill = factor(Wind)))+
  geom_bar(stat="identity",
  position=position_dodge())+theme_minimal()
```

```
BarplotV1
```




```
BarplotV2
```

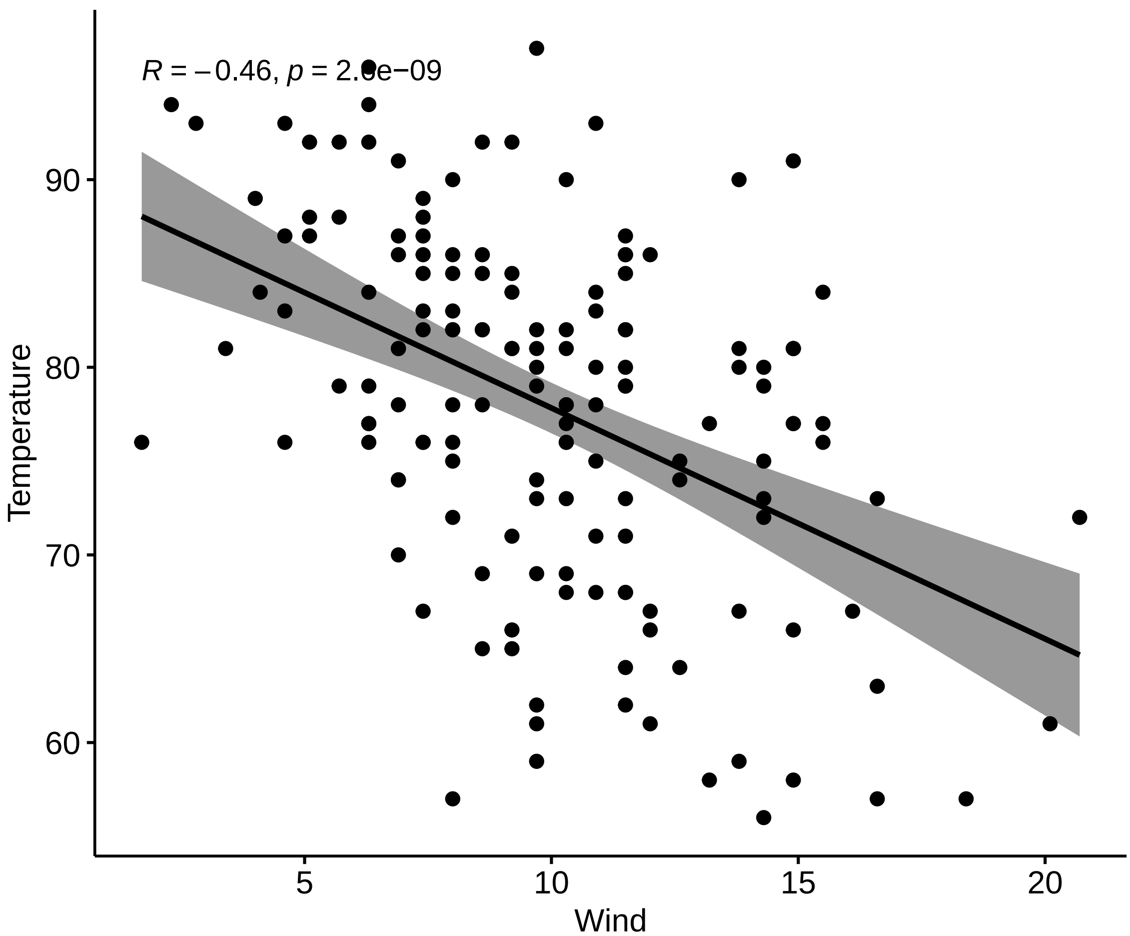



```
# Find the correlation between any 2 variables by applying least square linear regression model
ScatterModel<-ggscatter(airquality, x = "Wind", y = "Temp",
  add = "reg.line", conf.int = TRUE,cor.coef = TRUE,
  cor.method = "pearson", xlab = "Wind", ylab = "Temperature")
y<-airquality[,"Temp"]
x<-airquality[,"Wind"]
```

```r
xycorr<- cor(y,x, method="pearson")
head(xycorr)
```

```
## [1] -0.4579879
```

```r
ScatterModel
```



Link to the Github Repository

https://github.com/Alisam9/Gp7