Processing large datasets with R - exam: Exercise 2

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```
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
```

```
library(ggplot2)
library(gridExtra)
```

```
##
## Attaching package: 'gridExtra'

## The following object is masked from 'package:dplyr':
##
##     combine
```

Part 1

Question 1a

```
winter <- read.csv("datasets_exam/winter_olympic.csv")
```

Question 1b

```
head(winter)
```

```
##   Rank                  NOC Gold Silver Bronze Total  Region
## 1    1        Russia (RUS)*   13     11      9    33 EURASIA
## 2    2         Norway (NOR)   11      5     10    26  EUROPE
## 3    3         Canada (CAN)   10     10      5    25 NORTH_A
## 4    4  United States (USA)    9      7     12    28 NORTH_A
## 5    5    Netherlands (NED)    8      7      9    24  EUROPE
## 6    6        Germany (GER)    8      6      5    19  EUROPE
```

Question 1c

```
colnames(winter)
```

```
## [1] "Rank"   "NOC"    "Gold"   "Silver" "Bronze" "Total"  "Region"
```

Question 1d

```
dim(winter)
```

```
## [1] 26  7
```

```
nrow(winter)
```

```
## [1] 26
```

```
ncol(winter)
```

```
## [1] 7
```

Part 2

```
sort_total <- winter %>% arrange(Total, NOC)
head(sort_total)
```

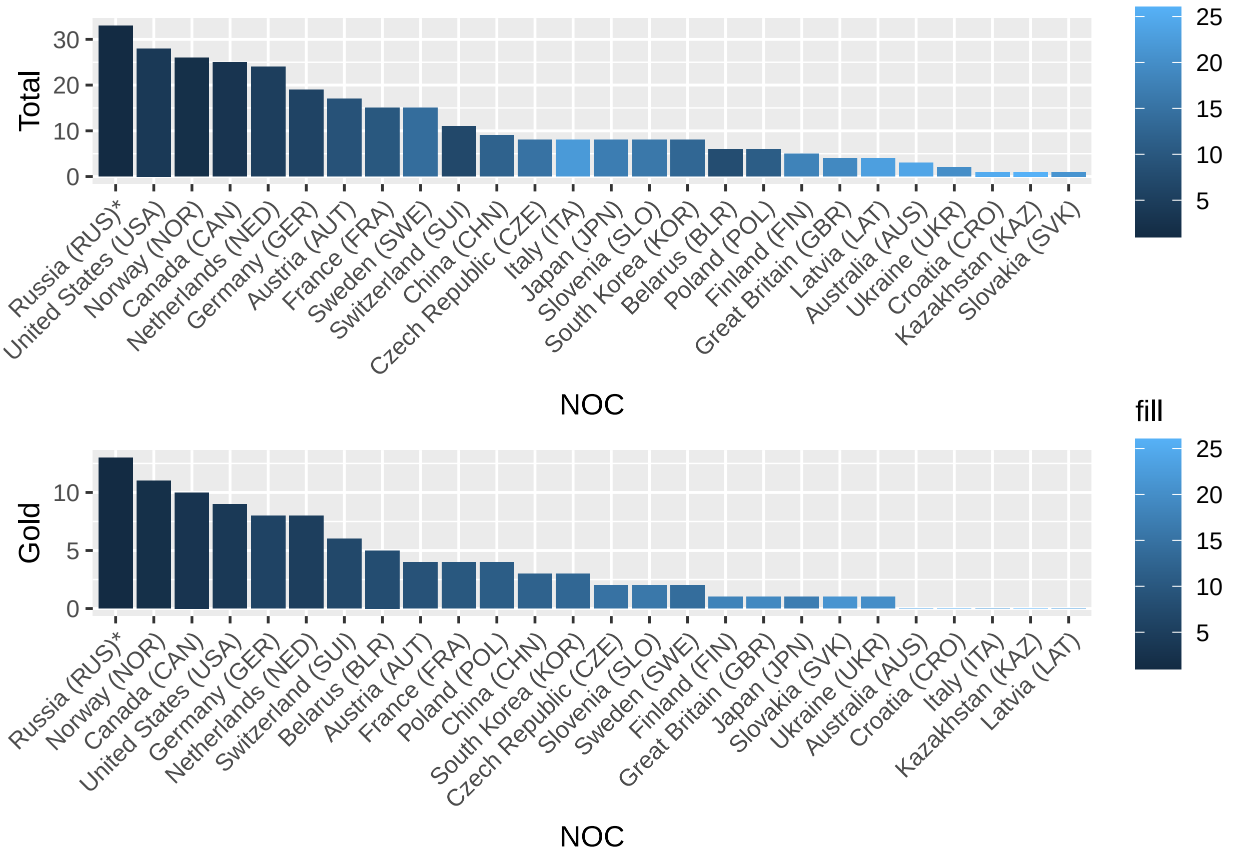
```
##   Rank                  NOC Gold Silver Bronze Total    Region
## 1   25        Croatia (CRO)    0      1      0     1    EUROPE
## 2   26     Kazakhstan (KAZ)    0      0      1     1   EURASIA
## 3   21       Slovakia (SVK)    1      0      0     1    EUROPE
## 4   20        Ukraine (UKR)    1      0      1     2   EURASIA
## 5   24      Australia (AUS)    0      2      1     3 AUSTRALIA
## 6   19  Great Britain (GBR)    1      1      2     4    EUROPE
```

Part 3

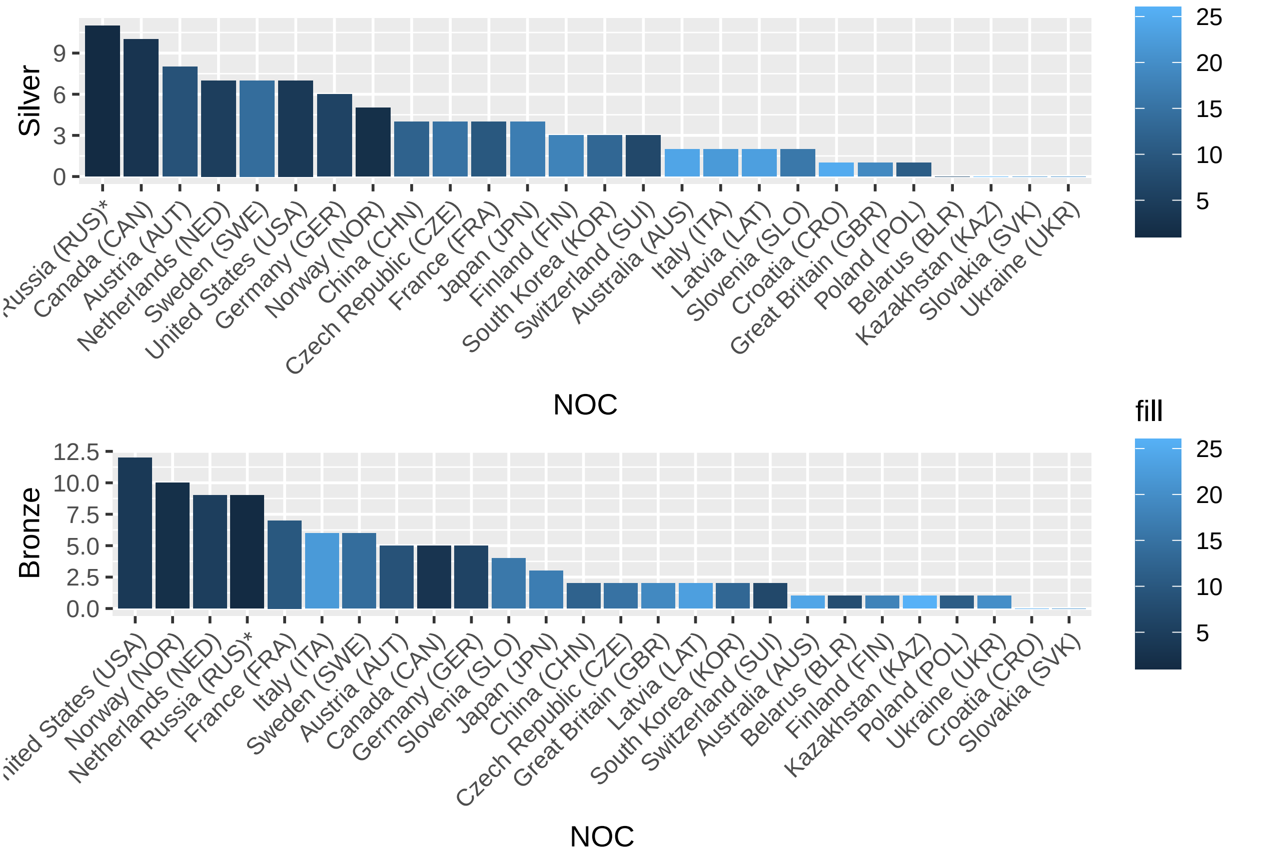
```
print_stat <- function() {
    print(sum(is.na(sort_total)))
    print(summary(sort_total))
}
print_stat()
```

```
## [1] 0
##       Rank           NOC                 Gold            Silver
##  Min.   : 1.00   Length:26          Min.   : 0.000   Min.   : 0.000
##  1st Qu.: 7.25   Class :character   1st Qu.: 1.000   1st Qu.: 1.250
##  Median :13.50   Mode  :character   Median : 2.500   Median : 3.000
##  Mean   :13.50                      Mean   : 3.808   Mean   : 3.731
##  3rd Qu.:19.75                      3rd Qu.: 5.750   3rd Qu.: 5.750
##  Max.   :26.00                      Max.   :13.000   Max.   :11.000
##      Bronze           Total          Region
##  Min.   : 0.000   Min.   : 1.00   Length:26
##  1st Qu.: 1.000   1st Qu.: 4.25   Class :character
##  Median : 2.000   Median : 8.00   Mode  :character
##  Mean   : 3.808   Mean   :11.35
##  3rd Qu.: 5.750   3rd Qu.:16.50
##  Max.   :12.000   Max.   :33.00
```

```
plot_desc <- function(
    x, y, fill=sort_total$Rank,
    x_label="NOC", y_label
){
    ggplot(sort_total, aes(reorder(x, -y, sum), y, fill=fill)) +
    geom_col() +
    scale_x_discrete(guide=guide_axis(angle=45)) +
    xlab(x_label) +
    ylab(y_label)
}
p_total <- plot_desc(
    sort_total$NOC,
    sort_total$Total,
    y_label="Total"
)
p_gold <- plot_desc(
    sort_total$NOC,
    sort_total$Gold,
    y_label="Gold"
)
p_silver <- plot_desc(
    sort_total$NOC,
    sort_total$Silver,
    y_label="Silver"
)
p_bronze <- plot_desc(
    sort_total$NOC,
    sort_total$Bronze,
    y_label="Bronze"
)
grid.arrange(p_total, p_gold, nrow=2)
```



```r
grid.arrange(p_silver, p_bronze, nrow=2)
```



Part 4

Question 4a

```r
for (column in c("Gold", "Silver", "Bronze", "Total")) {
    print(
        paste(
            column,
            "-> median:",
            median(sort_total[[column]])
        )
    )
}
```

```
## [1] "Gold -> median: 2.5"
## [1] "Silver -> median: 3"
## [1] "Bronze -> median: 2"
## [1] "Total -> median: 8"
```

Question 4b

```r
for (column in c("Gold", "Silver", "Bronze", "Total")) {
    print(
        paste(
            column,
            "-> mean:",
            mean(sort_total[[column]])
        )
    )
}
```

```
## [1] "Gold -> mean: 3.80769230769231"
## [1] "Silver -> mean: 3.73076923076923"
## [1] "Bronze -> mean: 3.80769230769231"
## [1] "Total -> mean: 11.3461538461538"
```

```
for (column in c("Gold", "Silver", "Bronze", "Total")) {
    print(
        paste(
            column,
            "-> total:",
            sum(sort_total[[column]])
        )
    )
}
```

```
## [1] "Gold -> total: 99"
## [1] "Silver -> total: 97"
## [1] "Bronze -> total: 99"
## [1] "Total -> total: 295"
```

Part 6

Question 6a

```
winter_group_region <- winter %>%
    group_by(Region)

print("median:")
```

```
## [1] "median:"
```

```
winter_group_region %>%
    summarise(
        median(Gold),
        median(Silver),
        median(Bronze),
        median(Total)
    )
```

```
## # A tibble: 5 x 5
##   Region    `median(Gold)` `median(Silver)` `median(Bronze)` `median(Total)`
##   <chr>              <dbl>            <dbl>            <dbl>           <dbl>
## 1 ASIA                 3                4                2               8
## 2 AUSTRALIA            0                2                1               3
## 3 EURASIA              1                0                1               4
## 4 EUROPE               2                3                4               8
## 5 NORTH_A              9.5              8.5              8.5            26.5
```

```
print("mean:")
```

```
## [1] "mean:"
```

```r
winter_group_region %>%
    summarise(
        mean(Gold),
        mean(Silver),
        mean(Bronze),
        mean(Total)
    )
```

```
## # A tibble: 5 x 5
##   Region    `mean(Gold)` `mean(Silver)` `mean(Bronze)` `mean(Total)`
##   <chr>            <dbl>          <dbl>          <dbl>         <dbl>
## 1 ASIA              2.33           3.67           2.33          8.33
## 2 AUSTRALIA         0              2              1             3
## 3 EURASIA           3.8            2.6            2.8           9.2
## 4 EUROPE            3.6            3.6            4            11.2
## 5 NORTH_A           9.5            8.5            8.5          26.5
```

```r
print("total:")
```

```
## [1] "total:"
```

```r
winter_group_region %>%
    summarise(
        sum(Gold),
        sum(Silver),
        sum(Bronze),
        sum(Total)
    )
```

```
## # A tibble: 5 x 5
##   Region    `sum(Gold)` `sum(Silver)` `sum(Bronze)` `sum(Total)`
##   <chr>           <int>         <int>         <int>        <int>
## 1 ASIA                7            11             7           25
## 2 AUSTRALIA           0             2             1            3
## 3 EURASIA            19            13            14           46
## 4 EUROPE             54            54            60          168
## 5 NORTH_A            19            17            17           53
```

Question 6b

```r
max_total_mean <- winter_group_region %>%
    summarise(mean_total = mean(Total)) %>%
    arrange(desc(mean_total)) %>%
    filter(row_number() == 1)
max_total_mean
```

```
## # A tibble: 1 x 2
##   Region  mean_total
##   <chr>        <dbl>
## 1 NORTH_A       26.5
```

```r
region_max_total_mean <- max_total_mean$Region
print(
    paste(
        "Region with maximum mean total medals:",
        region_max_total_mean
    )
)
```

```
## [1] "Region with maximum mean total medals: NORTH_A"
```

Question 6c

```
nb_countries_north_am <- nrow(
    winter %>%
        filter(Region == region_max_total_mean)
)

print(
    paste(
        "Number of countries in region",
        region_max_total_mean,
        ": ",
        nb_countries_north_am
    )
)
```

```
## [1] "Number of countries in region NORTH_A :  2"
```

Question 6d

```
nb_countries_eur <- nrow(
    winter %>%
        filter(Region == "EUROPE")
)

print(
    paste(
        "Number of countries in region EUROPE: ",
        nb_countries_eur
    )
)
```

```
## [1] "Number of countries in region EUROPE:  15"
```

Question 6e

```
max_nb_total <- winter %>%
    arrange(desc(Total)) %>%
    filter(row_number() == 1)

print(
    paste(
        "The maximum number of medals won is",
        max_nb_total$Total,
        "medals won by",
        max_nb_total$NOC
    )
)
```

```
## [1] "The maximum number of medals won is 33 medals won by  Russia (RUS)*"
```