Assignment1

ESM 262

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4/26/2017

Contents

Loading Data

The data set climate was modified to include month names and separate years by seasons

```
other_data = data.frame(month=seq(1,12),
                        month_names=month.abb,
                        season = c(1,1,2,2,2,3,3,3,4,4,4,1))

climate=read.table("clim.txt", header=T) %>%
  left_join(other_data) %>%
  mutate(temp = (tmin+tmax)/2)
```

Task 1

Precipitation and average temperature by month

```
ggplot(data=climate, aes(x=as.factor(month), y=rain)) +
  geom_boxplot(color="darkblue") +
  stat_summary(geom="point", fun.y = "mean", color="red") +
  xlab("Month") +
  ylab("Precipitation") +
  theme_bw() +
  removeGrid(x=TRUE, y=TRUE) +
  scale_x_discrete(labels=month.abb)
```
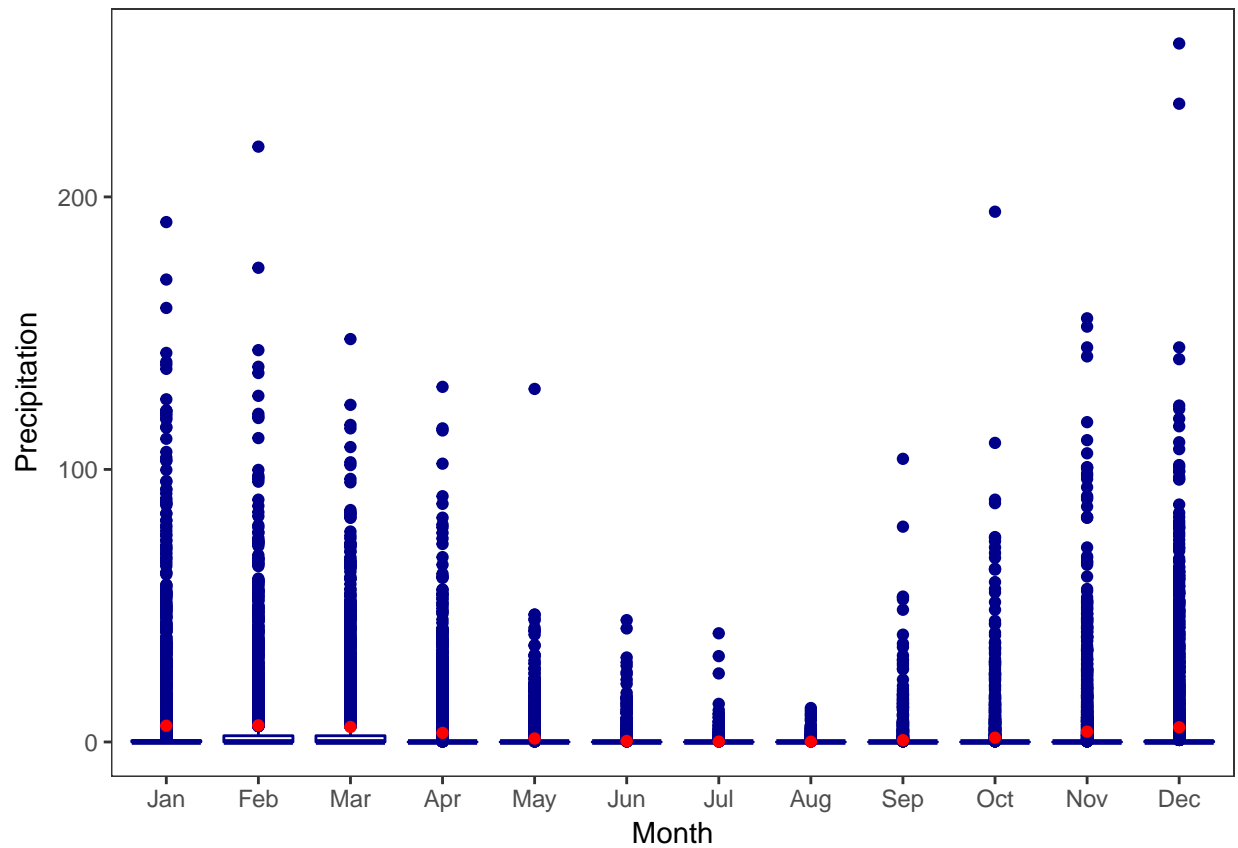

Figure 1: Precipitation by moth

```r
ggplot(data=climate, aes(x = as.factor(month), y = temp)) +
  geom_boxplot(fill= "aquamarine3", color = "black") +
  stat_summary(geom="point", fun.y = "mean", color="red") +
  xlab("Month") +
  ylab("Temperature") +
  theme_bw() +
  removeGrid(x=TRUE, y=TRUE) +
  scale_x_discrete(labels=month.abb)
```
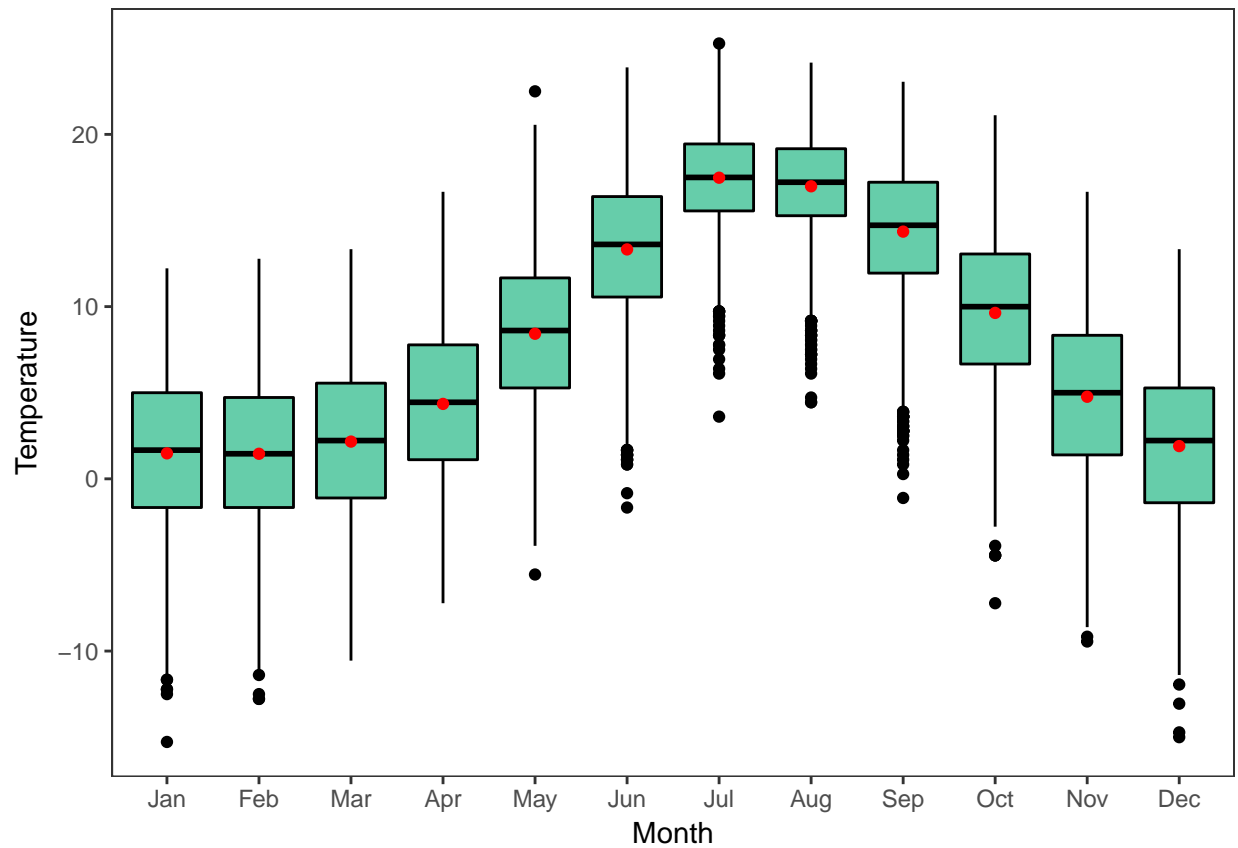

Figure 2: Temperature by month

Task 2

Find wettest and driest years

```r
rain_year <- climate %>%
  group_by(year) %>%
  summarise(total_rain = sum(rain))

ggplot(data = rain_year, aes(x = year, y = total_rain)) +
  geom_line(color = "gray63") +
  geom_point(color = "dodgerblue4") +
  xlab("Year") +
  ylab("Total precipitation") +
  theme_bw() +
  removeGrid(x=TRUE, y=TRUE)
```
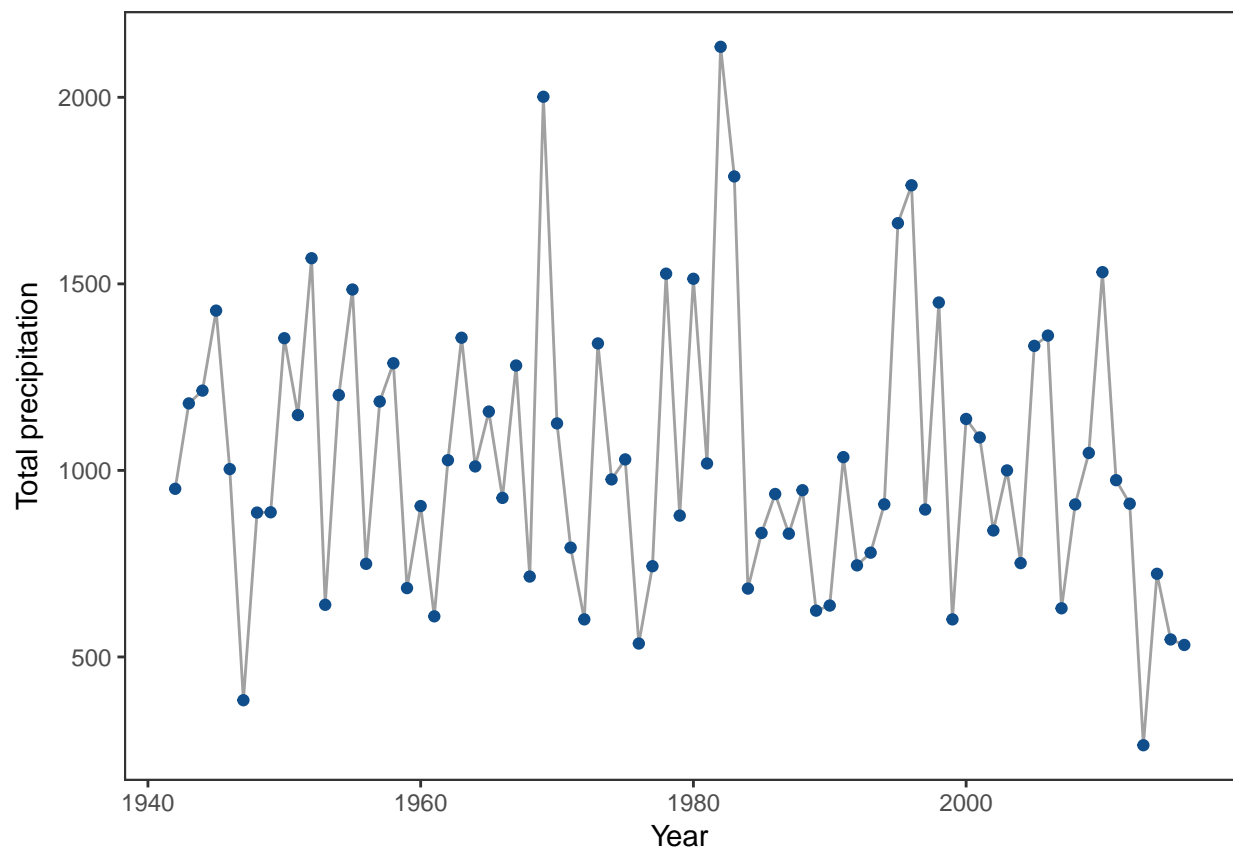

Figure 3: Total precipitation by year

The driest year was 2013 with a total precipitation of 263.398. The wettest was 1982 with a total precipitation of 2135.378.

Task 3

Illustrate what a wet and dry year might look like for the ecosystem of your choice

A wet day in the tropics

Figure 4: Amazon Tropical Rain Forest

A dry day in La Guajira desert

Figure 5: La Guajira

Task 4

Find wettest and driest seasons

```r
rain_season <- climate %>%
  group_by(season) %>%
  summarise(total_rain = sum(rain))

ggplot(data = rain_season, aes(x = as.character(season), y = total_rain)) +
  geom_col(fill = "gray63") +
  xlab("Season") +
  ylab("Total precipitation") +
  theme_bw() +
  removeGrid(x=TRUE, y=TRUE) +
  scale_x_discrete(labels = c("Winter","Spring","Summer","Fall"))
```
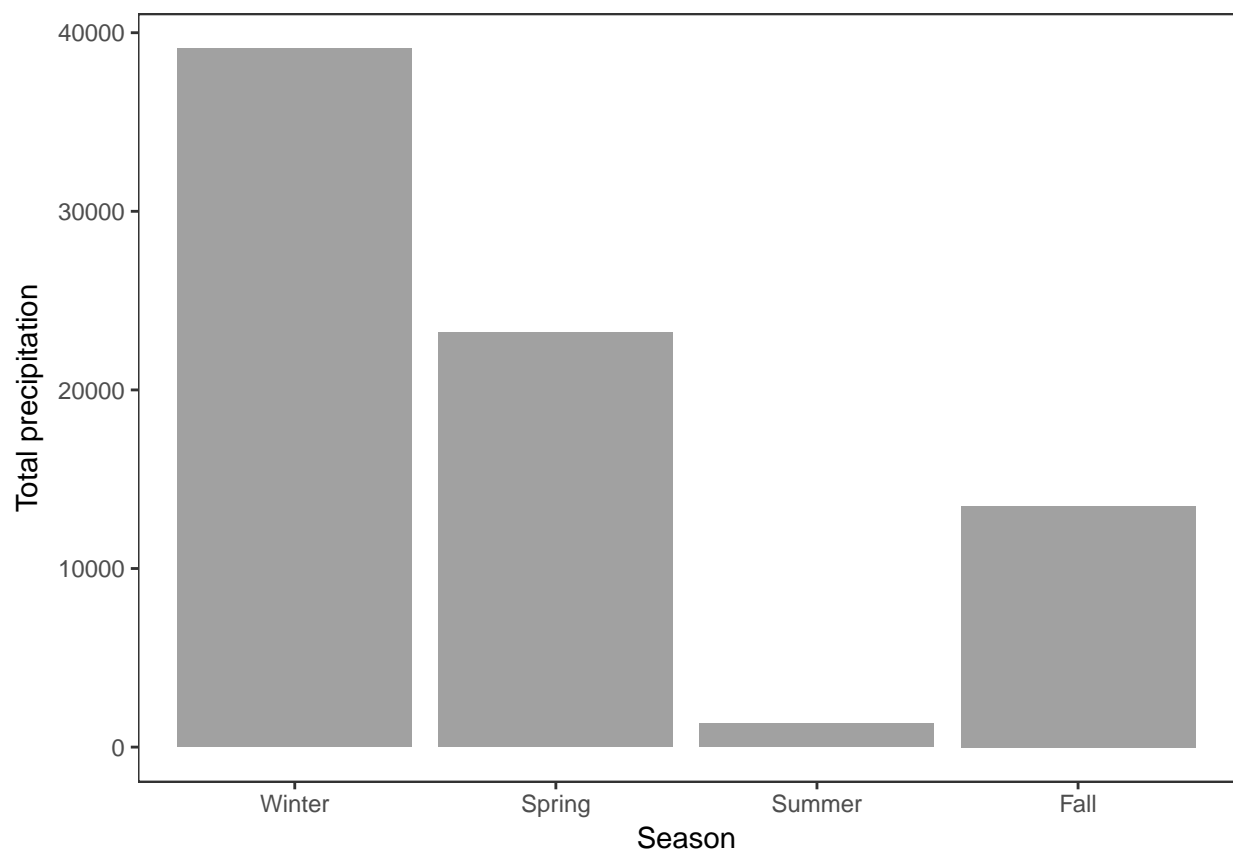

Figure 6: Total precipitation by seasons

The wettest season is winter and the driest is summer

Task 5

Graph the relationship between winter precipitation and summer temperature

```r
climate %>%
  group_by(year, season) %>%
  summarise(total_rain = sum(rain),
            temp = mean(temp)) -> rain_temp

temp <- rain_temp %>%
  filter(season == 3) %>%
  select(year, temp)

rain_temp %>%
  filter(season == 1) %>%
  select(year, total_rain) %>%
  left_join(temp) %>%
  ggplot(aes(x = total_rain, y = temp, color = year)) +
  geom_point() +
  theme_bw() +
  removeGrid(x=TRUE, y=TRUE) +
  labs(x = "Winter Precipitation", y = "Summer Temperature")
```
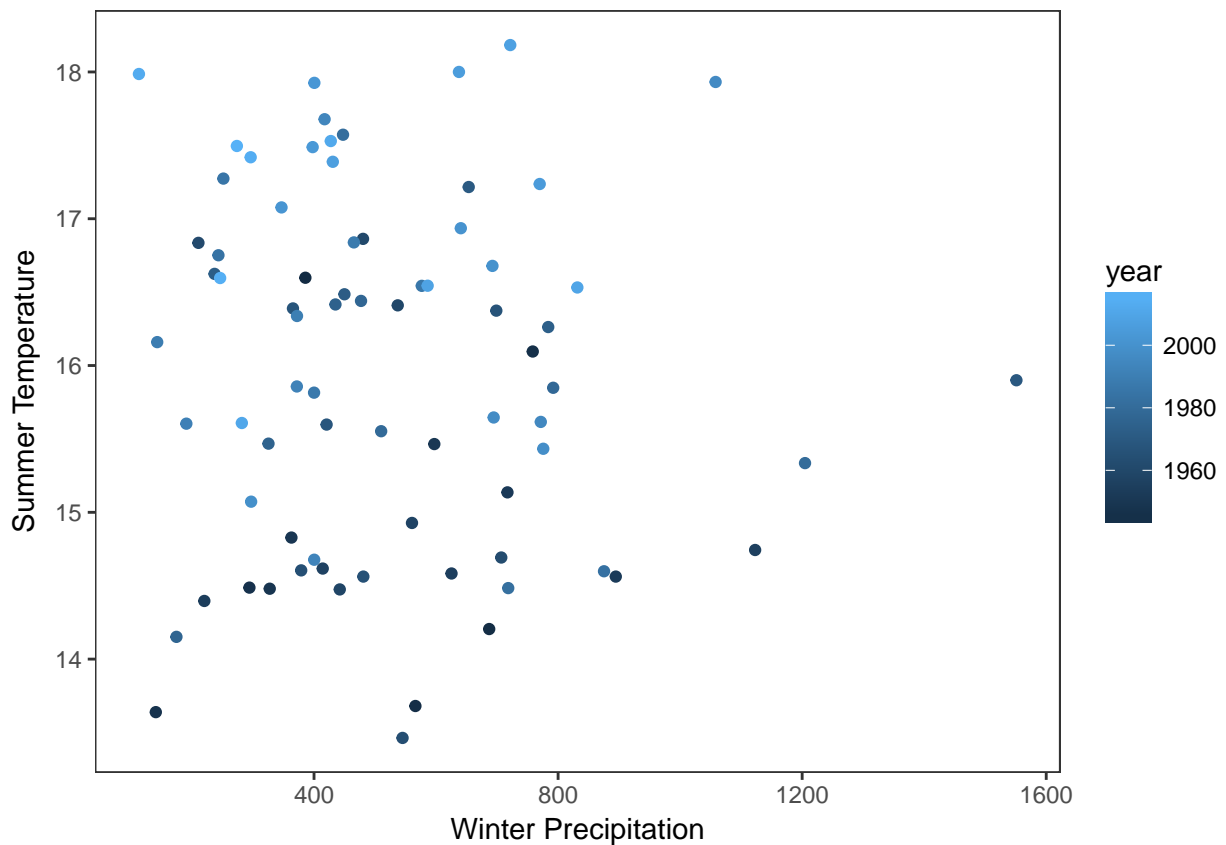

Figure 7: Total winter precipitation vs Average summer temperature

For the period 1942 to 2016, there is no obvious relationship between the total precipitation in winter and the average summer temperature.