CodingChallenge5

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Question 1

```
diversity.data <- read.csv("CodingChallenge5/DiversityData.csv", header = TRUE)
metadata <- read.csv("CodingChallenge5/Metadata.csv", header = TRUE)
```

Question 2

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## v forcats   1.0.0     v stringr   1.5.1
## v ggplot2   3.5.1     v tibble    3.2.1
## v lubridate 1.9.4     v tidyr     1.3.1
## v purrr     1.0.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
alpha <- left_join(metadata, diversity.data, by = "Code")
head(alpha)
```

```
##     Code Crop Time_Point Replicate Water_Imbibed  shannon invsimpson   simpson
## 1 S01_13 Soil          0         1            na 6.624921   210.7279 0.9952545
## 2 S02_16 Soil          0         2            na 6.612413   206.8666 0.9951660
## 3 S03_19 Soil          0         3            na 6.660853   213.0184 0.9953056
## 4 S04_22 Soil          0         4            na 6.660671   204.6908 0.9951146
## 5 S05_25 Soil          0         5            na 6.610965   200.2552 0.9950064
## 6 S06_28 Soil          0         6            na 6.650812   199.3211 0.9949830
##   richness
## 1     3319
## 2     3079
## 3     3935
## 4     3922
## 5     3196
## 6     3481
```

Question 3

```
alpha_even <- alpha %>%
  mutate(Pielou_Evenness = shannon/log(richness))
head(alpha_even)
```

```
##     Code Crop Time_Point Replicate Water_Imbibed  shannon invsimpson   simpson
## 1 S01_13 Soil          0         1            na 6.624921   210.7279 0.9952545
## 2 S02_16 Soil          0         2            na 6.612413   206.8666 0.9951660
## 3 S03_19 Soil          0         3            na 6.660853   213.0184 0.9953056
## 4 S04_22 Soil          0         4            na 6.660671   204.6908 0.9951146
## 5 S05_25 Soil          0         5            na 6.610965   200.2552 0.9950064
## 6 S06_28 Soil          0         6            na 6.650812   199.3211 0.9949830
##   richness Pielou_Evenness
## 1     3319       0.8171431
## 2     3079       0.8232216
## 3     3935       0.8046776
## 4     3922       0.8049774
## 5     3196       0.8192376
## 6     3481       0.8155427
```

Question 4

```
alpha_average <- alpha_even %>%
  group_by(Crop, Time_Point) %>%
  summarise(
    mean_evenness = mean(Pielou_Evenness, na.rm = TRUE),
    count = n(),
    sd_evenness = sd(Pielou_Evenness, na.rm = TRUE),
    se_evenness = sd_evenness / sqrt(count),
    .groups = "drop"
  )
```

Question 5

```
alpha_average2 <- alpha_average %>%
  select(Time_Point, Crop, mean_evenness) %>%
  pivot_wider(names_from = Crop, values_from = mean_evenness) %>%
  mutate(
    diff_cotton_even = Soil - Cotton,
    diff_soybean_even = Soil - Soybean
  )
head(alpha_average2)
```

```
## # A tibble: 4 x 6
##   Time_Point Cotton  Soil Soybean diff_cotton_even diff_soybean_even
```

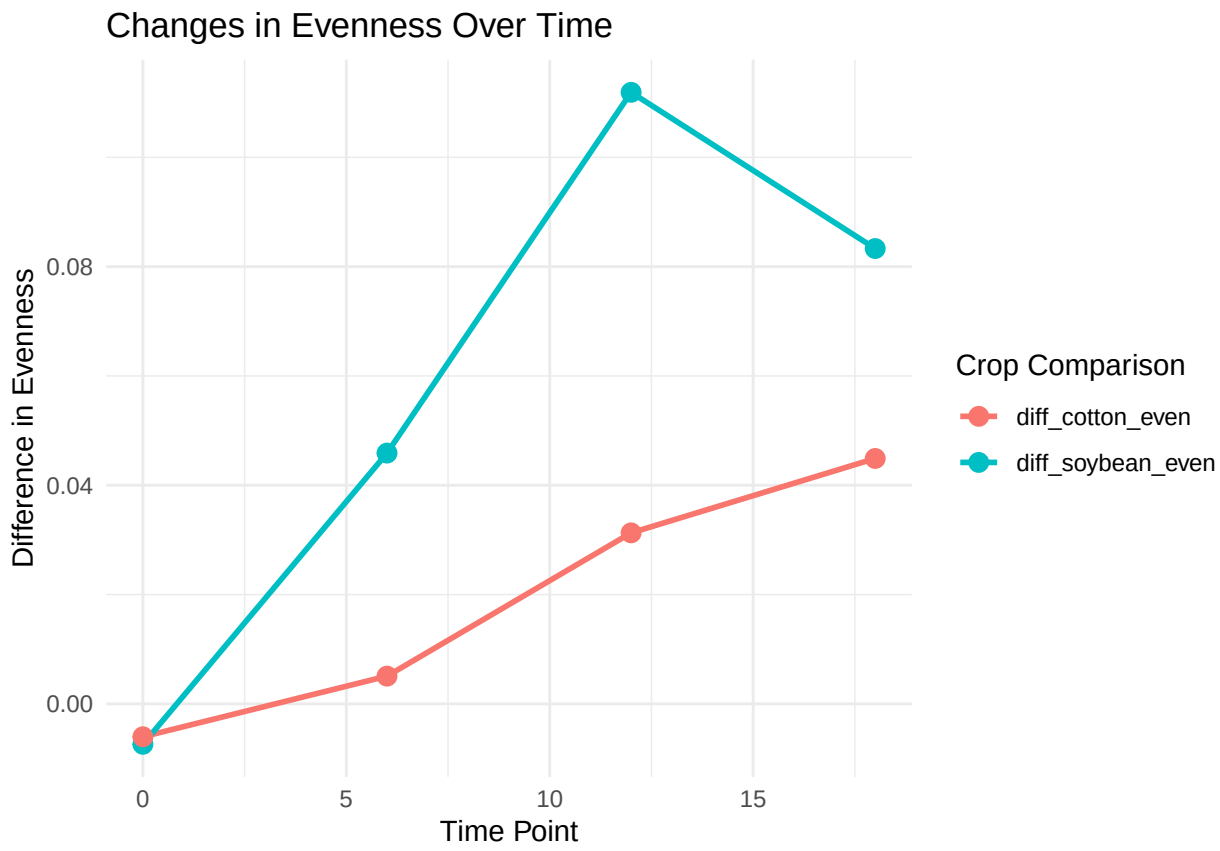
```
##        <int>  <dbl> <dbl>   <dbl>            <dbl>            <dbl>
## 1          0  0.820 0.814   0.822         -0.00602         -0.00740
## 2          6  0.805 0.810   0.764          0.00507          0.0459
## 3         12  0.767 0.798   0.687          0.0313           0.112
## 4         18  0.755 0.800   0.716          0.0449           0.0833
```

Question 6

```
alpha_plot_data <- alpha_average2 %>%
  select(Time_Point, diff_soybean_even, diff_cotton_even) %>%
  pivot_longer(cols = c(diff_soybean_even, diff_cotton_even), names_to = "diff", values_to = "values")

ggplot(alpha_plot_data, aes(x = Time_Point, y = values, color = diff, group = diff)) +
  geom_line(size = 1) +
  geom_point(size = 3) +
  labs(
    title = "Changes in Evenness Over Time",
    x = "Time Point",
    y = "Difference in Evenness",
    color = "Crop Comparison"
  ) +
  theme_minimal()
```

```
## Warning: Using ‘size‘ aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use ‘linewidth‘ instead.
## This warning is displayed once every 8 hours.
## Call ‘lifecycle::last_lifecycle_warnings()‘ to see where this warning was
## generated.
```



Question 7

Link to GitHub