

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_Imbided  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_Imbided  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
```

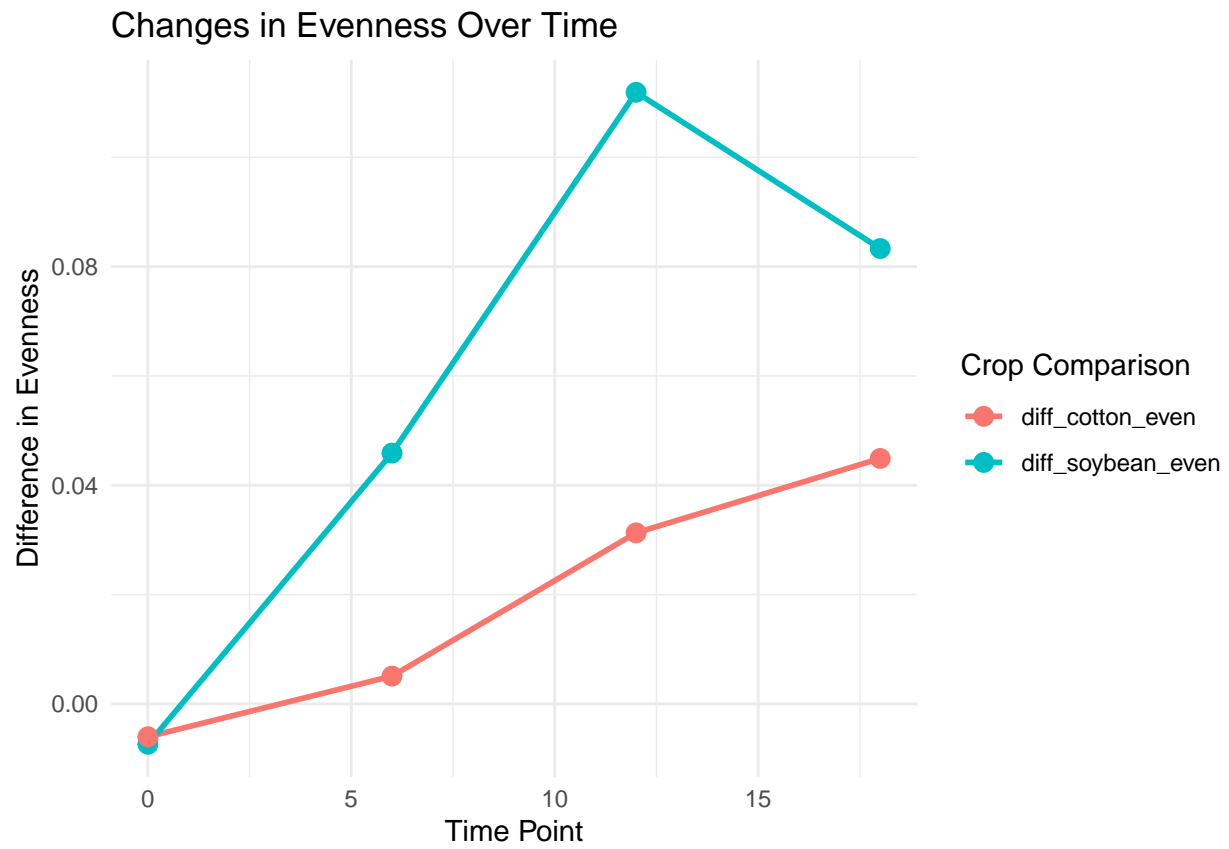
	<int>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
## 1	0	0.820	0.814	0.822	-0.00602	-0.00740
## 2	6	0.805	0.810	0.764	0.00507	0.0459
## 3	12	0.767	0.798	0.687	0.0313	0.112
## 4	18	0.755	0.800	0.716	0.0449	0.0833

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](#)