ENVS-193DS_homework-03

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github link

```
library(fs) # used to create file structure
library(tidyverse)
library(here)
library(gt)
library(janitor)
library(readxl)
library(ggplot2)
```

Problem 1

a. Data Summarizing

For my data, I am interested in my response variable of the amount of miles ran, and how my mileage is influenced by the explanatory variables of caloric intake and sleep duration. I would like to take the mean of each of these explanatory variables, and then use the mean to determine levels of lower than average or higher than average caloric intake or sleep duration. I would then calculate the mean number of miles ran for each group.

This comparison is informative as it could help me gauge the conditions under which I perform best, and help me further understand how fueling and rest influence my running performance.

b. Visualization

```
#cleaning data
personal_data <- read_csv(here("data", "ES193DS_running_data .csv")) # read in the data
personal_data <- personal_data %>% #cleaning the data
  clean_names()
```

```
# find the mean for sleep
mean_sleep <- mean(personal_data$sleep_duration_hours, na.rm = TRUE) # calculating the m

# filter the column for  above average sleep
above_avg_sleep <- personal_data %>%
  filter(sleep_duration_hours > mean_sleep) # creating a new data set where sleep is abo

# filter the column for  below average sleep
below_avg_sleep <- personal_data %>%
  filter(sleep_duration_hours < mean_sleep) # creating a new data set where sleep is bel
```

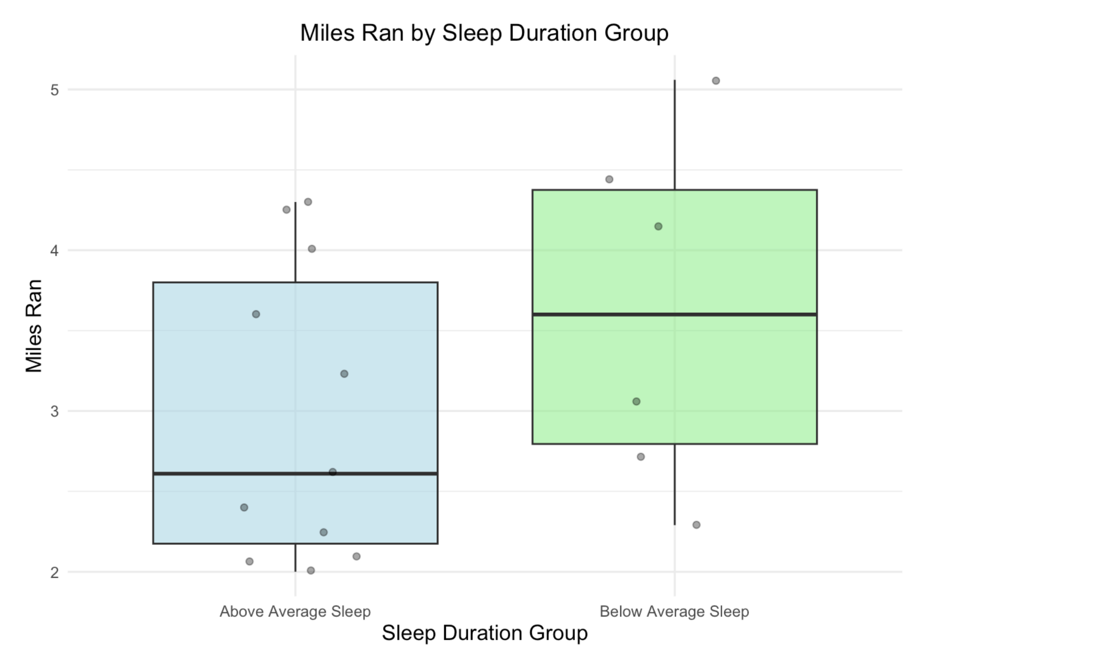
```
# find the mean for caloric intake
mean_calories <- mean(personal_data$caloric_intake, na.rm = TRUE) # calculating the mena

# filter for above average caloric intake
above_avg_caloric_intake <- personal_data %>%
  filter(caloric_intake > mean_calories) # creating a new data set where caloric intake

# filter for below average caloric intake
below_avg_caloric_intake <- personal_data %>%
  filter(caloric_intake < mean_calories) # creating a new data set where caloric intake
```

```
#group sleep data
personal_data <- personal_data %>%
  mutate(sleep_group = if_else(sleep_duration_hours > mean_sleep, # using mutate to crea
                               "Above Average Sleep", # if sleep is greater than the mea
                               "Below Average Sleep")) # if sleep is less than the mean
```

```
#group calorie data
personal_data <- personal_data %>%
  mutate(caloric_group = if_else(caloric_intake > mean_calories, # using mutate to creat
                                 "Above Average Calories", # If caloric intake is greate
                                 "Below Average Calories")) # If caloric intake is lower
```

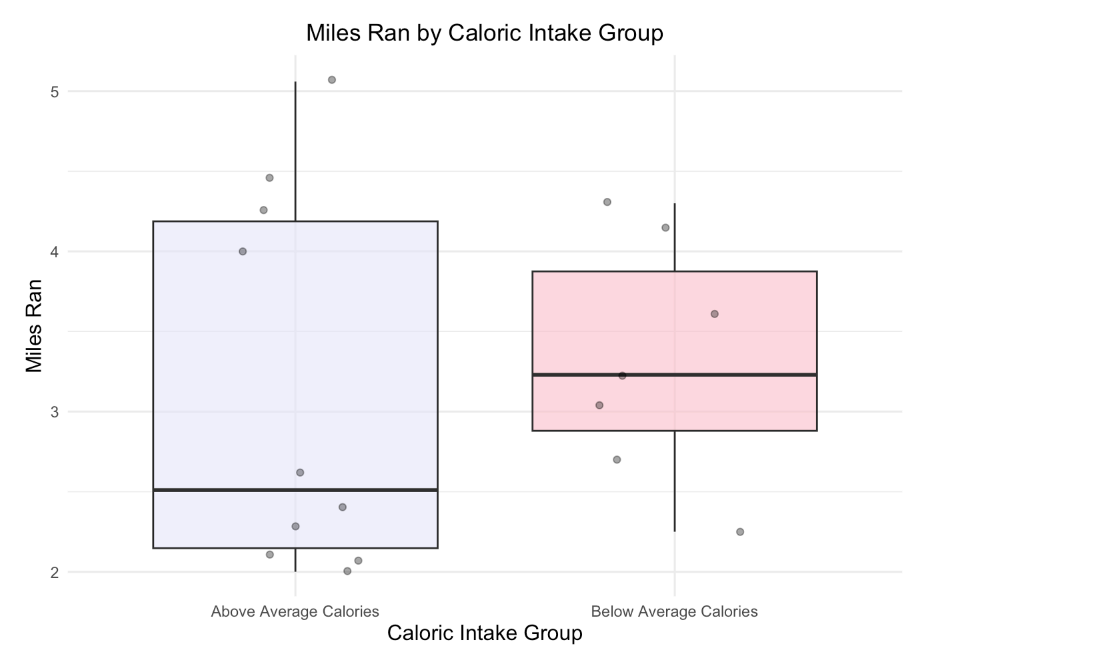
```
# summarize by group
sleep_summary <- personal_data %>% # create sleep_summary table
  group_by(sleep_group) %>% # group data by the sleep_group column that was previously c
  summarize(mean_miles_ran = mean(miles_ran, # calculate the mean of miles_ran for betwe
                                  na.rm = TRUE)) # ignoring any NA values

# creating a summary for calorie_summary
caloric_summary <- personal_data %>%
  group_by(caloric_group) %>% # group data by the caloric_group column
  summarize(mean_miles_ran = mean(miles_ran, # calculate the mean of miles_ran between g
                                  na.rm = TRUE)) # ignoring any NA values
```

```
clean_data <- personal_data %>%
  filter(!is.na(miles_ran), !is.na(caloric_group))

ggplot(personal_data, #create the plot using personal data
       aes(x = sleep_group, # set the x axis to the sleep group
           y = miles_ran, # set the y axis to the miles ran
           fill = sleep_group)) + # fill color will be determined based on sleep group

  geom_boxplot(alpha = 0.6, # creating a boxplot, making boxplots a little transparent w
               outlier.shape = NA) + # removing outliers

  geom_jitter(width = 0.2, # adding jitter plots, spreading horizontally
              alpha = 0.4, # alpha is used tor transparency
              color = "black") + # coloring the jitter points

  scale_fill_manual(values = c("lightblue", "lightgreen")) + # customizing colors

  labs( #adding titles and axis titles
    title = "Miles Ran by Sleep Duration Group", # plot title
    x = "Sleep Duration Group", # x axis label
    y = "Miles Ran" # y axis label
  ) +
  theme_minimal() + # use a minimal theme
  theme(legend.position = "none") + # remove the legend
  theme(plot.title = element_text(hjust = 0.5), # center the plot title
        axis.title.x = element_text(size = 12), # increase the font size
        axis.title.y = element_text(size = 12) # increase the font size
      )
```



c. caption - Figure 1: This figure is displaying the distribution of miles ran based on two groups of sleep data; either below oe above average. This boxplot can help visualize how I perform with different amounts of rest.

```
ggplot(personal_data, # using personal data
       aes(x = caloric_group, # set the x axis to caloric group
           y = miles_ran, # set the y axis to miles ran
           fill = caloric_group)) + # fill color determined by group

  geom_boxplot(alpha = 0.6, # creating a boxplot, making them a little transparent with
               outlier.shape = NA) + # removing outliers

  geom_jitter(width = 0.2, # adding jitter points, spreading horizontally
              alpha = 0.4, # alpha is used for transparency
              color = "black") + # coloring the jitter points

  scale_fill_manual(values = c("lavender", "pink")) + # customizing colors

  labs(
    title = "Miles Ran by Caloric Intake Group", # plot title
    x = "Caloric Intake Group", # x axis label
    y = "Miles Ran" # y axis label
  ) +

  theme_minimal() + # use a minimal theme
  theme(legend.position = "none") +
  theme(plot.title = element_text(hjust = 0.5), # center the title
        axis.title.x = element_text(size = 12), # increase the font size
        axis.title.y = element_text(size = 12) # increase the font size
      )
```



c. caption - Figure 2: This boxplot displays distribution of miles ran based on two caloric intake groups, either an above or below average daily intake, with each point representing an individual day of data. This plot suggests that there is a slight correlation between days with higher caloric in takee and higher mileage, although there is some variability.

d. Table Presentation

```
summary_table <- personal_data %>%
  group_by(sleep_group, caloric_group) %>%
  summarize(mean_miles_ran = round(mean(miles_ran, na.rm = TRUE), 1),
            .groups = "drop")
```

```
# Use gt to create the table
summary_table %>%
  gt() %>%
  tab_header(
    title = "Mean Miles Ran by Sleep and Caloric Intake Group" # adding a title
  ) %>%
  cols_label(
    sleep_group = "Sleep Group", # renaming the column header
    caloric_group = "Caloric Intake Group", # renaming the column header
    mean_miles_ran = "Mean Miles Ran" # renaming the column header
  ) %>%
  fmt_number(
    columns = c(mean_miles_ran), # identifying particular column we want to format
    decimals = 2 # format the mean miles ran column to show two decimal places
  )
```

Mean Miles Ran by Sleep and Caloric Intake Group

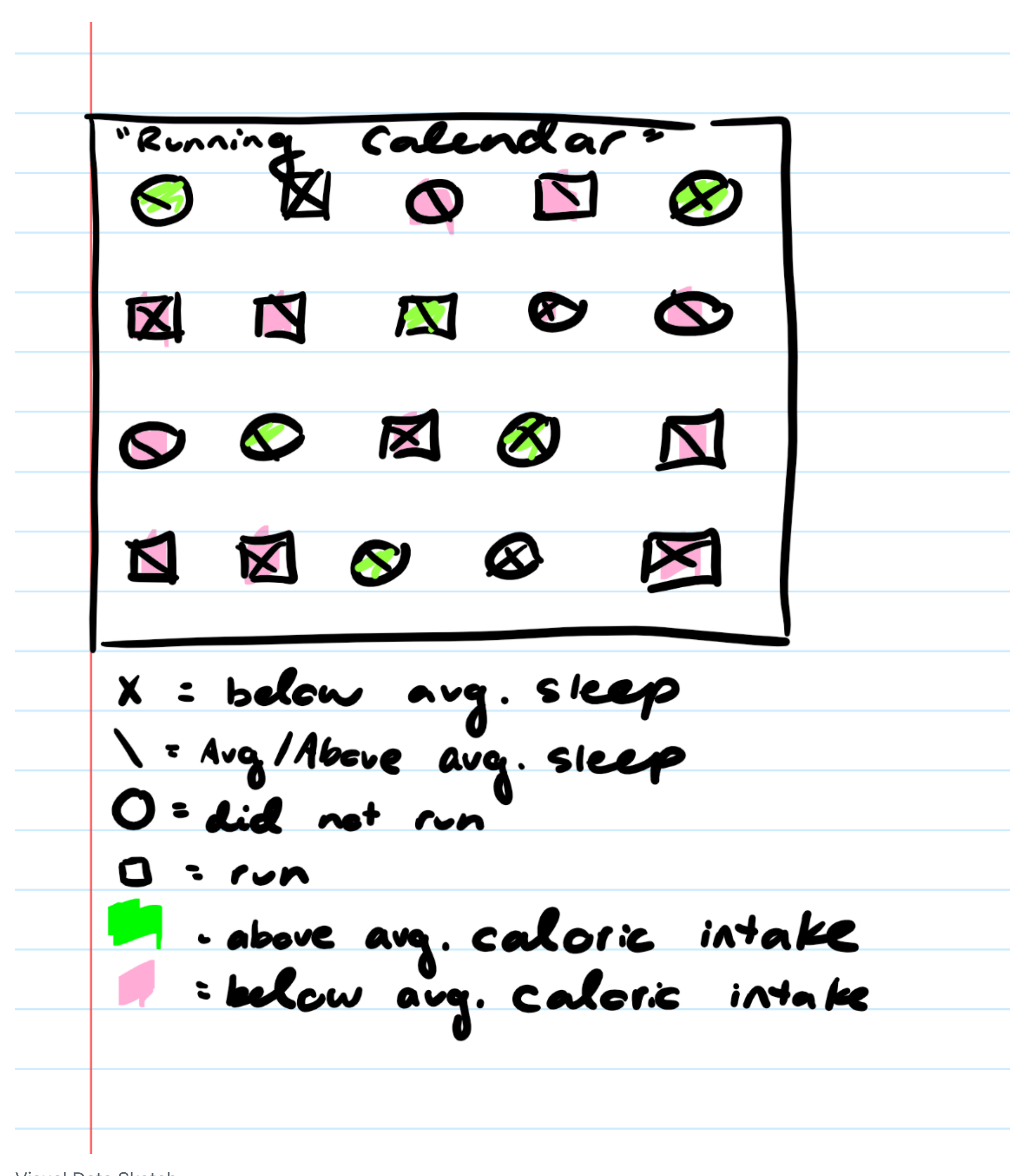
Sleep Group	Caloric Intake Group	Mean Miles Ran
Above Average Sleep	Above Average Calories	2.80
Above Average Sleep	Below Average Calories	3.30
Below Average Sleep	Above Average Calories	3.90
Below Average Sleep	Below Average Calories	3.30

Problem 2

a. Describe in words when an affective visualization could look like for your personal data

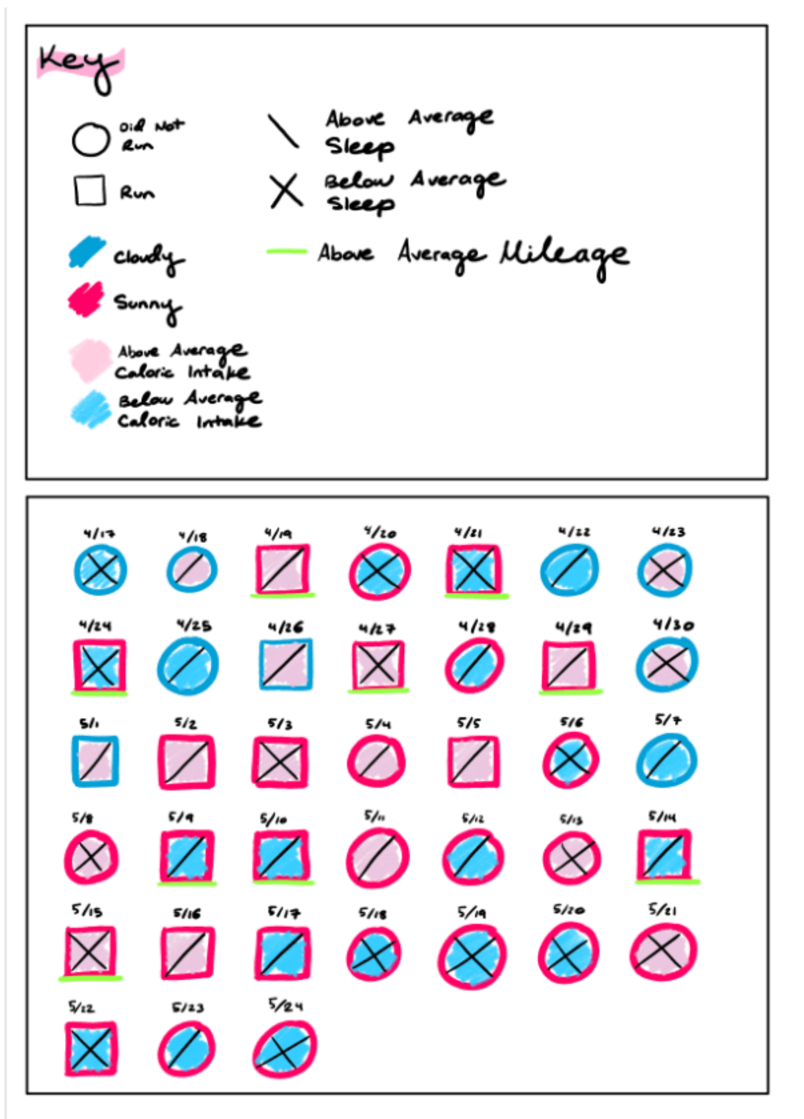
For my personal data, I believe that an affective visualization could look like a weekly timeline or calendar, with each day a different shape depending on if I ran or not; another option would be to have the days in the shapes of clouds or suns depending on the weather outside. Considering that I am using sleep and caloric intake to understand my mileage, a visualization using a color or heat gradient could be used as well to better understand the relationship between sleep, calorie intake, and performance, creating a visualization that is more visually engaging.

b. Create a sketch (on paper) of your idea



Visual Data Sketch

c. Draft of visualization



Sketch of Affective Visualization

d. Artist Statement

For my visualization, I took inspiration from Stefanie Posavec and Giorgia Lupi's Dear Data project. I created a postcard-style design similar to that ot the Dear Data project that uses different shapes and colors to represent key aspects of my data. For example, a circle indicates a day when I did not run, while a square represents a running day. A green line beneath some squares highlights days when I ran more than my average of 2.8 miles. The colors inside the shapes reflect whether my caloric intake was above or below average. I chose this format because it reminds me of a bullet journal, offering a personal and creative way to track my running, nutrition, and mileage.

Problem 3

a. Revisit and Summarize

Figure 3

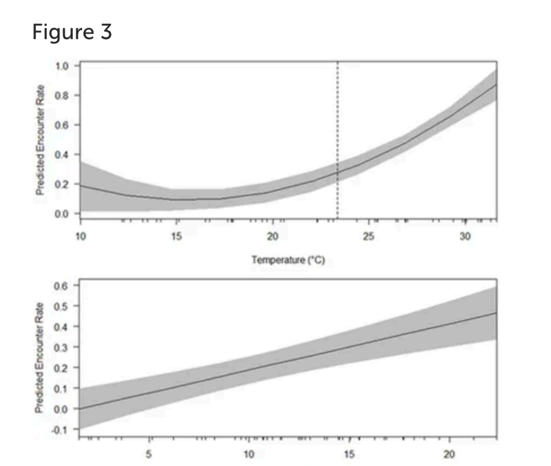


Figure 3. Predicted encounter rates (dolphins/km) of bottlenose dolphins (*Tursiops truncatus*) in upper Galveston Bay, Texas resulting from a multiple regression model with water temperature (°C) and salinity (ppt) as predictor variables. Tick marks on *x*-axis represent observed values. A breaking point of 23.37°C (dashed line) identified by segmented linear regression is displayed.

A multiple linear regression is used; the response variable is the dolphin encounter rate which is measured as the number of dolphins per kilometer surveyed. The predictor variables are the water temperature (C), salinity (ppt), and the interaction between the water temperature and salinity.

b. Visual Clarity

Figure 3 on this critique has clear axes displaying temperature vs predicted encounter rates, and salinity vs predicted encounter rates (dolphins/km), with a breakpoint line at 23.37 degrees Celsius. The axes are positioned logically, and the solid lines for model predictions are clearly visible. However, there is an absense of confidence intervals and summary statistics that could be insightful for the reader to assess the fit of the model.

c. Aesthetic Clarity

I would describe this figure as having a high data to ink ratio. The figure is minimal, but some key components are difficult to see and understand. For example, each tick on the x axis represents an observation, but the tick marks are very small, making it challenging to get a full idea of the amount of observations that were collected. Additional small details that should be considered include the font size on the axes, which makes the figure difficult to read.

d. Recommendations

Recommendations I have to enhance this figure could be to overlay raw data points and 95% confidence interval bands on the regression lines, which could better illustrate the data distribution and model uncertainty. A redesign of the figure as a heatmap could help the reader have an enhanced visual understanding of the relationship between temperature and interactions. Lastly, the readability of the figure could also be improved by increasing axes label fonts, making the tick marks larger, and labeling the intervals more clearly.