Final Project

Mike Slathar

2025-04-30

Library

```
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     1.0.4
## -- 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
```

```
library(plotly)
```

```
## Warning: package 'plotly' was built under R version 4.4.3
```

```
##
## Attaching package: 'plotly'
##
## The following object is masked from 'package:ggplot2':
##
##     last_plot
##
## The following object is masked from 'package:stats':
##
##     filter
##
## The following object is masked from 'package:graphics':
##
##     layout
```

```
library(DT)
```

```
## Warning: package 'DT' was built under R version 4.4.3
```

Data

Compiled data from iphone built-in screen-time application into a data frame

```
data=data.frame(Day = c("4/06", "4/07", "4/08", "4/09", "4/10", "4/11", "4/12", "4/13", "4/14", "4/15",

mean(data$Screen_Time)
```

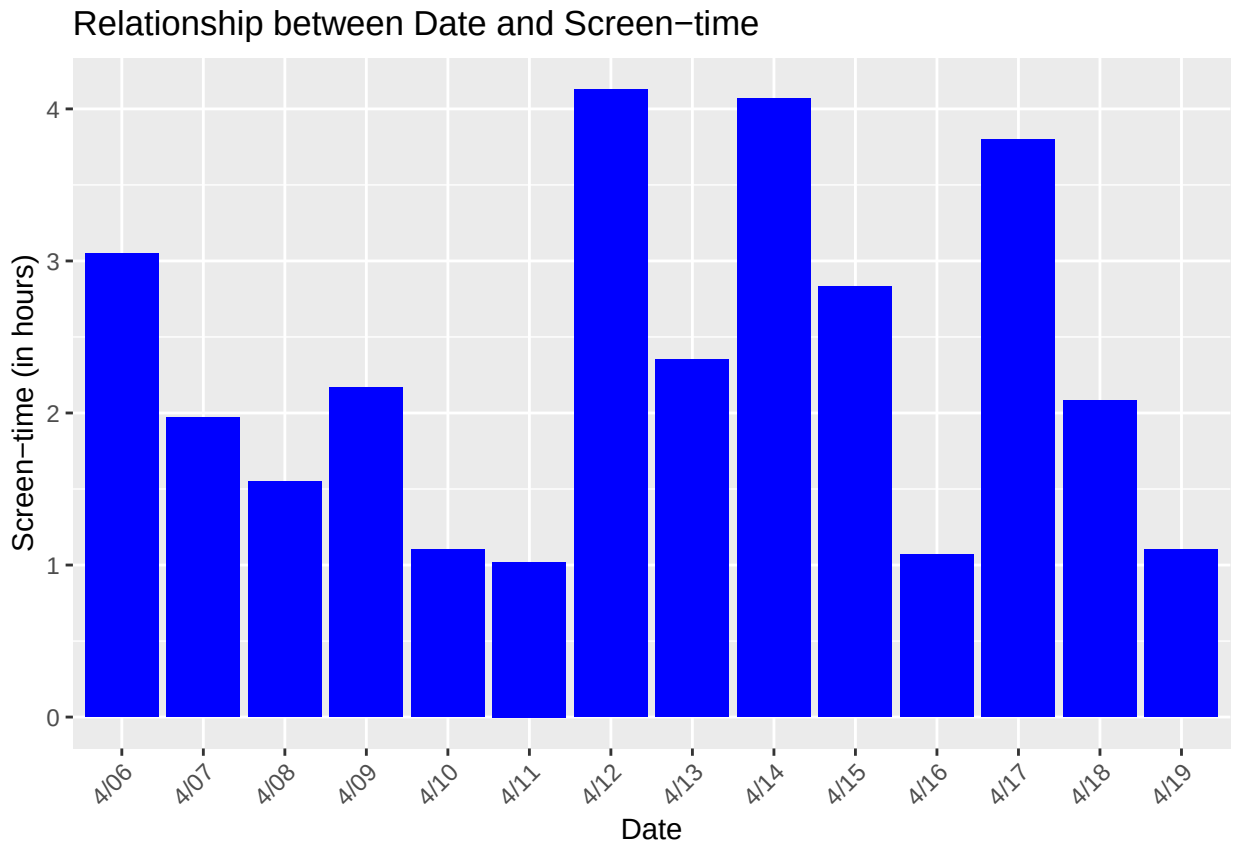
```
## [1] 2.306429
```

```
data
```

```
##     Day Screen_Time
## 1  4/06        3.05
## 2  4/07        1.97
## 3  4/08        1.55
## 4  4/09        2.17
## 5  4/10        1.10
## 6  4/11        1.02
## 7  4/12        4.13
## 8  4/13        2.35
## 9  4/14        4.07
## 10 4/15        2.83
## 11 4/16        1.07
## 12 4/17        3.80
## 13 4/18        2.08
## 14 4/19        1.10
```

Graphical Visualization

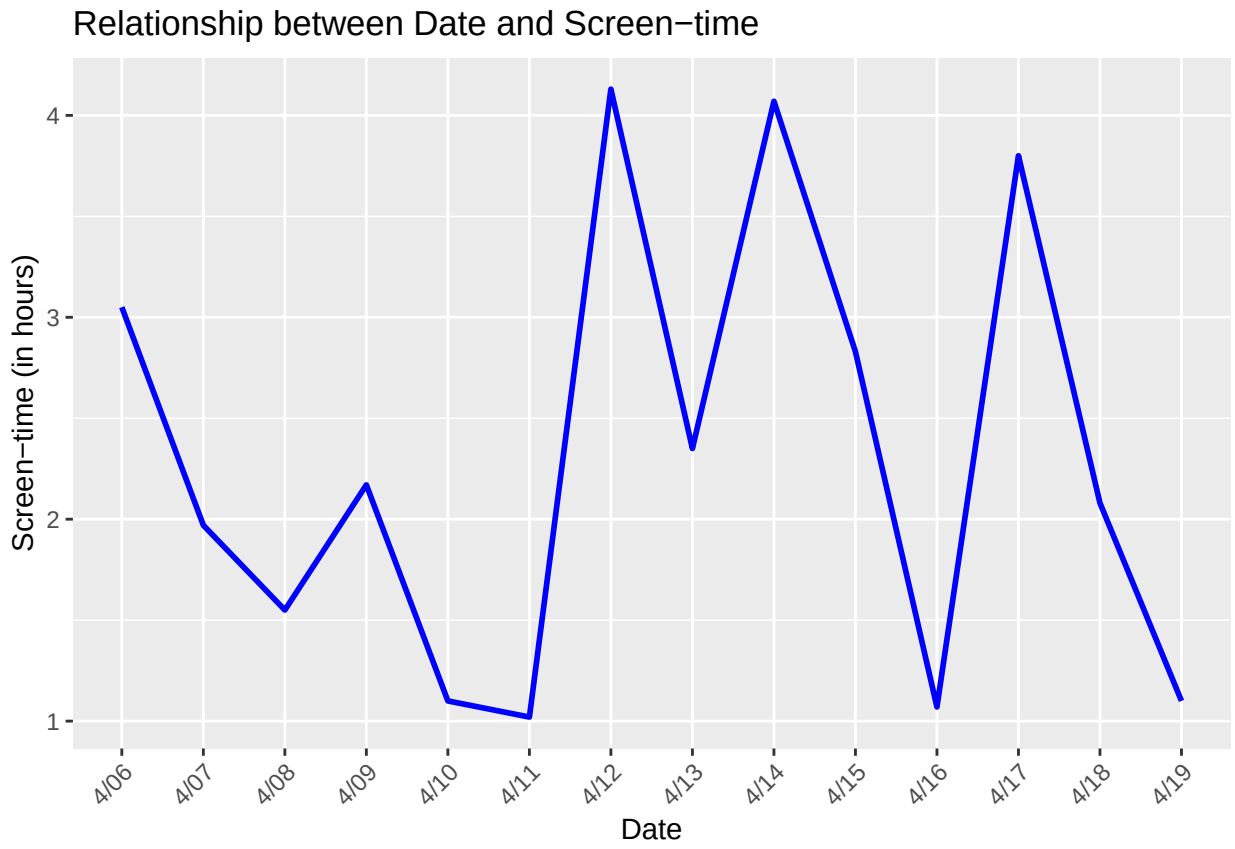
```
myplotbar=data%>%ggplot(aes(x=Day, y=Screen_Time))+
  geom_col(fill="blue")+
  labs(title = "Relationship between Date and Screen-time", x="Date", y="Screen-time (in hours)")+
  theme(axis.text.x = element_text(angle=45, hjust = 1))

myplotbar
```



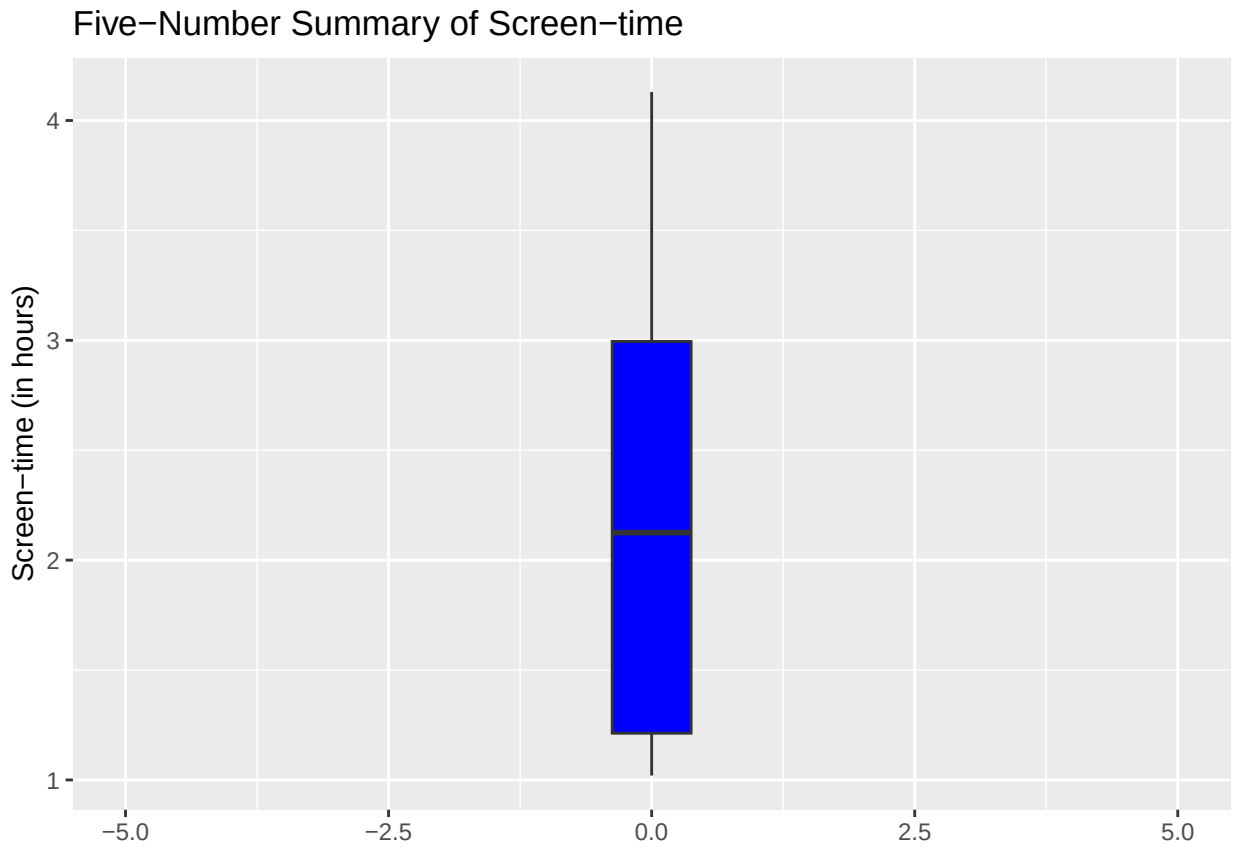

```
myplotLine=ggplot(data = data, aes(x=Day, y=Screen_Time, group = 1))+
  geom_line(color="blue", size=1)+
  labs(title = "Relationship between Date and Screen-time", x="Date", y="Screen-time (in hours)")+
  theme(axis.text.x = element_text(angle=45, hjust = 1))
```

```
## 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.
```

```
myplotLine
```




```
myplotBox=ggplot(data)+
  geom_boxplot(aes(y=Screen_Time), fill="blue")+
  labs(title = "Five-Number Summary of Screen-time", y="Screen-time (in hours)")+
  xlim(-5,5)

myplotBox
```



$\overline{x}$: my average daily cellular screen-time

μ : national average daily cellular screen-time

Hypothesis

$H_o : \overline{x} = \mu$ vs $H_a : \overline{x} < \mu$ at $\alpha = 0.05$

Testing

```
t.test(data$Screen_Time, mu=4.5, alternative = "less")
```

```
##
##  One Sample t-test
##
## data:  data$Screen_Time
## t = -7.3197, df = 13, p-value = 2.917e-06
## alternative hypothesis: true mean is less than 4.5
## 95 percent confidence interval:
##      -Inf 2.837143
## sample estimates:
## mean of x
##  2.306429
```

Conclusion

$p - value < \alpha$. At the 5% significance level, we reject H_o, and accept H_a. We have sufficient evidence to conclude that my daily average cellular screen-time is significantly lower than the national average daily cellular screen-time or $H_a : \overline{x} < \mu$.