NFL_Data_Analysis

Isaac Swope Kyle Barber Tim Smith

2025-12-03

Data Overview

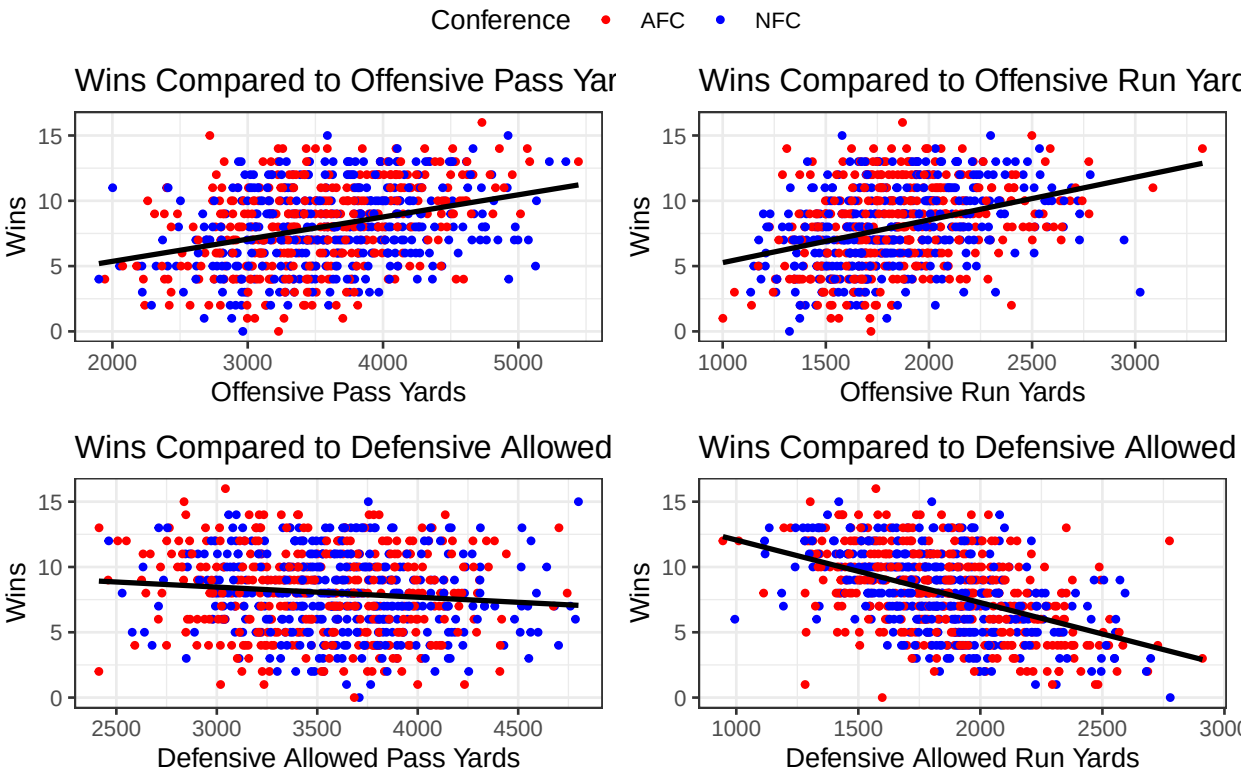

Table 1

Teams	Average Wins	Mean Offensive Pass Yards	Mean Offense Run Yards	Mean Defensive Pass Yards	Mean Defensive Run Yards
ARI	6.92	3598.42	1559.42	3589.96	1932.25
ATL	7.79	3623.42	1858.67	3792.96	1916.62
BAL	9.46	3247.50	2084.08	3407.50	1501.79
BUF	7.71	3255.38	1941.00	3221.00	1968.67
CAR	7.58	3308.42	1915.33	3519.83	1830.17
CHI	7.50	3182.75	1775.92	3548.67	1835.25

Table 1

Teams	Average Wins	Mean Offensive Pass Yards	Mean Offense Run Yards	Mean Defensive Pass Yards	Mean Defensive Run Yards
CIN	7.29	3482.04	1766.79	3616.21	1887.46
CLE	5.29	3175.08	1711.04	3457.75	2170.79
DAL	8.58	3679.12	1950.88	3536.79	1782.58
DEN	8.54	3689.21	2003.58	3432.25	1781.42
DET	5.79	3728.75	1527.25	3817.00	1940.75
GB	9.96	3960.79	1817.25	3531.54	1847.38
HOU	6.76	3501.05	1803.76	3648.29	1947.19
IND	9.75	3988.96	1735.12	3528.33	1957.33
JAX	6.42	3342.38	1890.96	3528.83	1854.96
KC	8.96	3721.92	1979.12	3667.08	1998.04
LA	7.67	3733.75	1728.92	3533.83	1890.71
LAC	8.17	3892.08	1742.62	3569.33	1764.67
LV	6.54	3541.25	1797.79	3629.83	1995.25
MIA	7.75	3363.58	1718.25	3510.58	1857.42
MIN	8.46	3578.42	2011.67	3768.75	1733.96
NE	11.25	3931.29	1864.83	3585.88	1756.21
NO	8.92	4153.79	1813.71	3656.42	1868.92
NYG	7.67	3622.71	1832.17	3676.29	1820.17
NYJ	7.04	3168.58	1853.83	3468.08	1837.75
PHI	9.25	3701.00	1990.42	3531.21	1801.33
PIT	10.04	3672.92	1864.96	3295.71	1582.00
SEA	9.12	3446.96	1981.71	3632.79	1834.29
SF	7.54	3326.38	1969.67	3618.83	1747.42
TB	7.54	3679.04	1662.88	3486.29	1787.38
TEN	8.46	3333.25	1964.04	3754.17	1703.88
WAS	6.83	3450.46	1857.29	3537.04	1858.88

Code Appendix

```
#|label: Packages

#Tidyverse Coding Styling
library(tidyverse)
library(dbplyr)
library(kableExtra)
#install.packages("patchwork")
library(patchwork)
library(ggplot2)
#install.packages("ggpubr")
library(ggpubr)
#|label: Importing Data

NFL_raw <- read.csv("nfl-team-statistics (1).csv")

#|label: Adding East, West, North and South Conferences
NFC_East_data <- NFL_raw %>%
  filter(team %in% c("DAL", "NYG", "PHI", "WAS"))%>%
  mutate(Conf = 'NFC_East')

NFC_West_data <- NFL_raw %>%
  filter(team %in% c("LA", "SEA", "SF", "ARI"))%>%
  mutate(Conf = 'NFC_West')

NFC_North_data <- NFL_raw %>%
  filter(team %in% c("CHI", "GB", "DET", "MIN"))%>%
  mutate(Conf = 'NFC_North')

NFC_South_data <- NFL_raw %>%
  filter(team %in% c("TB", "CAR", "ATL", "NO"))%>%
  mutate(Conf = 'NFC_South')

AFC_East_data <- NFL_raw %>%
  filter(team %in% c("NE", "BUF", "MIA", "NYJ"))%>%
  mutate(Conf = 'AFC_East')

AFC_West_data <- NFL_raw %>%
  filter(team %in% c("DEN", "LAC", "KC", "LV"))%>%
  mutate(Conf = 'AFC_West')

AFC_North_data <- NFL_raw %>%
  filter(team %in% c("BAL", "PIT", "CIN", "CLE"))%>%
  mutate(Conf = 'AFC_North')

AFC_South_data <- NFL_raw %>%
  filter(team %in% c("JAX", "IND", "HOU", "TEN"))%>%
```

```
  mutate(Conf = 'AFC_South')

NFL_Clean <- bind_rows(NFC_East_data, NFC_North_data, NFC_South_data, NFC_West_data, AFC_East_
  arrange(season, team)%>%
    separate_wider_delim(
    cols = 'Conf',
    delim = '_',
    names = c('Conf', 'Div')
  )

#|label: fig-Win-association
#|fig-cap: "Win Association of Offensive and Defensive Pass Yards"
#|fig-alt: "Four scatter plots showing NFL data, with axes for wins and various yard metrics. T

#author: Timothy Smith
plot1<-NFL_Clean%>%
  group_by(Div)%>%
ggplot(
    mapping = aes(
      x = offense_total_yards_gained_pass,
      y = wins,
      color = Conf
    )
  ) +
  geom_point(size = 1) +
  labs(#Step 4: add labels and title to the data visualization and create the colors for the li
    x = "Offensive Pass Yards",
    y = "Wins",
    color = "Conference",
    title = "Wins Compared to Offensive Pass Yards"
  ) +
  scale_color_manual(
    values = c("red", "blue")
  )+
  theme_bw() +
  theme(
    legend.position = "bottom"
  )+
  geom_smooth(method = "lm", se = FALSE, color = "black")

  plot2<-NFL_Clean%>%
  group_by(Div)%>%
ggplot(
    mapping = aes(
      x = offense_total_yards_gained_run,
      y = wins,
      color = Conf
```

```
    )
  ) +
  geom_point(size=1) +
  labs(#Step 4: add labels and title to the data visualization and create the colors for the li
    x = "Offensive Run Yards",
    y = "Wins",
    color = "Conference",
    shape = "team",
    title = "Wins Compared to Offensive Run Yards"
  ) +
  scale_color_manual(
    values = c("red", "blue")
  )+
  theme_bw() +
  theme(
    legend.position = "bottom"
  )+
  geom_smooth(method = "lm", se = FALSE, color = "black")

  plot3<-NFL_Clean%>%
  group_by(Div)%>%
ggplot(
    mapping = aes(
      x = defense_total_yards_gained_pass,
      y = wins,
      color = Conf
    )
  ) +
  geom_point(size=1) +
  labs(#Step 4: add labels and title to the data visualization and create the colors for the li
    x = "Defensive Allowed Pass Yards",
    y = "Wins",
    color = "Conference",
    title = "Wins Compared to Defensive Allowed Pass Yards"
  ) +
  scale_color_manual(
    values = c("red", "blue")
  )+
  theme_bw() +
  theme(
    legend.position = "bottom"
  )+
  geom_smooth(method = "lm", se = FALSE, color = "black")


  plot4<-NFL_Clean%>%
  group_by(Div)%>%
```

```
ggplot(
    mapping = aes(
      x = defense_total_yards_gained_run,
      y = wins,
      color = Conf
    )
  ) +
  geom_point(size=1) +
  labs(#Step 4: add labels and title to the data visualization and create the colors for the li
    x = "Defensive Allowed Run Yards",
    y = "Wins",
    color = "Conference",
    title = "Wins Compared to Defensive Allowed Run Yards"
  ) +
  scale_color_manual(
    values = c("red", "blue")
  )+
  theme_bw() +
  theme(
    legend.position = "bottom"
  )+
  geom_smooth(method = "lm", se = FALSE, color = "black")

  ggarrange(plot1, plot2, plot3, plot4, nrow = 2, ncol = 2, common.legend = TRUE)




#|tbl-cap: "NFL Offensive and Drfensive Statistics"

NFL_O_D <- NFL_Clean %>%
  group_by(team)%>%
  summarize(
    Mean_Wins = mean(wins, na.rm = TRUE),
    Mean_O_pass_yards = mean(offense_total_yards_gained_pass, na.rm = TRUE),
    Mean_O_run_yards = mean(offense_total_yards_gained_run, na.rm = TRUE),
    Mean_D_pass_yards = mean(defense_total_yards_gained_pass, na.rm = TRUE),
    Mean_D_run_yards = mean(defense_total_yards_gained_run, na.rm = TRUE)
  )%>%
  mutate(
    across(
      .cols = where(is.numeric),
      .fns = ~round(.x, digits = 2)
    )
  )

names(NFL_O_D) <- c(
```

```
    "Teams",
    "Average Wins",
    "Mean Offensive Pass Yards",
    "Mean Offense Run Yards",
    "Mean Defensive Pass Yards",
    "Mean Defensive Run Yards"
    )

NFL_O_D %>%
  kable(
    booktabs = TRUE,
    align = c("l", rep("c",10)))
```