Assignment-1.R

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2022-07-23

```r
library(nflfastR)
```

```
## Warning: package 'nflfastR' was built under R version 4.1.3
```

```r
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 4.1.3
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```r
library(ggplot2)
library(caTools)
```

```
## Warning: package 'caTools' was built under R version 4.1.3
```

```r
pbp_2021 <- load_pbp(2021)
pbp_2021 <- pbp_2021 %>% mutate(winner = ifelse(home_score > away_score,
                                                home_team,
                                                away_team))
pbp_2021 <- pbp_2021 %>% mutate(poswins = ifelse(winner == posteam, "Yes",
                                                 "No"))
pbp_2021$poswins <- as.factor(pbp_2021$poswins)

filtered_pbp_2021 <- pbp_2021 %>%
  filter(qtr <= 4 & poswins != "NA" & play_type != "no_play"
         & play_type != "NA") %>%
  select(game_id, home_team, away_team, yardline_100,
         game_seconds_remaining/60, posteam, poswins, down,
         ydstogo, score_differential, home_wp, away_wp, wp,
```

```
        desc)

set.seed(123)
split = sample.split(filtered_pbp_2021$poswins, SplitRatio = 0.8)
train = filtered_pbp_2021 %>% filter(split == TRUE)
test = filtered_pbp_2021 %>% filter(split == FALSE)


model1 <- glm(poswins ~ down +
              yardline_100 + game_seconds_remaining +
              ydstogo +
              score_differential,
              train,
              family = "binomial")
summary(model1)
```

```
##
## Call:
## glm(formula = poswins ~ down + yardline_100 + game_seconds_remaining +
##     ydstogo + score_differential, family = "binomial", data = train)
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -2.65656  -0.77237   0.09731   0.82356   2.64449
##
## Coefficients:
##                           Estimate Std. Error z value Pr(>|z|)
## (Intercept)              1.175e+00  6.111e-02  19.227   <2e-16 ***
## down                    -1.400e-01  1.481e-02  -9.452   <2e-16 ***
## yardline_100            -9.627e-03  6.087e-04 -15.816   <2e-16 ***
## game_seconds_remaining -2.324e-05  1.344e-05  -1.730   0.0837 .
## ydstogo                 -6.514e-03  3.684e-03  -1.768   0.0771 .
## score_differential       1.893e-01  2.340e-03  80.912   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 43186  on 31162  degrees of freedom
## Residual deviance: 29479  on 31157  degrees of freedom
##   (3510 observations deleted due to missingness)
## AIC: 29491
##
## Number of Fisher Scoring iterations: 5
```

```
pred_home = predict(model1, train, type = "response")

train <- cbind(train, pred_home)
train <- mutate(train, pred_home = ifelse(posteam == home_team,
                                  pred_home, 1 - pred_home))

ggplot(filter(train, game_id == "2021_01_ARI_TEN", !is.na(down)),
    aes(x=game_seconds_remaining/60, y = pred_home)) +
  geom_line(size = 2, color = "lightblue") + scale_x_reverse() +
```

```
ylim(c(0,1)) + theme_minimal() +
xlab("Time Remaining") + ylab("Win Probability") +
geom_line(aes(game_seconds_remaining/60, 1 - pred_home), col = "red",
        size = 2) +
geom_line(aes(game_seconds_remaining/60, home_wp), col = "black") +
geom_line(aes(game_seconds_remaining/60, away_wp), col = "darkgray") +
annotate("text", x = 10, y = 0.9, label = "Davis WP Model",
        col = "red") +
annotate("text", x = 10, y = 0.85, label = "nflfastR WP Cardinals",
        col = "darkgray") +
annotate("text", x = 10, y = .3, label = "nflfastR WP Titans",
        col = "black") +
annotate("text", x = 10, y = 0.25, label = "Davis WP Model",
        col = "lightblue") +
geom_vline(aes(xintercept = 30), lty = "dashed") +
geom_vline(aes(xintercept = 45), lty = "dashed") +
geom_vline(aes(xintercept = 15), lty = "dashed")
```