

Predicting NFL Wide Receiver Success Using Combine Measurables and PFF College Data

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Load Packages

```
library(tidyverse)
library(tidyr)
library(readr)
library(dplyr)
library(broom)
library(knitr)
library(nflfastR)
library(nflplotR)
library(ggrepel)
library(caret)
```

Load PFF Data

```
stats_2014 <- read.csv("data_pff_receiver/2014_receiver_pff_data.csv") %>%
  select(-c(avg_depth_of_target, avoided_tackles, contested_catch_rate,
            contested_receptions, contested_targets, declined_penalties,
            franchise_id, fumbles, grades_pass_block, inline_rate, inline_snaps,
            interceptions, longest, pass_block_rate, pass_blocks, penalties,
            slot_rate, slot_snaps, wide_rate, wide_snaps))
stats_2015 <- read.csv("data_pff_receiver/2015_receiver_pff_data.csv") %>%
  select(-c(avg_depth_of_target, avoided_tackles, contested_catch_rate,
            contested_receptions, contested_targets, declined_penalties,
            franchise_id, fumbles, grades_pass_block, inline_rate, inline_snaps,
            interceptions, longest, pass_block_rate, pass_blocks, penalties,
            slot_rate, slot_snaps, wide_rate, wide_snaps))
stats_2016 <- read.csv("data_pff_receiver/2016_receiver_pff_data.csv") %>%
  select(-c(avg_depth_of_target, avoided_tackles, contested_catch_rate,
            contested_receptions, contested_targets, declined_penalties,
            franchise_id, fumbles, grades_pass_block, inline_rate, inline_snaps,
            interceptions, longest, pass_block_rate, pass_blocks, penalties,
            slot_rate, slot_snaps, wide_rate, wide_snaps))
stats_2017 <- read.csv("data_pff_receiver/2017_receiver_pff_data.csv") %>%
  select(-c(avg_depth_of_target, avoided_tackles, contested_catch_rate,
            contested_receptions, contested_targets, declined_penalties,
            franchise_id, fumbles, grades_pass_block, inline_rate, inline_snaps,
            interceptions, longest, pass_block_rate, pass_blocks, penalties,
            slot_rate, slot_snaps, wide_rate, wide_snaps))
```

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stats_2018 <- read.csv("data_pff_receiver/2018_receiver_pff_data.csv") %>%
  select(-c(avg_depth_of_target, avoided_tackles, contested_catch_rate,
            contested_receptions, contested_targets, declined_penalties,
            franchise_id, fumbles, grades_pass_block, inline_rate, inline_snaps,
            interceptions, longest, pass_block_rate, pass_blocks, penalties,
            slot_rate, slot_snaps, wide_rate, wide_snaps))
stats_2019 <- read.csv("data_pff_receiver/2019_receiver_pff_data.csv") %>%
  select(-c(avg_depth_of_target, avoided_tackles, contested_catch_rate,
            contested_receptions, contested_targets, declined_penalties,
            franchise_id, fumbles, grades_pass_block, inline_rate, inline_snaps,
            interceptions, longest, pass_block_rate, pass_blocks, penalties,
            slot_rate, slot_snaps, wide_rate, wide_snaps))
stats_2020 <- read.csv("data_pff_receiver/2020_receiver_pff_data.csv") %>%
  select(-c(avg_depth_of_target, avoided_tackles, contested_catch_rate,
            contested_receptions, contested_targets, declined_penalties,
            franchise_id, fumbles, grades_pass_block, inline_rate, inline_snaps,
            interceptions, longest, pass_block_rate, pass_blocks, penalties,
            slot_rate, slot_snaps, wide_rate, wide_snaps))
combine_stats <- read.csv("combinedStats.csv")

```

Stats by Draft Classes

#2020 Stats of 2021 DC

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dc_2021 <- c("Ja'Marr Chase", "DeVonta Smith", "Elijah Moore", "Dax Milne",
            "Jaelon Darden", "Austin Trammell", "Marlon Williams",
            "Tim Jones", "Tylan Wallace", "D'Wayne Eskridge",
            "Jonathan Adams Jr.", "Kadarius Toney", "Jaylen Waddle",
            "Antonio Nunn", "Dyami Brown", "Rashod Bateman",
            "Terrace Marshall Jr.", "Shi Smith", "Amari Rodgers", "Rondale Moore",
            "Isaiah McKoy", "Damon Hazelton", "Camden Harrison", "Brevin Jordan",
            "Bailey Gaither", "Tutu Atwell", "Dez Fitzpatrick", "Austin Watkins",
            "Simi Fehoko", "Connor Wedington", "Kawaan Baker", "Cornell Powell",
            "Blake Proehl", "Javon McKinley", "Dazz Newsome", "Landen Akers",
            "Tre Walker", "Amon-Ra St. Brown", "Eli Stove", "Ramaud Chiaokhiao-Bowman",
            "Josh Palmer", "Anthony Schwartz", "Whop Philyor", "Damonte Coxie",
            "Tray Eafford", "Brennan Eagles", "Trevon Grimes", "Myron Mitchell",
            "Marquez Stevenson", "Adrian Hardy", "Seth Williams", "Tre Odoms-Dukes",
            "Tyler Vaughns", "Antwan Davis", "Dillon Stoner", "Josh Imatorbhebhe",
            "Tamorrion Terry", "T.J. Simmons", "DJ Turner", "Tarik Black",
            "Tre Nixon", "Sam Denmark", "Jalen Camp", "Ihmir Smith-Marsette",
            "Osirus Mitchell", "Bennett Skowronek", "Terrell Jana", "Khalil McClain",
            "Jeremiah Haydel", "T.J. Vasher", "Riley Lees", "Jacob Harris",
            "Racey McMath", "Rico Bussey Jr.", "Branden Mack", "Brandon Smith",
            "Frank Darby", "Javon Turner", "Adam Krumholz")

dc2021_stats2020 <- stats_2020 %>%
  filter(player %in% dc_2021 & position == "WR") %>%
  left_join(stats_2019, by = c("player", "player_id", "position"),
            suffix = c("_draft", "_pre")) |>
  rowwise() %>%
  mutate(total_yards = yards_draft + yards_pre,
         total_catch_percent = sum(c(receptions_draft + receptions_pre), na.rm=TRUE) / sum(c(targets_draft + targets_pre)))

```

```

total_target_percent = sum(c(targets_draft + targets_pre), na.rm = TRUE) / sum(c(routes_draft + routes_pre, na.rm = TRUE), na.rm = TRUE),
total_route_percent = sum(c(routes_draft + routes_pre), na.rm = TRUE) / sum(c(pass_plays_draft + pass_plays_pre, na.rm = TRUE), na.rm = TRUE),
total_drop_percent = sum(c(drops_draft+drops_pre), na.rm = TRUE) / sum(c(targets_draft+targets_pre), na.rm = TRUE),
total_yprp = yprp_draft + yprp_pre,
total_first_downs = sum(c(first_downs_draft+first_downs_pre), na.rm = TRUE),
total_yards_per_reception = sum(c(yards_per_reception_draft+yards_per_reception_pre), na.rm = TRUE),
total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception_draft+yards_after_catch_per_reception_pre), na.rm = TRUE),
total_player_game_count = sum(c(player_game_count_draft+player_game_count_pre), na.rm = TRUE),
total_touchdowns = sum(c(touchdowns_draft+touchdowns_pre), na.rm = TRUE),
total_yards_per_game = ((sum(c(yards_draft,yards_pre), na.rm = TRUE)) / total_player_game_count),
total_yards_after_catch_per_game = ((sum(c(yards_after_catch_draft+ yards_after_catch_pre), na.rm = TRUE)) / total_player_game_count),
total_targets_per_game = ((sum(c(targets_draft+targets_pre), na.rm = TRUE)) / total_player_game_count),
total_targeted_qb_rating = sum(c(targeted_qb_rating_draft+targeted_qb_rating_pre), na.rm = TRUE),
games_draft = (player_game_count_draft / sum(c(player_game_count_draft+ player_game_count_pre), na.rm = TRUE)),
grades_hands_drop = sum(c((games_draft*grades_hands_drop_draft),((1-games_draft)*grades_hands_drop_pre), na.rm = TRUE),
grades_hands_fumble = sum(c((games_draft*grades_hands_fumble_draft)+((1-games_draft)*grades_hands_fumble_pre), na.rm = TRUE),
grades_offense = sum(c((games_draft*grades_offense_draft)+((1-games_draft)*grades_offense_pre), na.rm = TRUE),
grades_pass_route = sum(c((games_draft*grades_pass_route_draft)+((1-games_draft)*grades_pass_route_pre), na.rm = TRUE))
pro_2022 <- read_csv("data/2022_pro_stats.csv")

## Rows: 466 Columns: 45
## -- Column specification -----
## Delimiter: ","
## chr (3): player, position, team_name
## dbl (42): player_id, player_game_count, avg_depth_of_target, avoided_tackles...
##
## i Use 'spec()' to retrieve the full column specification for this data.
## i Specify the column types or set 'show_col_types = FALSE' to quiet this message.

pro_2021 <- read_csv("data/2021_pro_stats.csv")

## Rows: 538 Columns: 45
## -- Column specification -----
## Delimiter: ","
## chr (3): player, position, team_name
## dbl (42): player_id, player_game_count, avg_depth_of_target, avoided_tackles...
##
## i Use 'spec()' to retrieve the full column specification for this data.
## i Specify the column types or set 'show_col_types = FALSE' to quiet this message.

dc_2021_pro_stats <- pro_2021 %>%
  inner_join(pro_2022, by = c("player", "position", "player_id"), suffix = c("1yr", "2yr")) %>%
  select(-c(grades_pass_block1yr, grades_pass_block2yr)) |>
  rowwise() %>%

```

```

mutate(total_yards = yards1yr + yards2yr,
       total_catch_percent = sum(c(receptions1yr + receptions2yr), na.rm=TRUE) / sum(c(targets1yr + targets2yr), na.rm = TRUE),
       total_target_percent = sum(c(targets1yr + targets2yr), na.rm = TRUE) / sum(c(routes1yr + routes2yr), na.rm = TRUE),
       total_route_percent = sum(c(routes1yr + routes2yr), na.rm = TRUE) / sum(c(pass_plays1yr + pass_plays2yr), na.rm = TRUE),
       total_drop_percent = sum(c(drops1yr+drops2yr), na.rm = TRUE) / sum(c(targets1yr+targets2yr), na.rm = TRUE),
       total_ypr = ypr1yr + ypr2yr,
       total_first_downs = sum(c(first_downs1yr+first_downs2yr), na.rm = TRUE),
       total_yards_per_reception = sum(c(yards_per_reception1yr+yards_per_reception2yr), na.rm = TRUE),
       total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception1yr+
                                                    yards_after_catch_per_reception2yr), na.rm = TRUE),
       total_player_game_count = sum(c(player_game_count1yr+player_game_count2yr), na.rm = TRUE),
       total_touchdowns = sum(c(touchdowns1yr+touchdowns2yr), na.rm = TRUE),
       total_yards_per_game = sum(c(yards1yr+yards2yr), na.rm = TRUE) / total_player_game_count,
       total_yards_after_catch_per_game = sum(c(yards_after_catch1yr + yards_after_catch2yr), na.rm = TRUE) /
                                           total_player_game_count,
       total_targets_per_game = sum(c(targets1yr + targets2yr), na.rm = TRUE) / total_player_game_count,
       total_targeted_qb_rating = sum(c(targeted_qb_rating1yr+targeted_qb_rating2yr), na.rm = TRUE) /
                                   games2yr,
       games2yr = (player_game_count2yr / sum(c(player_game_count2yr + player_game_count1yr), na.rm = TRUE)),
       grades_hands_drop = sum(c((games2yr*grades_hands_drop2yr)+((1-games2yr)*grades_hands_drop1yr)),
                               na.rm = TRUE),
       grades_hands_fumble = sum(c((games2yr*grades_hands_fumble2yr)+((1-games2yr)*grades_hands_fumble1yr)),
                               na.rm = TRUE),
       grades_offense = sum(c((games2yr*grades_offense2yr)+((1-games2yr)*grades_offense1yr)), na.rm = TRUE),
       grades_pass_route = sum(c((games2yr*grades_pass_route2yr)+((1-games2yr)*grades_pass_route1yr)),
                               na.rm = TRUE))

```

#2019 Stats of 2020 DC

```

dc_2020 <- c("Geraud Sanders" , "Tyler Johnson" , "CeeDee Lamb" , "Tee Higgins" ,
             "Isaiah Hodgins" , "Omar Bayless" , "Devin Duvernay" , "Jauan Jennings" ,
             "Antonio Gandy-Golden" , "Ja'Marcus Bradley" , "James Proche" ,
             "Jerry Jeudy" , "Justin Jefferson" , "Laviska Shenault Jr." ,
             "Quintez Cephus" , "Brandon Arconado" , "Lawrence Cager" ,
             "Denzel Mims" , "Chase Claypool" , "Michael Pittman Jr." ,
             "Gabriel Davis" , "Arthur Jackson III" , "Hasise Dubois" , "Brandon Aiyuk" ,
             "Bryan Edwards" , "Deangelo Antoine" , "Michael Lawrence" ,
             "Micah Simon" , "Deshaunte Jones" , "Raghib Ismail Jr." , "Kendall Hinton" ,
             "Binjimen Victor" , "Tony Brown" , "Lucky Jackson" , "Cody White" ,
             "Elijah Robinson" , "Collin Johnson" , "Easop Winston Jr." ,
             "Freddie Swain" , "Quez Watkins" , "Antonio Gibson" , "Henry Ruggs III" ,
             "Siaosi Mariner" , "Darrell Stewart Jr." , "Trishton Jackson" ,
             "Demetrius Davis" , "John Hightower" , "Austin Mack" , "Aaron Fuller" ,
             "Malik Stanley" , "K.J. Hill" , "Dezmon Patmon" , "Pace Ozmint" ,
             "Kirk Merritt" , "Maurice Ffrench" , "Joe Reed" , "Jordan Mitchell" ,
             "K.J. Hamler" , "George Campbell" , "Jeff Thomas" , "Van Jefferson" ,
             "Darnell Mooney" , "Riley Miller" , "Kalija Lipscomb" , "Jason-Matthew Sharsh" ,
             "Donovan Peoples-Jones" , "Marquez Callaway" , "Hutch White" ,
             "Quartney Davis" , "Kumoku Noa" , "Q' Drennan" , "Tony Nicholson" ,
             "Dedrick Thomas" , "Dalton Schoen" , "Scotty Washington" ,
             "Ardell Brown" , "Derrick Vickers" , "Devin Gentry" , "Tony Gaiter IV" ,
             "Weston Carr" , "Bryan Long Jr." , "Mark Michaud" , "Jalen McCleskey" ,
             "Tyler Tupa" , "Josh Hammond" , "Jalen Reagor" , "Daylon Charlot" ,

```

"Talon Shumway" , "La'Michael Pettway" , "JoJo Ward" , "Aaron Molina" ,
 "Camryn Snow" , "Kendall Parham" , "RJ Turner" , "Damian King" ,
 "Nick Basquine" , "Austin Maloney" , "Keith Mixon Jr." , "Chico McClatcher"
 , "Aleva Hifo" , "Ben Putman" , "Donavan Hale" , "Phil Patterson" ,
 "Mathew Sexton" , "Tyrie Cleveland" , "K.J. Osborn" , "Cedric Byrd II" ,
 "Austin Conway" , "Desmond Phillips" , "DL Knock" , "Lee Morris" ,
 "CJ Sanders" , "Stephen Guidry" , "Markis McCray" , "Juwane Johnson" ,
 "Nick Westbrook-Ikhine" , "Brenden Fulton" , "Trevor Terry" ,
 "Alan Busey" , "Jarrod Jackson" , "Johnathon Johnson" , "Deondre Farrier" ,
 "Chris Finke" , "Derrick Dillon" , "Terrell Chatman" , "Jocquez Bruce" ,
 "Travon Williams" , "Mike Carrigan" , "A.J. Taylor" , "Derrion Grim" ,
 "Line Latu" , "Xavier Brown" , "Dante Cousart" , "Sadiq Palmer" ,
 "Diondre Overton" , "Kaleb Fossum" , "Joey Fields" , "James Brunson" ,
 "Demari Simpkins" , "Jair Hawkins-Anderson" , "Courtney Lark" ,
 "Tabari Hines" , "Isaiah Wright" , "Seth Dawkins" , "Ryan Newsome" ,
 "Tyler Byrd" , "Keenen Johnson" , "Alex Mussat" , "Rashad Medaris" , "OJ Clark" ,
 "Trenard Davis" , "Jordan McCray" , "Prince Taylor" , "Aaron Mathews" ,
 "Kavious Price" , "Cedric Peterson" ,
 "T'Qele Holmes" , "Maurice Alexander" , "Luke Mayock" , "Ky'Jon Tyler" ,
 "Isiah Upton" , "Izaiah Lottie" , "Ty Lee" , "Isaiah Zuber" ,
 "Blaze Moorhead" , "Mason Hays" , "A.D. Miller" , "Ahmad Wagner" ,
 "Chris Platt" , "Quin Jernighan" , "Darren Woods Jr." , "Kyle Williams" ,
 "Caleb Reams" , "Jordan Duncan" , "OJ Davis" , "Jonathan Nance" ,
 "Andre Bodden" , "Darveon Brown" , "Darrell Brown" , "Tyler Simmons" ,
 "Josh Anderson" , "John Humphrey" , "Thomas Vieira" , "Kevin Purlett" ,
 "Anu Somoye" , "Tavaris Harrison" , "Devante Peete" , "Kendrick Rogers" ,
 "Will Hastings" , "Drew Dan" , "Malik Dunner" , "Larry Collins Jr." ,
 "Christian Hayes" , "Simino Walden" , "Thomas Jackson" ,
 "Hasaan Patterson" , "Jay Jay Wilson" , "Steven Claude" , "Spencer Tears" ,
 "Stephen Sullivan" , "Kjetil Cline" , "Dominic Christian" ,
 "RB Marlow III" , "Tre'Veon Hamilton" , "Keith Gavin" , "Myron Gailliard" ,
 "Eddie Daugherty" , "Colby Ransom" , "Andre Baccellia" , "Nick Szpor" ,
 "Neil McLaurin" , "Keishawn Watson" , "Devon Jackson" , "TreVontae Hights" ,
 "Malik Tyson" , "Akilian Butler" , "Marques Jones" , "Tavin Richardson" ,
 "Terry Mark" , "Ben Glines" , "Javonte Woodard" , "Mike Williams" ,
 "Justice Shelton-Mosley" , "DeAndre McNeal" , "Brendan O'Leary-Orange" ,
 "Chavis Dawkins" , "Brandon Sowards" , "Kanawai Noa" , "Sal Cannella" ,
 "Thomas Geddis" , "John Okwoli" , "Dejon Brissett" , "Sean Riley" ,
 "Jordan Wayne-Prather" , "Kavika Johnson" , "John Johnson" ,
 "Dan Chisena" , "Cameron Cole" , "Stanley Clerveaux" , "John Burt" ,
 "Christian Owens" , "Darrius Scott" , "Chaz Collins" , "Shea Holebrook Jr.")

```
dc2020_stats2019 <- stats_2019 %>%
  filter(player %in% dc_2020 & position == "WR") %>%
  left_join(stats_2018, by = c("player", "player_id", "position"),
            suffix = c("_draft", "_pre")) |>
  rowwise() %>%
  mutate(total_yards = yards_draft + yards_pre,
         total_catch_percent = sum(c(receptions_draft + receptions_pre), na.rm=TRUE) / sum(c(targets_draft + targets_pre, na.rm = TRUE)),
         total_target_percent = sum(c(targets_draft + targets_pre), na.rm = TRUE) / sum(c(routes_draft + routes_pre, na.rm = TRUE)),
         total_route_percent = sum(c(routes_draft + routes_pre), na.rm = TRUE) / sum(c(pass_plays_draft + pass_plays_pre, na.rm = TRUE)))
```

```

total_drop_percent = sum(c(drops_draft+drops_pre), na.rm = TRUE) / sum(c(targets_draft+targets_pre, na.rm = TRUE),
total_ypr = ypr_draft + ypr_pre,
total_first_downs = sum(c(first_downs_draft+first_downs_pre), na.rm = TRUE),
total_yards_per_reception = sum(c(yards_per_reception_draft+yards_per_reception_pre), na.rm = TRUE),
total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception_draft+
yards_after_catch_per_reception_pre), na.rm = TRUE),
total_player_game_count = sum(c(player_game_count_draft+player_game_count_pre), na.rm = TRUE),
total_touchdowns = sum(c(touchdowns_draft+touchdowns_pre), na.rm = TRUE),
total_yards_per_game = ((sum(c(yards_draft,yards_pre), na.rm = TRUE)) / total_player_game_count),
total_yards_after_catch_per_game = ((sum(c(yards_after_catch_draft+ yards_after_catch_pre), na.rm = TRUE) /
total_player_game_count),
total_targets_per_game = ((sum(c(targets_draft+targets_pre), na.rm = TRUE)) / total_player_game_count),
total_targeted_qb_rating = sum(c(targeted_qb_rating_draft+targeted_qb_rating_pre), na.rm = TRUE),
games_draft = (player_game_count_draft / sum(c(player_game_count_draft+ player_game_count_pre), na.rm = TRUE)),
grades_hands_drop = sum(c((games_draft*grades_hands_drop_draft),((1-games_draft)*grades_hands_drop_pre), na.rm = TRUE),
na.rm = TRUE),
grades_hands_fumble = sum(c((games_draft*grades_hands_fumble_draft)+((1-games_draft)*grades_hands_fumble_pre), na.rm = TRUE),
na.rm = TRUE),
grades_offense = sum(c((games_draft*grades_offense_draft)+((1-games_draft)*grades_offense_pre), na.rm = TRUE),
grades_pass_route = sum(c((games_draft*grades_pass_route_draft)+((1-games_draft)*grades_pass_route_pre), na.rm = TRUE),
na.rm = TRUE)
pro_2020 <- read_csv("data/2020_pro_stats.csv")

```

```

## Rows: 526 Columns: 45
## -- Column specification -----
## Delimiter: ","
## chr (3): player, position, team_name
## dbl (42): player_id, player_game_count, avg_depth_of_target, avoided_tackles...
##
## i Use 'spec()' to retrieve the full column specification for this data.
## i Specify the column types or set 'show_col_types = FALSE' to quiet this message.

```

```

dc_2020_pro_stats <- pro_2020 %>%
  inner_join(pro_2021, by = c("player", "position", "player_id"), suffix = c("1yr", "2yr"))
dc_2020_stats <- inner_join(dc_2020_pro_stats, dc2020_stats2019, by = c("player_id", "player", "position"))
select(-c(grades_pass_block1yr, grades_pass_block2yr)) |>
rowwise() %>%
mutate(total_yards = yards1yr + yards2yr,
total_catch_percent = sum(c(receptions1yr + receptions2yr), na.rm=TRUE) / sum(c(targets1yr + targets2yr), na.rm = TRUE),
total_target_percent = sum(c(targets1yr + targets2yr), na.rm = TRUE) / sum(c(routes1yr + routes2yr), na.rm = TRUE),
total_route_percent = sum(c(routes1yr + routes2yr), na.rm = TRUE) / sum(c(pass_plays1yr + pass_plays2yr), na.rm = TRUE),
total_drop_percent = sum(c(drops1yr+drops2yr), na.rm = TRUE) / sum(c(targets1yr+targets2yr), na.rm = TRUE),
total_ypr = ypr1yr + ypr2yr,
total_first_downs = sum(c(first_downs1yr+first_downs2yr), na.rm = TRUE),
total_yards_per_reception = sum(c(yards_per_reception1yr+yards_per_reception2yr), na.rm = TRUE),
total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception1yr+
yards_after_catch_per_reception2yr), na.rm = TRUE),
total_player_game_count = sum(c(player_game_count1yr+player_game_count2yr), na.rm = TRUE),
total_touchdowns = sum(c(touchdowns1yr+touchdowns2yr), na.rm = TRUE),

```



```

total_yards_per_game = sum(c(yards1yr+yards2yr), na.rm = TRUE) / total_player_game_count,
total_yards_after_catch_per_game = sum(c(yards_after_catch1yr + yards_after_catch2yr), na.rm =
total_player_game_count,
total_targets_per_game = sum(c(targets1yr + targets2yr), na.rm = TRUE) / total_player_game_count,
total_targeted_qb_rating = sum(c(targeted_qb_rating1yr+targeted_qb_rating2yr), na.rm = TRUE) /
games2yr = (player_game_count2yr / sum(c(player_game_count2yr + player_game_count1yr), na.rm =
grades_hands_drop = sum(c((games2yr*grades_hands_drop2yr)+((1-games2yr)*grades_hands_drop1yr))
na.rm = TRUE),
grades_hands_fumble = sum(c((games2yr*grades_hands_fumble2yr)+((1-games2yr)*grades_hands_fumble1yr))
na.rm = TRUE),
grades_offense = sum(c((games2yr*grades_offense2yr)+((1-games2yr)*grades_offense1yr)), na.rm =
grades_pass_route = sum(c((games2yr*grades_pass_route2yr)+((1-games2yr)*grades_pass_route1yr))
na.rm = TRUE))

```

#2018 Stats of 2019 DC

```

dc_2019 <- c("Andy Isabella" , "J.J. Arcega-Whiteside" , "Greg Dortch" , "Parris Campbell" ,
"N'Keal Harry" , "Marquise Brown" , "Jakobi Meyers" , "Emanuel Hall" ,
"Damion Willis" , "KeeSean Johnson" , "Anthony Johnson" ,
"Kelvin Harmon" , "Preston Williams" , "Scotty Miller" , "Lil'Jordan Humphrey" ,
"Antoine Wesley" , "Gary Jennings" , "Olamide Zaccheaus" , "Hakeem Butler" ,
"Papi White" , "Dillon Mitchell" , "Deebo Samuel" , "Shawn Poindexter" ,
"C.J. Worton" , "A.J. Brown" , "Travis Fulgham" , "Jovon Durante" ,
"Floyd Allen" , "Malcolm Williams" , "Miles Boykin" , "Xavier Ubosi" ,
"Tyre Brady" , "Nyqwan Murray" , "Sean Modster" , "Delane Hart-Johnson" ,
"Fred Trevellion" , "Ronald Cleveland" , "Jalen Hurd" , "Stanley Morgan Jr." ,
"DaMarkus Lodge" , "Dominique Heath" , "A.J. Richardson" , "Riley Ridley" ,
"Jamarius Way" , "Collin Lisa" , "Andre Wilson" , "Olabisi Johnson" ,
"Kahlil Lewis" , "Taylor Jackson" , "Reggie Turner" , "Trenton Irwin" ,
"Trevon Brown" , "Shun Brown" , "Flynn Nagel" , "KaVontae Turpin" ,
"D.K. Metcalf" , "Marcus Simms" , "Blake Banham" , "David Sills" ,
"Felton Davis" , "Mike Dudek" , "Cody Thompson" , "Jonathan Duhart" ,
"Earnest Patterson" , "Hunter Renfrow" , "Ja'Deion High" , "Aaren Vaughns" ,
"Terry McLaurin" , "Mecole Hardman" , "Greg Campbell Jr." , "Terry Godwin II" ,
"Ventell Bryant" , "Marcus Green" , "Diontae Johnson" , "John Ursua" ,
"TJ Rahming" , "James Gardner" , "Kailon Carter" , "Jon'Vea Johnson" ,
"Cudjoe Young" , "Penny Hart" , "Ron'Quavion Tarver" , "Brodrick Yancy" ,
"Zach Abey" , "Dredrick Snelson" , "Deondre Douglas" , "Timmy Hernandez" ,
"Justin McInnis" , "Jamal Custis" , "Brad Stewart" , "Tyron Johnson" ,
"Nick Easley" , "Teddy Veal" , "Warren Redix" , "Anthony Ratliff-Williams" ,
"Michael Walker" , "Terren Encalade" , "Ryheem Malone" , "Jalen Greene" ,
"Andrew Smith" , "Steven Sims" , "DJ Nelson" , "Luke Timian" ,
"Jalen Guyton" , "Alex Bachman" , "B.J. Farrow" , "Ryan Davis" ,
"Devon Spalding" , "Kwadarrius Smith" , "Thai Cottrell" , "Deric Phouthavong" ,
"Tyre McCants" , "Juwann Winfree" , "Jahmmir Taylor" , "Dylan Collie" ,
"Andrew Meyer" , "Jake Matkovich" , "Johnnie Dixon" , "Patrick Smith" ,
"Raelon Singleton" , "Rafael Araujo-Lopes" , "Alex Weber" , "David Bouvier" ,
"Tony Ellison" , "Johnathan Boone" , "Jaylen Smith" , "Terry Wright" ,
"J-Shun Harris II" , "Darius Slayton" , "Marquez McNair" , "Hergy Mayala" ,
"Jauan Wesley" , "Sidney Davis" , "Isaac Zico" , "D.J. Brown" ,
"Taivon Jacobs" , "Tre Hartley" , "Corey Lacanaria" , "Derek Kief" ,
"Kelton Powell" , "Devan Stubblefield" , "Tyler Watts" , "Kerr Johnson Jr." ,
"D'Marius Gillespie" , "Ryeshene Bronson" , "Marcus Armstrong-Brown" ,
"Erik Brown" , "Jelani Roberts" , "Vic Wharton III" , "Darrell Langham" ,

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"Terry Juniel" , "Matthew Eaton" , "James Price" , "Isaiah Harper" ,
"Dre Massey" , "Trevion Thompson" , "Jeremiah Booker" , "Gatlin Casey" ,
"Raekwon James" , "Stephen Louis" , "Austin Ahrendt" , "Justin Hobbs" ,
"Justin Walker" , "Kabion Ento" , "Griffin King" , "Royce Caldwell" ,
"Robert Lewis" , "Drake Harris" , "Johnathan Lloyd" , "Brad Absher" ,
"Ahkil Crumpton" , "DeSean Holmes" , "Brian Newman" , "Grant Perry" ,
"Moe Ways" , "Sam Mays" , "Ryan Jenkins" , "Michiah Quick" , "Jamire Jordan" ,
"Sam Harris" , "Johnny Woods" , "Jameson Field" , "Marcel Williams" ,
"Kinte Hatton" , "Dominique Maiden" , "Kyle Sweet" , "Terrell Green" ,
"Jerrod Heard" , "Jarrison Stewart" , "Namani Parker" , "Jeff Smith" ,
"Justin Holmes" , "Jabril Clewis" , "Kyle Buss" , "Tristan Payton" ,
"Patrick Reed" , "Zach Austin" , "Chris Taylor" , "Kendrick Edwards" ,
"Trevon Lee" , "Jayson Stanley" , "Sam Craft" , "Myles Tease" , "Jesse Jackson" ,
"Tristin Kamaka" , "Emmanuel Harris" , "Trey Ellis" , "Kyle Groeneweg" ,
"De'Quan Bowman" , "Jarrett Burgess" , "Keyan Williams" , "Kendal Keys" ,
"Christian Pabico" , "Mykel Traylor-Bennett" , "Quinetin Jackson" ,
"Tavonn Salter" , "Zaquon Tyson" , "Justin Sawmiller" , "Jacoby Herring" ,
"Jaelan Austin" , "Justin Allen" , "Dorian Baker" , "DeAndre Thompkins" ,
"Bryan Reimers" , "Jay MacIntyre" , "Jahrvis Davenport" , "Jared Cornelius" ,
"Nate Brown" , "Devin Reece" , "Zach Reuter" , "Dakota Torres" ,
"George Rushing" , "Tyraiq Beals" , "Larry Stephens" , "Cam Stewart" ,
"Ryan Schadler" , "Rafael Hidalgo" , "William Crest Jr." , "Brandon Mitchell" ,
"Lemar Harris")

```

```

dc2019_stats2018 <- stats_2018 %>%
  filter(player %in% dc_2019 & position == "WR") %>%
  left_join(stats_2017, by = c("player", "player_id", "position"),
            suffix = c("_draft", "_pre")) |>
  rowwise() %>%
  mutate(total_yards = yards_draft + yards_pre,
         total_catch_percent = sum(c(receptions_draft + receptions_pre), na.rm=TRUE) / sum(c(targets_draft + targets_pre), na.rm = TRUE),
         total_target_percent = sum(c(targets_draft + targets_pre), na.rm = TRUE) / sum(c(routes_draft + routes_pre), na.rm = TRUE),
         total_route_percent = sum(c(routes_draft + routes_pre), na.rm = TRUE) / sum(c(pass_plays_draft + pass_plays_pre), na.rm = TRUE),
         total_drop_percent = sum(c(drops_draft+drops_pre), na.rm = TRUE) / sum(c(targets_draft+targets_pre), na.rm = TRUE),
         total_yprp = yprp_draft + yprp_pre,
         total_first_downs = sum(c(first_downs_draft+first_downs_pre), na.rm = TRUE),
         total_yards_per_reception = sum(c(yards_per_reception_draft+yards_per_reception_pre), na.rm = TRUE),
         total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception_draft+
                                                       yards_after_catch_per_reception_pre), na.rm = TRUE),
         total_player_game_count = sum(c(player_game_count_draft+player_game_count_pre), na.rm = TRUE),
         total_touchdowns = sum(c(touchdowns_draft+touchdowns_pre), na.rm = TRUE),
         total_yards_per_game = ((sum(c(yards_draft,yards_pre), na.rm = TRUE)) / total_player_game_count),
         total_yards_after_catch_per_game = ((sum(c(yards_after_catch_draft+ yards_after_catch_pre), na.rm = TRUE)) / total_player_game_count),
         total_targets_per_game = ((sum(c(targets_draft+targets_pre), na.rm = TRUE)) / total_player_game_count),
         total_targeted_qb_rating = sum(c(targeted_qb_rating_draft+targeted_qb_rating_pre), na.rm = TRUE),
         games_draft = (player_game_count_draft / sum(c(player_game_count_draft+ player_game_count_pre), na.rm = TRUE)),
         grades_hands_drop = sum(c((games_draft*grades_hands_drop_draft),((1-games_draft)*grades_hands_drop_pre), na.rm = TRUE),
         grades_hands_fumble = sum(c((games_draft*grades_hands_fumble_draft)+((1-games_draft)*grades_hands_fumble_pre), na.rm = TRUE))

```



```

                                na.rm = TRUE),
grades_offense = sum(c((games_draft*grades_offense_draft)+((1-games_draft)*grades_offense_pre)),
grades_pass_route = sum(c((games_draft*grades_pass_route_draft)+((1-games_draft)*grades_pass_route_pre)),
                                na.rm = TRUE))

pro_2019 <- read_csv("data/2019_pro_stats.csv")

## Rows: 509 Columns: 45
## -- Column specification -----
## Delimiter: ","
## chr (3): player, position, team_name
## dbl (42): player_id, player_game_count, avg_depth_of_target, avoided_tackles...
##
## i Use 'spec()' to retrieve the full column specification for this data.
## i Specify the column types or set 'show_col_types = FALSE' to quiet this message.

dc_2019_pro_stats <- pro_2019 %>%
  inner_join(pro_2020, by = c("player", "position", "player_id"), suffix = c("1yr", "2yr"))
dc_2019_stats <- inner_join(dc_2019_pro_stats, dc2019_stats2018, by = c("player_id", "player", "position"))
select(-c(grades_pass_block1yr, grades_pass_block2yr)) |>
rowwise() %>%
mutate(total_yards = yards1yr + yards2yr,
       total_catch_percent = sum(c(receptions1yr + receptions2yr), na.rm=TRUE) / sum(c(targets1yr + targets2yr), na.rm = TRUE),
       total_target_percent = sum(c(targets1yr + targets2yr), na.rm = TRUE) / sum(c(routes1yr + routes2yr), na.rm = TRUE),
       total_route_percent = sum(c(routes1yr + routes2yr), na.rm = TRUE) / sum(c(pass_plays1yr + pass_plays2yr), na.rm = TRUE),
       total_drop_percent = sum(c(drops1yr+drops2yr), na.rm = TRUE) / sum(c(targets1yr+targets2yr), na.rm = TRUE),
       total_ypr = ypr1yr + ypr2yr,
       total_first_downs = sum(c(first_downs1yr+first_downs2yr), na.rm = TRUE),
       total_yards_per_reception = sum(c(yards_per_reception1yr+yards_per_reception2yr), na.rm = TRUE),
       total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception1yr+
                                                    yards_after_catch_per_reception2yr), na.rm = TRUE),
       total_player_game_count = sum(c(player_game_count1yr+player_game_count2yr), na.rm = TRUE),
       total_touchdowns = sum(c(touchdowns1yr+touchdowns2yr), na.rm = TRUE),
       total_yards_per_game = sum(c(yards1yr+yards2yr), na.rm = TRUE) / total_player_game_count,
       total_yards_after_catch_per_game = sum(c(yards_after_catch1yr + yards_after_catch2yr), na.rm = TRUE) /
                                           total_player_game_count,
       total_targets_per_game = sum(c(targets1yr + targets2yr), na.rm = TRUE) / total_player_game_count,
       total_targeted_qb_rating = sum(c(targeted_qb_rating1yr+targeted_qb_rating2yr), na.rm = TRUE) /
                                     (player_game_count2yr + player_game_count1yr), na.rm = TRUE),
       games2yr = (player_game_count2yr / sum(c(player_game_count2yr + player_game_count1yr), na.rm = TRUE)),
       grades_hands_drop = sum(c((games2yr*grades_hands_drop2yr)+((1-games2yr)*grades_hands_drop1yr)),
                                na.rm = TRUE),
       grades_hands_fumble = sum(c((games2yr*grades_hands_fumble2yr)+((1-games2yr)*grades_hands_fumble1yr)),
                                na.rm = TRUE),
       grades_offense = sum(c((games2yr*grades_offense2yr)+((1-games2yr)*grades_offense1yr)), na.rm = TRUE),
       grades_pass_route = sum(c((games2yr*grades_pass_route2yr)+((1-games2yr)*grades_pass_route1yr)),
                                na.rm = TRUE))

#2017 Stats of 2018 DC
dc_2018 <- c("Michael Gallup" , "Trey Quinn" , "Cedrick Wilson" , "Anthony Miller" ,
            "Marcell Ateman" , "Thomas Owens" , "James Washington" , "Cam Phillips" ,

```

"Keke Coutee" , "Mikah Holder" , "Deontay Burnett" , "Jordan Lasley" ,
 "Ricky Jeune" , "Darren Carrington II" , "D.J. Moore" , "Linell Bonner" ,
 "Keith Kirkwood" , "Alfonso Onunwor" , "Tre'Quan Smith" , "Teo Redding" ,
 "Kylen Towner" , "Dante Pettis" , "Ike Lewis" , "D.J. Chark Jr." ,
 "Korey Robertson" , "Allen Lazard" , "J'Mon Moore" , "Calvin Ridley" ,
 "Christian Kirk" , "Steve Ishmael" , "DaeSean Hamilton" , "Jeff Badet" ,
 "Tyler Carmona" , "Kalib Woods" , "Javon Wims" , "Courtland Sutton" ,
 "Trent Sherfield" , "Davon Grayson" , "Sergio Bailey II" , "Tyrell Johnson" ,
 "Jaleel Scott" , "Armanti Foreman" , "Auden Tate" , "Steven Mitchell Jr." ,
 "Steven Dunbar Jr." , "Ermon Lane" , "Tavares Martin Jr." , "Cam Echols-Luper" ,
 "Deon Cain" , "Darren Andrews" , "Austin Proehl" , "Nacarius Fant" ,
 "Trevor Ryen" , "Turner Smiley" , "De'Mornay Pierson-El" , "Dylan Cantrell" ,
 "Brandon Powell" , "Elijah King" , "Braxton Berrios" , "Charlie Callinan" ,
 "Antoine Porter" , "Kerry Thomas Jr." , "Sa'Mory Collier" , "Devonte Boyd" ,
 "Mark Chapman" , "Christian Booker" , "Marquez Valdes-Scantling" ,
 "Equanimeous St. Brown" , "Zy Letman" , "Bryce Bobo" , "Chad Beebe" ,
 "Jacob Sannon" , "Anthony Mahoungou" , "Wyatt Demps" , "Detrich Clark" ,
 "Trey Smith" , "Justin Motlow" , "Russell Gage" , "Jerriid Marhefka" ,
 "Brendan Cope" , "Garrett Johnson" , "JaQuay Savage" , "Ka'Raun White" ,
 "Ervin Philips" , "Workpeh Kofa" , "Jacob Martinez" , "Damion Ratley" ,
 "Tyler Jaynes" , "Corey Willis" , "Richie James Jr." , "Desmon White" ,
 "Jimmy Williams" , "Jordan Veasy" , "Simmie Cobbs" , "Josh Stewart" ,
 "Janarion Grant" , "John Diarse" , "Emanuel Thompson" , "Jermaine Adams" ,
 "Andre Levrone" , "Pete Norris" , "Julian Williams" , "Adonis Jennings" ,
 "Chris Murray" , "Charles Nelson" , "Phil Mayhue" , "Sean Avant" ,
 "Jojo Robinson" , "Jared Murphy" , "Da'Mari Scott" , "Chris Davis Jr." ,
 "Javonte Bagley" , "Tevaris McCormick" , "Tra'Von Chapman" , "A.J. Coney" ,
 "Jester Weah" , "Alejandro Marenco III" , "C.J. Duncan" , "Charles Walker" ,
 "Austin Wolf" , "John Leday" , "Tyler Batson" , "Devin Gray" ,
 "Byron Pringle" , "Taj Williams" , "Gabe Myles" , "Allenzae Staggers" ,
 "Liam Allen" , "Chris Lacy" , "Kamathi Holsey" , "Jordan Hogue" ,
 "Josh Aganon" , "Blake Bone" , "Conner Cramer" , "Ellis Jefferson" ,
 "James Clark" , "Will Reger" , "Quay Johnson" , "Lance Wright" ,
 "Marques Little" , "Jeff George" , "Ray-Ray McCloud III" , "Malik Turner" ,
 "John Johnson" , "Jordan Cunningham" , "Jordan Villamin" , "Dorian Leonard" ,
 "Kayaune Ross" , "Shay Fields" , "Fransohn Bickley" , "Derek McLemore" ,
 "Chris Montgomery" , "Glenn Smith" , "Reuben Mwehla" , "Hyleck Foster" ,
 "Cam Sims" , "Dijon Paschal" , "Cameron Batson" , "Temi Alaka" ,
 "Ammon Barker" , "Doni Dowling" , "Braelon Roberts" , "Quest Truxton" ,
 "Johnnie Niupalau" , "Marchie Murdock" , "John Franklin III" ,
 "Mark Quattlebaum" , "Jumichael Ramos" , "Saeed Blacknall" , "Caleb Scott" ,
 "Jeff Ejekam" , "Derrick Willies" , "Sam Martin" , "Cody Hodgens" ,
 "Kyle Fulks" , "Uriah LeMay" , "Trent Bostick" , "Jordan Smallwood" ,
 "Jonah Trinnaman" , "KE'Marvin Pitts" , "Dominic Collins" ,
 "Quadree Henderson" , "Cam Denson" , "Chase Whitehead" , "Ty Slanina" ,
 "Donald Gray" , "Gregory Phillips" , "Dannon Cavil" , "CJ Dimry" ,
 "Matt VandeBerg" , "Jack Swinney" , "Isaiah Bernard" , "Bobby Mitchell" ,
 "Parker Smith" , "Ben Olinger" , "Dalton Ponchillia" , "Alex Byers" ,
 "Kamrin Solomon" , "Brandon Mitchell" , "Brandon Colon")

```
dc_2018_2 <- c("Jaron Johnson" , "Austin Parker" , "Jeffery Mead" , "Brady Jones" ,  

  "Marlon Watts" , "Macan Wilson" , "Bryan LaCivita" , "Eldridge Massington" ,  

  "Dante Jones" , "Tristan Davis" , "Devin Ross" , "Donovan Walker" ,
```

```

      "Xavier Hawkins" , "Jamarl Eiland" , "Clark Quisenberry" ,
      "Marcus Gaines" , "Tucker Melcher" , "Roderick Proctor" , "Markell Pack",
      "Eric Cooper" , "Eric Luna" , "Quay Chambers" , "Darryl Richards" ,
      "Anthony Young" , "Keelan Ewaliko" , "Alex Van Dyke" , "Cameron Smith" ,
      "Gregory Hogan" , "T.L. Ford II" , "Damon Mitchell" , "Trevor Steinke" ,
      "Nigel Carter" , "Gabe Rahn" , "Christian Blake" , "Ricky Rogers" ,
      "Kevin Gladney" , "Jaren Colston-Green" , "Myles Campbell" ,
      "Gary Bradshaw" , "Emanuel Porter" , "Lorenzo Joe" , "Josh Smith" ,
      "Thadd Smith" , "DeJuawn Oliver" , "Kris White" , "Craig Scott" ,
      "Jared Jackson" , "Todd Boyd" , "Gavin Locklear" , "Freddy Canteen" ,
      "Isaiah Jones" , "Devin Scott" , "Eric Carter" , "Nate Terry" ,
      "Robert Foster" , "Henry Bussey III" , "Jazz Peavy" , "Kendrick Dorn" ,
      "Shelby Walker" , "Jacquille Veii")

dc2018_stats2017 <- stats_2017 %>%
  filter(player %in% dc_2018 | player %in% dc_2018_2 & position == "WR") %>%
  left_join(stats_2016, by = c("player", "player_id", "position"),
            suffix = c("_draft", "_pre")) |>
  rowwise() %>%
  mutate(total_yards = yards_draft + yards_pre,
         total_catch_percent = sum(c(receptions_draft + receptions_pre), na.rm=TRUE) / sum(c(targets_draft + targets_pre), na.rm = TRUE),
         total_target_percent = sum(c(targets_draft + targets_pre), na.rm = TRUE) / sum(c(routes_draft + routes_pre), na.rm = TRUE),
         total_route_percent = sum(c(routes_draft + routes_pre), na.rm = TRUE) / sum(c(pass_plays_draft + pass_plays_pre), na.rm = TRUE),
         total_drop_percent = sum(c(drops_draft+drops_pre), na.rm = TRUE) / sum(c(targets_draft+targets_pre), na.rm = TRUE),
         total_yprp = yprp_draft + yprp_pre,
         total_first_downs = sum(c(first_downs_draft+first_downs_pre), na.rm = TRUE),
         total_yards_per_reception = sum(c(yards_per_reception_draft+yards_per_reception_pre), na.rm = TRUE),
         total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception_draft+
                                                       yards_after_catch_per_reception_pre), na.rm = TRUE),
         total_player_game_count = sum(c(player_game_count_draft+player_game_count_pre), na.rm = TRUE),
         total_touchdowns = sum(c(touchdowns_draft+touchdowns_pre), na.rm = TRUE),
         total_yards_per_game = ((sum(c(yards_draft,yards_pre), na.rm = TRUE)) / total_player_game_count),
         total_yards_after_catch_per_game = ((sum(c(yards_after_catch_draft+ yards_after_catch_pre), na.rm = TRUE)) /
                                              total_player_game_count),
         total_targets_per_game = ((sum(c(targets_draft+targets_pre), na.rm = TRUE)) / total_player_game_count),
         total_targeted_qb_rating = sum(c(targeted_qb_rating_draft+targeted_qb_rating_pre), na.rm = TRUE),
         games_draft = (player_game_count_draft / sum(c(player_game_count_draft+ player_game_count_pre), na.rm = TRUE)),
         grades_hands_drop = sum(c((games_draft*grades_hands_drop_draft),((1-games_draft)*grades_hands_drop_pre), na.rm = TRUE),
         grades_hands_fumble = sum(c((games_draft*grades_hands_fumble_draft)+((1-games_draft)*grades_hands_fumble_pre), na.rm = TRUE),
         grades_offense = sum(c((games_draft*grades_offense_draft)+((1-games_draft)*grades_offense_pre), na.rm = TRUE),
         grades_pass_route = sum(c((games_draft*grades_pass_route_draft)+((1-games_draft)*grades_pass_route_pre), na.rm = TRUE))

pro_2018 <- read_csv("data/2018_pro_stats.csv")

## Rows: 514 Columns: 45
## -- Column specification -----
## Delimiter: ",",

```

```
## chr (3): player, position, team_name
## dbl (42): player_id, player_game_count, avg_depth_of_target, avoided_tackles...
##
## i Use 'spec()' to retrieve the full column specification for this data.
## i Specify the column types or set 'show_col_types = FALSE' to quiet this message.
```

```
dc_2018_pro_stats <- pro_2018 %>%
  inner_join(pro_2019, by = c("player", "position", "player_id"), suffix = c("1yr", "2yr"))
dc_2018_stats <- inner_join(dc_2018_pro_stats, dc2018_stats2017, by = c("player_id", "player", "position"))
select(-c(grades_pass_block1yr, grades_pass_block2yr)) |>
rowwise() %>%
mutate(total_yards = yards1yr + yards2yr,
       total_catch_percent = sum(c(receptions1yr + receptions2yr), na.rm=TRUE) / sum(c(targets1yr + targets2yr), na.rm = TRUE),
       total_target_percent = sum(c(targets1yr + targets2yr), na.rm = TRUE) / sum(c(routes1yr + routes2yr), na.rm = TRUE),
       total_route_percent = sum(c(routes1yr + routes2yr), na.rm = TRUE) / sum(c(pass_plays1yr + pass_plays2yr), na.rm = TRUE),
       total_drop_percent = sum(c(drops1yr+drops2yr), na.rm = TRUE) / sum(c(targets1yr+targets2yr), na.rm = TRUE),
       total_ypr = ypr1yr + ypr2yr,
       total_first_downs = sum(c(first_downs1yr+first_downs2yr), na.rm = TRUE),
       total_yards_per_reception = sum(c(yards_per_reception1yr+yards_per_reception2yr), na.rm = TRUE),
       total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception1yr+
                                                    yards_after_catch_per_reception2yr), na.rm = TRUE),
       total_player_game_count = sum(c(player_game_count1yr+player_game_count2yr), na.rm = TRUE),
       total_touchdowns = sum(c(touchdowns1yr+touchdowns2yr), na.rm = TRUE),
       total_yards_per_game = sum(c(yards1yr+yards2yr), na.rm = TRUE) / total_player_game_count,
       total_yards_after_catch_per_game = sum(c(yards_after_catch1yr + yards_after_catch2yr), na.rm = TRUE) /
                                           total_player_game_count,
       total_targets_per_game = sum(c(targets1yr + targets2yr), na.rm = TRUE) / total_player_game_count,
       total_targeted_qb_rating = sum(c(targeted_qb_rating1yr+targeted_qb_rating2yr), na.rm = TRUE) /
                                           total_player_game_count,
       games2yr = (player_game_count2yr / sum(c(player_game_count2yr + player_game_count1yr), na.rm = TRUE)),
       grades_hands_drop = sum(c((games2yr*grades_hands_drop2yr)+((1-games2yr)*grades_hands_drop1yr)), na.rm = TRUE),
       grades_hands_fumble = sum(c((games2yr*grades_hands_fumble2yr)+((1-games2yr)*grades_hands_fumble1yr)), na.rm = TRUE),
       grades_offense = sum(c((games2yr*grades_offense2yr)+((1-games2yr)*grades_offense1yr)), na.rm = TRUE),
       grades_pass_route = sum(c((games2yr*grades_pass_route2yr)+((1-games2yr)*grades_pass_route1yr)), na.rm = TRUE))
```

#2016 Stats of 2017 DC

```
dc_2017 <- c("Jalen Rowell","Austin Carr","Dede Westbrook","Mike Williams",
             "Zay Jones","Carlos Henderson","Corey Davis", "Taywan Taylor" ,
             "Jamir Tillman" , "Tanner Gentry" , "Trent Taylor" , "John Ross" ,
             "Chad Hansen" , "Kenny Golladay" , "Jordan Westerkamp" ,
             "Nicholas Norris" , "Jordan Frysinger" , "Drew Wolitarsky" ,
             "Josh Reynolds" , "Thomas Sperbeck" , "Eugene Lewis" ,
             "Daikiel Shorts" , "Ryan Switzer" , "Noel Thomas" , "Isaiah Ford" ,
             "Isaiah McKenzie" , "Malachi Dupre" , "Keon Hatcher" , "Edgar Poe" ,
             "Zach Pascal" , "Amba Etta-Tawo" , "BJ Johnson III" , "Amara Darboh",
             "R.J. Shelton" , "Marcus Kemp" , "KeVonn Mabon" , "Drew Morgan" ,
             "Josh Atkinson" , "Al-Damion Riles" , "Tim Patrick" , "Chris Godwin",
             "Sebastian Smith" , "K.D. Cannon" , "Josh Malone" , "Ricky Jones" ,
             "Fred Ross" , "Keevan Lucas" , "Tim Crawley" , "Noah Brown" ,
             "River Cracraft" , "Jerome Lane" , "ArDarius Stewart" , "Shelton Gibson" ,
```

"Zach Yousey" , "Robert Davis" , "JuJu Smith-Schuster" , "Garrett Juergens" ,
 "Dameon Gamblin" , "Rodney Adams" , "Josh Magee" , "Stacy Coley" ,
 "Callen Hightower" , "Bug Howard" , "Brandon Reilly" , "Tim White" ,
 "Dontre Wilson" , "Hasaan Henderson" , "Marcus McGill" , "Austin Duke" ,
 "Bobo Wilson" , "Darreus Rogers" , "Torii Hunter Jr." , "Travis Rudolph" ,
 "Kendall Sanders" , "Jacorey Warrick" , "Tony Stevens" , "Austin Hays" ,
 "Chance Allen" , "JoJo Natson" , "Cole Freytag" , "Gabe Marks" ,
 "Jhajuan Seales" , "Corey Jones" , "DeAndre Lane" , "Mitchell Paige" ,
 "Cory Butler-Byrd" , "Michael Henry" , "D.J. Thompson" , "Carrington Thompson" ,
 "Travin Dural" , "JaBryce Taylor" , "Damore'ea Stringfellow" ,
 "Artavis Scott" , "Montay Crockett" , "Nate Cole" , "Jordan Reid" ,
 "Jared Johnson" , "Nate Phillips" , "Jalen Williams" , "Dwayne Stanford" ,
 "Alonzo Moore" , "Kermit Whitfield" , "Chris Black" , "Devin Lauderdale" ,
 "Ahmad Fulwood" , "Temuchin Hodges" , "Teldrick Morgan" , "Michael Clark" ,
 "Dan Jonah" , "Mack Hollins" , "Robert Wheelwright" , "Riley McCarron" ,
 "Jared Mapps" , "Ishmael Adams" , "Jehu Chesson" , "Josh Knight" ,
 "Colby Pearson" , "Cody Hollister" , "Nick Kurtz" , "Ajalen Holley" ,
 "DeAngelo Yancey" , "Frederick Gammage" , "Demetrius Frazier")

```
dc_2017_2 <- c("Larry Dace III", "Stephon Brown", "Anthony Nash", "Jake Maulhardt",  

  "Andrew Scanlan", "Ishmael Zamora", "D'Vario Montgomery", "Domonique Young" ,  

  "Shug Oyegunle" , "Aaron Peck" , "Deon-Tay McManus" , "Cywettne Brown" ,  

  "Levern Jacobs" , "Jamari Staples" , "Ryan Timmons" , "Robert Ruiz" ,  

  "Eric Judge" , "Michael Rector" , "James Quick" , "Alvin Cornelius" ,  

  "Marquise Ricard" , "Dominique Reed" , "Bernard Davis" , "Bug Rivera" ,  

  "Malcolm Lewis" , "Dontez Ford" , "Deante Burton" , "Cameron Decell" ,  

  "Mitchell Juergens" , "Tyler Cooperwood" , "De'Quan Hampton" ,  

  "Drew Bishop" , "Justin Hunt" , "Speedy Noil" , "Rokeem Williams" ,  

  "Andre Patton" , "Ernest Calhoun" , "Aregeros Turner" , "Kevin Davis" ,  

  "Willie Robinson" , "Monty Madaris" , "Zach Wright" , "Charles Chandler" ,  

  "Jesse Kroll" , "Thaddeous Thompson" , "Chris Lewis" , "Taylor Oldham" ,  

  "Trey Griffey" , "Brisly Esteime" , "Bra'Lon Cherry" , "Keeon Johnson" ,  

  "Francis Owusu" , "Quincy Adeboyejo" , "Victor Bolden Jr." , "Andrew Rodriguez" ,  

  "Bilal Marshall" , "Ronnie Moore" , "Tony Thomas" , "Ethan Cortazzo" ,  

  "Tyrian Taylor" , "Zach Grant" , "Kendrick Mathis" , "Shawn Brickley" ,  

  "Jeremy Tabuyo" , "Curtis Anderson III" , "Jarvis Baxter" , "Jarell Aaron" ,  

  "Patrick Worstell" , "Darian Williams" , "Ricky Seals-Jones" ,  

  "Ryan Smith" , "Boone Niederhofer" , "Justin Hardee" ,  

  "Kevin Kutchera" , "Cameron Posey" , "Corey Smith" , "Kenneth Walker III"  

  , "Tre' Perrier" , "Dondre Daley" , "Jaquan White" , "Austin Moses"  

  , "Chaz Anderson" , "Kenny Buyers" , "Isaac Whitney" , "Reggie Davis"  

  , "Grant Newell" , "Tyre'oune Holmes" , "Daniel Hurd" , "Deante Gray"  

  , "Reginald Davis III" , "Samajie Grant" , "Dennis Andrews" , "Alex Mut"  

  , "Austin Stewart" , "Kennedy Williams" , "Sterling Stowers" ,  

  "Aaron Hepp" , "Jerico Richardson" , "Taijuan Thomas" , "Lynx Hawthorne"  

  , "Fred Nixon" , "Rod Ducksworth" , "Hayden Jones" , "Tyrone Williams"  

  , "Keigan Williams" , "Brandon Bishop" , "Carlton Agudosi" ,  

  "Shakiem Barbel" , "Gio Pascascio" , "Gehrig Dieter" , "Chris Thompson",  

  "Edward Pope" , "Latevius Rayford" , "Malcolm Robinson" ,  

  "Michael Martens" , "Devon Breaux" , "Devonte Mathis" , "John Thompson",  

  "Anthony Rice" , "Clayton Glasper" , "D.J. Taylor" , "Malcolm Culmer",  

  "Sam Shisso" , "Marcus Davis" , "Eric Laurent" , "Jeffrey Coprich",  

  "Brian Lemelle" , "Conner Smith" , "Darrion Pollard")
```



```

dc2017_stats2016 <- stats_2016 %>%
  filter(player %in% dc_2017 | player %in% dc_2017_2 & position == "WR") %>%
  left_join(stats_2015, by = c("player", "player_id", "position"),
            suffix = c("_draft", "_pre")) |>
  rowwise() %>%
  mutate(total_yards = yards_draft + yards_pre,
         total_catch_percent = sum(c(receptions_draft + receptions_pre), na.rm=TRUE) / sum(c(targets_draft + targets_pre, na.rm = TRUE),
         total_target_percent = sum(c(targets_draft + targets_pre), na.rm = TRUE) / sum(c(routes_draft + routes_pre, na.rm = TRUE),
         total_route_percent = sum(c(routes_draft + routes_pre), na.rm = TRUE) / sum(c(pass_plays_draft + pass_plays_pre, na.rm = TRUE),
         total_drop_percent = sum(c(drops_draft+drops_pre), na.rm = TRUE) / sum(c(targets_draft+targets_pre, na.rm = TRUE),
         total_yprp = yprp_draft + yprp_pre,
         total_first_downs = sum(c(first_downs_draft+first_downs_pre), na.rm = TRUE),
         total_yards_per_reception = sum(c(yards_per_reception_draft+yards_per_reception_pre), na.rm = TRUE),
         total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception_draft+
         yards_after_catch_per_reception_pre), na.rm = TRUE),
         total_player_game_count = sum(c(player_game_count_draft+player_game_count_pre), na.rm = TRUE),
         total_touchdowns = sum(c(touchdowns_draft+touchdowns_pre), na.rm = TRUE),
         total_yards_per_game = ((sum(c(yards_draft,yards_pre), na.rm = TRUE)) / total_player_game_count),
         total_yards_after_catch_per_game = ((sum(c(yards_after_catch_draft+ yards_after_catch_pre), na.rm = TRUE) /
         total_player_game_count),
         total_targets_per_game = ((sum(c(targets_draft+targets_pre), na.rm = TRUE)) / total_player_game_count),
         total_targeted_qb_rating = sum(c(targeted_qb_rating_draft+targeted_qb_rating_pre), na.rm = TRUE),
         games_draft = (player_game_count_draft / sum(c(player_game_count_draft+ player_game_count_pre), na.rm = TRUE)),
         grades_hands_drop = sum(c((games_draft*grades_hands_drop_draft),((1-games_draft)*grades_hands_drop_pre), na.rm = TRUE),
         grades_hands_fumble = sum(c((games_draft*grades_hands_fumble_draft)+((1-games_draft)*grades_hands_fumble_pre), na.rm = TRUE),
         grades_offense = sum(c((games_draft*grades_offense_draft)+((1-games_draft)*grades_offense_pre), na.rm = TRUE),
         grades_pass_route = sum(c((games_draft*grades_pass_route_draft)+((1-games_draft)*grades_pass_route_pre), na.rm = TRUE))

pro_2017 <- read_csv("data/2017_pro_stats.csv")

```

```

## Rows: 481 Columns: 45
## -- Column specification -----
## Delimiter: ","
## chr (3): player, position, team_name
## dbl (42): player_id, player_game_count, avg_depth_of_target, avoided_tackles...
##
## i Use 'spec()' to retrieve the full column specification for this data.
## i Specify the column types or set 'show_col_types = FALSE' to quiet this message.

```

```

dc_2017_pro_stats <- pro_2017 %>%
  inner_join(pro_2018, by = c("player", "position", "player_id"), suffix = c("1yr", "2yr"))
dc_2017_stats <- inner_join(dc_2017_pro_stats, dc2017_stats2016, by = c("player_id", "player", "position"))
select(-c(grades_pass_block1yr, grades_pass_block2yr)) |>
  rowwise() %>%
  mutate(total_yards = yards1yr + yards2yr,
         total_catch_percent = sum(c(receptions1yr + receptions2yr), na.rm=TRUE) / sum(c(targets1yr + targets2yr), na.rm = TRUE))

```



```

total_target_percent = sum(c(targets1yr + targets2yr), na.rm = TRUE) / sum(c(routes1yr + routes2yr), na.rm = TRUE),
total_route_percent = sum(c(routes1yr + routes2yr), na.rm = TRUE) / sum(c(pass_plays1yr + pass_plays2yr), na.rm = TRUE),
total_drop_percent = sum(c(drops1yr+drops2yr), na.rm = TRUE) / sum(c(targets1yr+targets2yr), na.rm = TRUE),
total_ypr = ypr1yr + ypr2yr,
total_first_downs = sum(c(first_downs1yr+first_downs2yr), na.rm = TRUE),
total_yards_per_reception = sum(c(yards_per_reception1yr+yards_per_reception2yr), na.rm = TRUE),
total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception1yr+
yards_after_catch_per_reception2yr), na.rm = TRUE),
total_player_game_count = sum(c(player_game_count1yr+player_game_count2yr), na.rm = TRUE),
total_touchdowns = sum(c(touchdowns1yr+touchdowns2yr), na.rm = TRUE),
total_yards_per_game = sum(c(yards1yr+yards2yr), na.rm = TRUE) / total_player_game_count,
total_yards_after_catch_per_game = sum(c(yards_after_catch1yr + yards_after_catch2yr), na.rm = TRUE) /
total_player_game_count,
total_targets_per_game = sum(c(targets1yr + targets2yr), na.rm = TRUE) / total_player_game_count,
total_targeted_qb_rating = sum(c(targeted_qb_rating1yr+targeted_qb_rating2yr), na.rm = TRUE) /
games2yr = (player_game_count2yr / sum(c(player_game_count2yr + player_game_count1yr), na.rm = TRUE))
grades_hands_drop = sum(c((games2yr*grades_hands_drop2yr)+((1-games2yr)*grades_hands_drop1yr)), na.rm = TRUE),
grades_hands_fumble = sum(c((games2yr*grades_hands_fumble2yr)+((1-games2yr)*grades_hands_fumble1yr)), na.rm = TRUE),
grades_offense = sum(c((games2yr*grades_offense2yr)+((1-games2yr)*grades_offense1yr)), na.rm = TRUE),
grades_pass_route = sum(c((games2yr*grades_pass_route2yr)+((1-games2yr)*grades_pass_route1yr)), na.rm = TRUE)

```

#2015 Stats of 2016 DC

```

dc_2016 <- c("Josh Doctson", "Rashard Higgins", "Daniel Braverman",
"Sterling Shepard", "Corey Coleman", "Tyler Boyd", "Garrett Brown",
"Leonte Carroo", "Tajae Sharpe", "De'Marcus Ayers", "Malcolm Mitchell",
"Alex Erickson", "Shaq Washington", "Jordan Payton", "Aaron Burbridge",
"Mike Thomas", "Laquon Treadwell", "Devin Lucien", "Michael Thomas",
"Nelson Spruce", "Pharoah Cooper", "Ricardo Louis", "Canaan Severin",
"Keyarris Garrett", "Teddy Ruben", "Hunter Sharp", "Bralon Addison",
"Dezmon Epps", "Quinshad Davis", "Jakeem Grant", "Andre Booker",
"Casey Martin", "J.D. McKissic", "Jamal Robinson", "De'Runnya Wilson",
"Rashawn Scott", "Shane Williams-Rhodes", "Jenson Stoshak",
"Ron Willoughby", "Chris Brown", "David Glidden", "Thomas Duarte",
"Will Fuller V", "Roger Lewis Jr.", "Imani Davis", "Jaydon Mickens",
"Robbie Anderson", "Jared Dangerfield", "Pierre Youngblood-Ary",
"Jordan Thompson", "Ed'Marques Batties", "Darius Powe", "K.J. Maye",
"Kody Cook", "Johnny Jackson", "Rashon Ceaser", "Josh Grady",
"Tres Houston", "Tevaun Smith", "Paul Turner", "Kenny Lawler",
"Jordan Williams-Lambert", "Devon Blackmon", "Bryce Treggs",
"Von Pearson", "Max Morrison", "Cayleb Jones", "Carlos Wiggins",
"Brandon Sheperd", "C.J. Best", "Charone Peake", "Antwane Grant",
"Mitch Mathews", "Chris Moore", "Trevor Davis", "Simms McElfresh",
"Johnny Holton", "DeAndre Reaves", "Cody Core", "Alonzo Russell",
"Donovan Harden", "Maurice Morgan", "Ben Lewis", "Jeff Greene",
"Damien Washington", "David Mellstrom", "Kolby Listenbee",
"Demarcus Robinson", "Braxton Miller", "Jemond Hazely", "Johnathon Johnson",
"Malachi Jones", "Dennis Parks", "Jordan Fredrick", "Devin Fuller",
"Mose Frazier", "Davonte Allen", "Brandon Swindall", "Terenn Houk",

```

```

"Richard Mullaney", "Alex Ludowig", "T.J. Thorpe", "Macgarrett Kings Jr.",
"Dom Williams", "Shane Mikesky", "Bubba Poole", "Danny Anthrop",
"DeAnthony Arnett", "Herve Coby", "Kenneth Scott", "Justin Berger",
"Quinton Pedroza", "Tommylee Lewis", "Daje Johnson", "Devon Cajuste",
"Maurice Harris", "Chris Kearney", "Montez McGuire", "D'haquille Williams",
"Joe Hansley", "Geronimo Allison", "Tre' Parmalee", "Jordan Bergstrom",
"Gary Chambers", "K.J. Brent", "DeAndre Bell", "Trey Page", "Hansell Wilson",
"Carlos Harris", "Clinton Taylor", "Thomas Wilson", "Brad Pearson",
"Byron Marshall", "Rollins Stallworth", "D.J. Foster", "Alex Chisum",
"Amir Carlisle", "Quenton Bundrage", "Ryan Burbrink", "Jay Lee", "Durrone Neal",
"David Richards", "Devonte Robinson", "Nathan Sassaman", "John Christopher",
"Sanford Seay", "Mekale McKay", "Andre Davis", "Valdez Showers",
"Marvin Shinn", "Bobo Beathard", "Max McCaffrey", "Damon Graham",
"Jafus Gaines", "Aaron Grubb", "Marvin Hall", "Jalin Marshall",
"Dustin Creel", "Kevin Asante", "Tevin Jones", "Roger Dixon",
"Kyle Klein", "Christian Jones", "Andrew Pratt", "Bryan Holmes",
"Jarvis Bentley", "Aaron Criswell", "Elgin Long", "Octavious Andrews",
"Kishon Wilcher", "Logan Sweet", "Herb Waters", "NaQuan Brown",
"Jamal Turner", "Brandon Oliver", "Ryan Garrey", "Ja'Juan Story",
"Avery Sweeting", "Tony Ray Parnell", "Brandon Smith", "Jordan Bianchi",
"Hayden Daniels", "Brandon Shippen", "Danny Woodson II", "Daniel Lilienthal",
"Conner Floyd", "Alvonta Jenkins", "Marquez North", "P.J. Howard IV",
"Kawmae Sawyer", "Tanner McEvoy", "Andrew Stone", "Terrell Johnson",
"Demitri Knowles", "AJ Troup", "Stanton Weber", "Kris Strange",
"Marken Michel", "Ryan Longoria", "Juwon Brescacin", "Tyler Scott",
"K.D. Edenfield", "Chris Shillings", "Cody Blanc", "Melvin Ray", "Joe Morrow",
"Connor Arlia", "Shamier Jeffery", "Marcus Johnson", "Claude Garrett",
"Taariq Allen", "Christian Collis", "Joshua Bowen", "Wesley Leftwich",
"Andre Sims", "KJ Myers", "Tyler Trosin", "Rayvean Moore", "Darius Joseph",
"Miles Shuler", "Bobby Swigert", "Kurt Henderson", "Nyiakki Height",
"Marquis Bundy", "David Dudeck", "Carlton Heard", "D.J. Vinson",
"Garrett Kidd", "Kenny Bias", "Tyler Baker", "Kendrick Roberts", "Ian Dixon",
"Justin Johnson")

```

```

dc_2016_2 <- c("Sabian Holmes", "Kendrick Singleton", "Cameron Dickerson",
"Jacob Hillyer", "Kris Kentera", "Anthony Williams", "Kameron Doolittle",
"Autrey Golden", "Christian Tober", "Derek Keaton", "Josh Boyle")

```

```

dc2016_stats2015 <- stats_2015 %>%
  filter(player %in% dc_2016 | player %in% dc_2016_2 & position == "WR") %>%
  left_join(stats_2014, by = c("player", "player_id", "position"),
            suffix = c("_draft", "_pre")) %>%
  rowwise() %>%
  mutate(total_yards = yards_draft + yards_pre,
         total_catch_percent = sum(c(receptions_draft + receptions_pre), na.rm=TRUE) / sum(c(targets_draft + targets_pre, na.rm = TRUE)),
         total_target_percent = sum(c(targets_draft + targets_pre), na.rm = TRUE) / sum(c(routes_draft + routes_pre, na.rm = TRUE)),
         total_route_percent = sum(c(routes_draft + routes_pre), na.rm = TRUE) / sum(c(pass_plays_draft + pass_plays_pre, na.rm = TRUE)),
         total_drop_percent = sum(c(drops_draft+drops_pre), na.rm = TRUE) / sum(c(targets_draft+targets_pre, na.rm = TRUE)),
         total_yprd = yprd_draft + yprd_pre,
         total_first_downs = sum(c(first_downs_draft+first_downs_pre), na.rm = TRUE),

```

```

total_yards_per_reception = sum(c(yards_per_reception_draft+yards_per_reception_pre), na.rm = TRUE)
total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception_draft+
                                              yards_after_catch_per_reception_pre), na.rm = TRUE)
total_player_game_count = sum(c(player_game_count_draft+player_game_count_pre), na.rm = TRUE),
total_touchdowns = sum(c(touchdowns_draft+touchdowns_pre), na.rm = TRUE),
total_yards_per_game = ((sum(c(yards_draft,yards_pre), na.rm = TRUE)) / total_player_game_count),
total_yards_after_catch_per_game = ((sum(c(yards_after_catch_draft+ yards_after_catch_pre), na.rm = TRUE)
                                     total_player_game_count),
total_targets_per_game = ((sum(c(targets_draft+targets_pre), na.rm = TRUE)) / total_player_game_count),
total_targeted_qb_rating = sum(c(targeted_qb_rating_draft+targeted_qb_rating_pre), na.rm = TRUE),
games_draft = (player_game_count_draft / sum(c(player_game_count_draft+ player_game_count_pre), na.rm = TRUE)),
grades_hands_drop = sum(c((games_draft*grades_hands_drop_draft),((1-games_draft)*grades_hands_drop_pre), na.rm = TRUE),
grades_hands_fumble = sum(c((games_draft*grades_hands_fumble_draft)+((1-games_draft)*grades_hands_fumble_pre), na.rm = TRUE),
grades_offense = sum(c((games_draft*grades_offense_draft)+((1-games_draft)*grades_offense_pre), na.rm = TRUE),
grades_pass_route = sum(c((games_draft*grades_pass_route_draft)+((1-games_draft)*grades_pass_route_pre), na.rm = TRUE))

pro_2016 <- read_csv("data/2016_pro_stats.csv")

## Rows: 490 Columns: 45
## -- Column specification -----
## Delimiter: ","
## chr (3): player, position, team_name
## dbl (42): player_id, player_game_count, avg_depth_of_target, avoided_tackles...
##
## i Use 'spec()' to retrieve the full column specification for this data.
## i Specify the column types or set 'show_col_types = FALSE' to quiet this message.

dc_2016_pro_stats <- pro_2016 %>%
  inner_join(pro_2017, by = c("player", "position", "player_id"), suffix = c("1yr", "2yr"))
dc_2016_stats <- inner_join(dc_2016_pro_stats, dc2016_stats2015, by = c("player_id", "player", "position"))
select(-c(grades_pass_block1yr, grades_pass_block2yr)) |>
rowwise() %>%
mutate(total_yards = yards1yr + yards2yr,
       total_catch_percent = sum(c(receptions1yr + receptions2yr), na.rm=TRUE) / sum(c(targets1yr + targets2yr), na.rm = TRUE),
       total_target_percent = sum(c(targets1yr + targets2yr), na.rm = TRUE) / sum(c(routes1yr + routes2yr), na.rm = TRUE),
       total_route_percent = sum(c(routes1yr + routes2yr), na.rm = TRUE) / sum(c(pass_plays1yr + pass_plays2yr), na.rm = TRUE),
       total_drop_percent = sum(c(drops1yr+drops2yr), na.rm = TRUE) / sum(c(targets1yr+targets2yr), na.rm = TRUE),
       total_ypr = ypr1yr + ypr2yr,
       total_first_downs = sum(c(first_downs1yr+first_downs2yr), na.rm = TRUE),
       total_yards_per_reception = sum(c(yards_per_reception1yr+yards_per_reception2yr), na.rm = TRUE),
       total_yards_after_catch_per_reception = sum(c(yards_after_catch_per_reception1yr+
                                                       yards_after_catch_per_reception2yr), na.rm = TRUE),
       total_player_game_count = sum(c(player_game_count1yr+player_game_count2yr), na.rm = TRUE),
       total_touchdowns = sum(c(touchdowns1yr+touchdowns2yr), na.rm = TRUE),
       total_yards_per_game = sum(c(yards1yr+yards2yr), na.rm = TRUE) / total_player_game_count,
       total_yards_after_catch_per_game = sum(c(yards_after_catch1yr + yards_after_catch2yr), na.rm = TRUE) /
                                     total_player_game_count,

```

```

total_targets_per_game = sum(c(targets1yr + targets2yr), na.rm = TRUE) / total_player_game_count
total_targeted_qb_rating = sum(c(targeted_qb_rating1yr+targeted_qb_rating2yr), na.rm = TRUE) /
games2yr = (player_game_count2yr / sum(c(player_game_count2yr + player_game_count1yr), na.rm =
grades_hands_drop = sum(c((games2yr*grades_hands_drop2yr)+((1-games2yr)*grades_hands_drop1yr))
na.rm = TRUE),
grades_hands_fumble = sum(c((games2yr*grades_hands_fumble2yr)+((1-games2yr)*grades_hands_fumble1yr))
na.rm = TRUE),
grades_offense = sum(c((games2yr*grades_offense2yr)+((1-games2yr)*grades_offense1yr)), na.rm =
grades_pass_route = sum(c((games2yr*grades_pass_route2yr)+((1-games2yr)*grades_pass_route1yr))
na.rm = TRUE))

#2014 Stats of 2015 DC
dc_2015 <- c("Amari Cooper", "Tyler Lockett", "DeVante Parker",
"Jonathon Rumph", "Nelson Agholor", "Tony Lippett", "DeAndre Smelter",
"Titus Davis", "Justin Hardy", "Jaelen Strong", "Darren Waller",
"Rashad Greene Sr.", "Devin Smith", "Curry Sexton", "Kenny Bell",
"Bud Sasser", "Tommy Shuler", "Ezell Ruffin", "Stefon Diggs",
"Matthew Miller", "Kevin White", "Jordan Taylor", "John Harris",
"Michael McNeely", "Joshua McCain", "Cam Worthy", "David Frazier",
"Lucky Whitehead", "Andre Davis", "Sammie Coates", "Vince Mayle",
"Christopher Harper", "Ty Montgomery", "Da'Ron Brown", "Antonio Vaughan",
"Chris Conley", "Jeremy Davis", "Jamison Crowder", "Darius Jennings",
"Shane Wynn", "Jeff Trojan", "Keiwone Malone", "Jalen Claiborne",
"Josh Harper", "Vince Sanders", "Bradley Marquez", "Lynquez Blair",
"Breshad Perriman", "Devin Funchess", "Phillip Dorsett", "Miles Gooch",
"Marcus Henry", "Kyle Prater", "Andrew Turzilli", "Keith Mumphery",
"Quan Bray", "Jordan Leslie", "Rannell Hall", "Michael Bennett",
"Shakim Phillips", "Clay Fuller", "Ronald Butler", "Devante Davis",
"Ian Hamilton", "Jarrod West", "Isiah Myers", "Jack Rhoades",
"Jalen Fitzpatrick", "Dominic Rufran", "Willie McNeal", "Levi Norwood",
"Chandler Worthy", "Antwan Goodley", "Earon Holmes", "J.J. Worton",
"Jordan Davis", "Deontay Greenberry", "DeAndrew White", "Eli Rogers",
"Josh Reese", "Joel German", "Kentrellis Showers", "Javess Blue",
"Malcome Kennedy", "Devin Clarke", "Demarco Robinson", "Jarred Haggins",
"George Farmer", "E.J. Scott", "Hunter Lee", "Tyler McCulloch", "Jimmie Hunt",
"Matt James", "Richy Turner", "Kenzee Jackson", "Devon Hughes",
"Jameon Lewis", "Nick Jones", "Manasseh Garner", "Jamarcus Nelson",
"Zach D'Orazio", "Sterling Griffin", "Tyler Duncan", "Jaxon Shipley",
"Jacob Carter", "Mario Hull", "Demetrius Wilson", "Ben Ijah", "Nigel King",
"Willie Byrn", "Jeric Magnant", "Jordan Pratt", "Deon Long",
"Cameron Peterson", "Adrian Henderson", "Tacoi Sumler", "Keith Sconiers",
"Chris Humphrey", "David Porter Jr.")
dc_2015_2 <- c("Nick Stoner", "Issac Blakeney", "Mario Alford",
"Isaac Fruechte", "Markese Triplett", "Marcus Cunningham", "Kasen Williams",
"Keanon Lowe", "Maudrecus Humphrey", "Justyn Shackelford", "Daniel Spencer",
"Glenn Coleman", "Josiah Monroe", "Kevonte Martin-Manley", "Zach Walker",
"Damond Powell", "Scott Harding", "Joe Craig", "Kendall Brock",
"Kaelin Clay", "John Chelf", "Dres Anderson", "Nick Harwell", "William Boyd",
"Andre Lewis", "Kai De La Cruz", "Brendan Dudeck", "Kevin Weatherspoon",
"Marcellus Mack", "L.T. Smith", "Alex Kenney", "Dwight Macon",
"D.D. Goodson", "Johnathan Loyd", "Keanu Nelson", "Isaiah Roundtree",
"Kenzel Doe", "Darius Terrell", "Chase Cochran", "Brandon Terry",
"Charles Lovett", "Damiere Byrd", "Maika Mataele", "Tony Jones",
"B.J. Chitty", "Shane Ros", "Ralph David Abernathy IV", "Terome Grant",

```

```

"Trey Norman", "Jack Spady", "Markeith Ambles", "Tyler Williams",
"Der'rikk Thompson", "Christion Jones", "Quinton Dunbar", "Rickey Galvin",
"John Jakubik", "Brent Mitcham", "Martize Barr", "Deshon Foxx",
"Jeremé Jones", "Kristoff Williams", "Donnie King Jr.", "Michael Erdman",
"Jackie Williams", "Jabari Carr", "Aaron Bradley", "Brandon Freeman",
"Austin Hill", "Daniel Bradbury", "Drake Whitehurst", "Andrew Maass",
"Christian Green", "Kinderick Dent", "Greg Watson", "Seth Grubb",
"Jarrad Shaw", "Lonnie Turner", "Clinton Jones", "Justin Olack",
"Adam Shapiro", "Wayne Beadle", "Landon Smith", "Jeremiah Kobena",
"Demetrius Evans", "DiAndre Campbell", "Jeffrey Jay", "Chris Perkins",
"Heath Jackson", "Keenan Montgomery", "Evan Spencer", "Jarvis West",
"Chevaughn Lawrence", "Daniel Rodriguez", "Stephen Nelson", "Kam Jones",
"T.J. Glover", "Michaelee Harris", "Craig Wilkins", "Adam Humphries",
"Ramhaan Patterson", "Matt Milton", "Kenny Harrison",
"Courtney Williams", "Robert Johnson", "John Dunmore", "Malcolm Trail",
"Tyler Allen", "Deonte Welch", "Jake Howton", "Justin McCay",
"Adrian Flemming", "William Dukes", "Bryan Underwood", "Trey Wilkins",
"Gavin Otte", "Carl Caldwell", "Ross Apo", "Logan Hutton", "Jordan Duval",
"LeKendrick Williams", "Dallas Burroughs", "Corey Dennis", "Andre Debose")
dc2015_stats2014 <- stats_2014 %>%
  filter(player %in% dc_2015 | player %in% dc_2015_2 & position == "WR")

```

Combine College Stats

```

long_data <- rbind(dc_2016_stats, dc_2017_stats, dc_2018_stats,
                  dc_2019_stats, dc_2020_stats) #, dc_2021_stats)
long_data <- long_data %>%
  as.data.frame() %>%
  filter(position == "WR")

```

Pro Stats

```

power5 <- c("PITTSBURGH", "MICH STATE", "WASH STATE", "WISCONSIN", "ILLINOIS", "COLORADO", "TEXAS TECH")
full_data <- inner_join(long_data, combine_stats,
                        by = c("player" = "Name")) %>%
  mutate(Power5 = if_else(team_name_draft %in% power5, 1, 0)) %>%
  distinct(player_id, .keep_all = TRUE) |>
  select(-c(Shuttle, Cone))
full_data$Arm[is.na(full_data$Arm)] <- mean(full_data$Arm, na.rm=TRUE)
full_data$X40.Yard[is.na(full_data$X40.Yard)] <- mean(full_data$X40.Yard, na.rm=TRUE)
full_data$Hand[is.na(full_data$Hand)] <- mean(full_data$Hand, na.rm=TRUE)

```

```

#ggplot(joined_data, aes(x = yprp_pre, y = yprp_draft)) +
#  geom_point()
#ggplot(joined_data, aes(x = total_yards, y = grades_offense)) +
#  geom_point()
#ggplot(joined_data, aes(x = X40.Yard, y = total_yards_per_reception)) +
#  geom_point()

```

```

all_college_data = rbind(dc2016_stats2015, dc2017_stats2016, dc2018_stats2017, dc2019_stats2018, dc2020_stats2019)
drop_na(team_name_pre) %>%
  mutate(Power5_draft = as.factor(if_else(team_name_draft %in% power5, 1, 0)),
         Power5_pre = as.factor(if_else(team_name_pre %in% power5, 1, 0)))
combine_college_data = inner_join(all_college_data, combine_stats, by = c("player" = "Name"))

```

Model Response Variables

To measure success

```

full_data$playedA_Yr <- with(full_data, ifelse(player_game_count1yr > 0 | player_game_count2yr > 0, 1, 0))
full_data$scoredTouchDown <- with(full_data, ifelse(touchdowns1yr > 0 | touchdowns2yr > 0, 1, 0))
full_data$decentStarter <- with(full_data, ifelse(yards1yr > 100 | yards2yr > 100, 1, 0))
full_data$greatStarter <- with(full_data, ifelse(yards1yr > 500 | yards2yr > 500, 1, 0))
full_data$eliteStarter <- with(full_data, ifelse(yards1yr > 1000 | yards2yr > 1000 | (yards1yr + yards2yr) > 2000, 1, 0))

```

```

response_data <- full_data %>%
  select(player_id, playedA_Yr, scoredTouchDown, decentStarter, greatStarter, eliteStarter)

```

Predicting NFL Success for NFL Players

*more interested in modeling Elite starter and great starter, might need to add some more response variables for higher thresholds

```

full_data %>%
  head()

```

```

##           player player_id position team_name1yr player_game_count1yr
## 1 Sterling Shepard    10674      WR          NYG                17
## 2 Tyler Boyd          10689      WR          CIN                16
## 3 Robbie Anderson     11254      WR          NYJ                16
## 4 Corey Coleman       10649      WR          CLV                10
## 5 Charone Peake        10875      WR          NYJ                13
## 6 Ricardo Louis       10748      WR          CLV                14
##   avg_depth_of_target1yr avoided_tackles1yr caught_percent1yr
## 1                9.8           8           61.6
## 2                9.0           2           71.1
## 3               16.9           3           56.0
## 4               15.5           8           53.2
## 5                9.5           4           57.6
## 6               10.8           4           56.3
##   contested_catch_rate1yr contested_receptions1yr contested_targets1yr
## 1                100                3                3
## 2                 50                 1                2
## 3                 50                 2                4
## 4                 NA                 0                0
## 5                100                 1                1
## 6                 50                 1                2
##   declined_penalties1yr drop_rate1yr drops1yr first_downs1yr franchise_id1yr
## 1                 1        10.4        8        46        21
## 2                 0         5.3        3        33         7

```


## 3	0	12.5	6	18	22
## 4	1	10.8	4	17	8
## 5	0	9.5	2	7	22
## 6	0	14.3	3	7	8
##	fumbles1yr	grades_hands_drop1yr	grades_hands_fumble1yr	grades_offense1yr	
## 1	0	53.3	82.0	66.2	
## 2	1	74.0	80.4	65.1	
## 3	1	39.2	34.3	58.0	
## 4	0	51.9	77.5	61.7	
## 5	0	58.1	74.4	59.0	
## 6	1	43.3	27.4	57.9	
##	grades_pass_routelyr	inline_ratelyr	inline_snaps1yr	interceptions1yr	
## 1	66.2	0.1	1	6	
## 2	64.4	0.8	4	3	
## 3	56.4	1.7	8	5	
## 4	61.9	0.0	0	3	
## 5	57.7	0.0	0	2	
## 6	57.1	0.0	0	1	
##	longest1yr	pass_block_ratelyr	pass_blocks1yr	pass_plays1yr	penalties1yr
## 1	32	0.1	1	692	2
## 2	30	0.2	1	510	1
## 3	52	0.0	0	476	1
## 4	58	0.0	0	379	3
## 5	27	0.0	0	239	0
## 6	42	0.5	1	222	2
##	receptions1yr	route_ratelyr	routes1yr	slot_ratelyr	slot_snaps1yr
## 1	69	94.9	657	85.3	590
## 2	54	94.3	481	88.4	451
## 3	42	95.6	455	11.1	53
## 4	33	95.0	360	5.3	20
## 5	19	95.0	227	77.0	184
## 6	18	94.6	210	21.6	48
##	targeted_qb_rating1yr	targets1yr	touchdowns1yr	wide_ratelyr	wide_snaps1yr
## 1	82.7	112	8	14.6	101
## 2	82.3	76	1	10.8	55
## 3	62.5	75	2	86.8	413
## 4	70.2	62	3	94.7	359
## 5	48.3	33	0	23.0	55
## 6	62.6	32	0	78.4	174
##	yards1yr	yards_after_catch1yr	yards_after_catch_per_reception1yr		
## 1	746	265		3.8	
## 2	603	213		3.9	
## 3	587	118		2.8	
## 4	413	100		3.0	
## 5	186	73		3.8	
## 6	205	93		5.2	
##	yards_per_reception1yr	ypr1yr	team_name2yr	player_game_count2yr	
## 1	10.8	1.14	NYG	11	
## 2	11.2	1.25	CIN	10	
## 3	14.0	1.29	NYJ	16	
## 4	12.5	1.15	CLV	9	
## 5	9.8	0.82	NYJ	3	
## 6	11.4	0.98	CLV	15	
##	avg_depth_of_target2yr	avoided_tackles2yr	caught_percent2yr		

## 1	8.9	5	71.1		
## 2	6.9	1	71.0		
## 3	13.6	5	56.8		
## 4	14.5	2	46.0		
## 5	2.0	0	100.0		
## 6	14.2	3	49.1		
##	contested_catch_rate2yr	contested_receptions2yr	contested_targets2yr		
## 1	63.6	14	22		
## 2	75.0	3	4		
## 3	30.8	8	26		
## 4	58.3	7	12		
## 5	NA	0	0		
## 6	45.5	5	11		
##	declined_penalties2yr	drop_rate2yr	drops2yr	first_downs2yr	franchise_id2yr
## 1	0	6.3	4	36	21
## 2	0	12.0	3	14	7
## 3	1	8.7	6	36	22
## 4	0	14.8	4	16	8
## 5	0	0.0	0	1	22
## 6	0	20.6	7	18	8
##	fumbles2yr	grades_hands_drop2yr	grades_hands_fumble2yr	grades_offense2yr	
## 1	1	69.8	45.8	70.7	
## 2	0	49.3	74.9	62.0	
## 3	0	60.3	80.9	71.4	
## 4	0	37.7	75.5	60.4	
## 5	0	64.7	61.2	57.8	
## 6	0	27.5	76.1	53.1	
##	grades_pass_route2yr	inline_rate2yr	inline_snaps2yr	interceptions2yr	
## 1	70.6	0.4	2	0	
## 2	61.5	0.5	1	1	
## 3	72.6	0.0	0	5	
## 4	61.9	0.0	0	3	
## 5	62.6	0.0	0	0	
## 6	52.0	0.0	0	2	
##	longest2yr	pass_block_rate2yr	pass_blocks2yr	pass_plays2yr	penalties2yr
## 1	77	0.0	0	467	2
## 2	49	0.0	0	219	0
## 3	69	0.0	0	520	3
## 4	44	0.3	1	312	5
## 5	3	0.0	0	12	0
## 6	37	0.2	1	406	1
##	receptions2yr	route_rate2yr	routes2yr	slot_rate2yr	slot_snaps2yr
## 1	59	94.0	439	83.3	389
## 2	22	94.5	207	87.2	191
## 3	63	94.6	492	28.1	146
## 4	23	93.6	292	7.4	23
## 5	1	83.3	10	33.3	4
## 6	27	91.4	371	20.7	84
##	targeted_qb_rating2yr	targets2yr	touchdowns2yr	wide_rate2yr	wide_snaps2yr
## 1	106.0	83	2	15.6	73
## 2	99.5	31	2	12.3	27
## 3	87.0	111	7	71.5	372
## 4	54.2	50	2	92.3	288
## 5	79.2	1	0	66.7	8

## 6	54.9	55	0	79.3	322
##	yards2yr	yards_after_catch2yr	yards_after_catch_per_reception2yr		
## 1	731	303		5.1	
## 2	225	93		4.2	
## 3	941	285		4.5	
## 4	305	27		1.2	
## 5	3	1		1.0	
## 6	357	83		3.1	
##	yards_per_reception2yr	yprrr2yr	team_name_draft	player_game_count_draft	
## 1	12.4	1.67	OKLAHOMA	13	
## 2	10.2	1.09	PITTSBURGH	12	
## 3	14.9	1.91	TEMPLE	14	
## 4	13.3	1.04	BAYLOR	12	
## 5	3.0	0.30	CLEMSON	15	
## 6	13.2	0.96	AUBURN	13	
##	caught_percent_draft	drop_rate_draft	drops_draft	first_downs_draft	
## 1	72.9	4.4	4	64	
## 2	71.8	5.1	5	52	
## 3	58.3	13.6	11	39	
## 4	63.8	11.9	10	51	
## 5	61.7	9.1	5	31	
## 6	56.8	11.5	6	28	
##	grades_hands_drop_draft	grades_hands_fumble_draft	grades_offense_draft		
## 1	83.4		76.4	91.5	
## 2	81.9		68.7	89.9	
## 3	46.4		55.7	73.1	
## 4	56.9		79.5	90.0	
## 5	65.9		73.9	72.1	
## 6	56.8		27.5	76.0	
##	grades_pass_route_draft	pass_plays_draft	receptions_draft	route_rate_draft	
## 1	90.8	469	86	95.5	
## 2	90.3	361	94	95.8	
## 3	74.6	429	70	93.0	
## 4	90.4	367	74	93.2	
## 5	70.4	388	50	95.4	
## 6	80.8	212	46	96.2	
##	routes_draft	targeted_qb_rating_draft	targets_draft	touchdowns_draft	
## 1	448	135.9	118	11	
## 2	346	91.1	131	6	
## 3	399	92.3	120	7	
## 4	342	133.1	116	20	
## 5	370	95.9	81	5	
## 6	204	93.5	81	3	
##	yards_draft	yards_after_catch_draft	yards_after_catch_per_reception_draft		
## 1	1289	495		5.8	
## 2	940	418		4.4	
## 3	939	298		4.3	
## 4	1365	569		7.7	
## 5	723	269		5.4	
## 6	717	198		4.3	
##	yards_per_reception_draft	yprrr_draft	team_name_pre	player_game_count_pre	
## 1	15.0	2.88	OKLAHOMA	10	
## 2	10.0	2.72	PITTSBURGH	13	
## 3	13.4	2.35	<NA>	NA	

## 4	18.4	3.99	BAYLOR	10	
## 5	14.5	1.95	CLEMSON	7	
## 6	15.6	3.51	AUBURN	12	
##	caught_percent_pre	drop_rate_pre	drops_pre	first_downs_pre	
## 1	62.2	1.9	1	0	
## 2	64.5	6.0	5	1	
## 3	NA	NA	NA	NA	
## 4	70.3	9.9	7	1	
## 5	70.6	0.0	0	0	
## 6	67.7	19.2	5	0	
##	grades_hands_drop_pre	grades_hands_fumble_pre	grades_offense_pre		
## 1	88.0	75.9	85.8		
## 2	75.5	59.8	90.3		
## 3	NA	NA	NA		
## 4	58.0	77.2	81.3		
## 5	82.2	68.5	62.3		
## 6	37.2	76.5	68.3		
##	grades_pass_route_pre	pass_plays_pre	receptions_pre	route_rate_pre	routes_pre
## 1	86.9	262	51	96.2	252
## 2	91.6	343	78	95.0	326
## 3	NA	NA	NA	NA	NA
## 4	83.8	324	64	96.3	312
## 5	63.2	128	12	97.7	125
## 6	61.8	122	21	95.9	117
##	targeted_qb_rating_pre	targets_pre	touchdowns_pre	yards_pre	
## 1	103.2	82	5	970	
## 2	107.4	121	8	1257	
## 3	NA	NA	NA	NA	
## 4	146.9	91	11	1119	
## 5	107.2	17	2	129	
## 6	125.9	31	3	261	
##	yards_after_catch_pre	yards_after_catch_per_reception_pre			
## 1	343			6.7	
## 2	506			6.5	
## 3	NA			NA	
## 4	421			6.6	
## 5	49			4.1	
## 6	160			7.6	
##	yards_per_reception_pre	yprp_pre	total_yards	total_catch_percent	
## 1	19.0	3.85	1477	0.6564103	
## 2	16.1	3.86	828	0.7102804	
## 3	NA	NA	1528	0.5645161	
## 4	17.5	3.59	718	0.5000000	
## 5	10.8	1.03	189	0.5882353	
## 6	12.4	2.23	562	0.5172414	
##	total_target_percent	total_route_percent	total_drop_percent	total_yprp	
## 1	0.1779197	0.9456428	0.06153846	2.81	
## 2	0.1555233	0.9437586	0.05607477	2.34	
## 3	0.1964097	0.9508032	0.06451613	3.20	
## 4	0.1717791	0.9435601	0.07142857	2.19	
## 5	0.1434599	0.9442231	0.05882353	1.12	
## 6	0.1497418	0.9251592	0.11494253	1.94	
##	total_first_downs	total_yards_per_reception			
## 1	82	23.2			

```
## 2          47          21.4
## 3          54          28.9
## 4          33          25.8
## 5           8          12.8
## 6          25          24.6
##   total_yards_after_catch_per_reception total_player_game_count
## 1                                8.9                28
## 2                                8.1                26
## 3                                7.3                32
## 4                                4.2                19
## 5                                4.8                16
## 6                                8.3                29
##   total_touchdowns total_yards_per_game total_yards_after_catch_per_game
## 1                10          52.75000          20.285714
## 2                 3          31.84615          11.769231
## 3                 9          47.75000          12.593750
## 4                 5          37.78947           6.684211
## 5                 0          11.81250           4.625000
## 6                 0          19.37931           6.068966
##   total_targets_per_game total_targeted_qb_rating games_draft grades_hands_drop
## 1          6.964286          94.35    0.5652174          59.78214
## 2          4.115385          90.90    0.4800000          64.50000
## 3          5.812500          74.75      Inf          49.75000
## 4          5.894737          62.20    0.5454545          45.17368
## 5          2.125000          63.75    0.6818182          59.33750
## 6          3.000000          58.75    0.5200000          35.12759
##   grades_hands_fumble grades_offense grades_pass_route games2yr Team Date
## 1          67.77857          67.96786          67.92857 0.3928571  NYG 2016
## 2          78.28462          63.90769          63.28462 0.3846154  CIN 2016
## 3          57.60000          64.70000          64.50000 0.5000000  ARI 2016
## 4          76.55263          61.08421          61.90000 0.4736842   FA 2016
## 5          71.92500          58.77500          58.61875 0.1875000   FA 2016
## 6          52.58966          55.41724          54.46207 0.5172414   FA 2016
##   Title Height Weight      Arm      Hand X40.Yard Vertical Broad Bench Power5
## 1 Combine    70    196 30.38000 9.750000 4.480000    41.0   123    20     1
## 2 Combine    74    203 32.00000 9.750000 4.580000    34.0   119    11     1
## 3 Pro Day    75    190 31.87483 9.409438 4.340000    36.5   128     8     0
## 4 Combine    71    193 30.25000 9.000000 4.486941    40.5   129    17     1
## 5 Combine    74    209 34.00000 9.250000 4.450000    35.5   122    12     1
## 6 Combine    74    215 32.38000 9.500000 4.430000    38.0   132    18     1
##   playedA_Yr scoredTouchDown decentStarter greatStarter eliteStarter
## 1           1              1              1              1              0
## 2           1              1              1              1              0
## 3           1              1              1              1              0
## 4           1              1              1              0              0
## 5           1              0              1              0              0
## 6           1              0              1              0              0
```

```
good_starter_nfl <- full_data %>%
  select(-c(player_id, player, position, team_name_draft, scoredTouchDown, playedA_Yr, decentStarter, e
```

```
elite_starter_nfl <- full_data %>%
  select(-c(player_id, player, position, team_name_draft, scoredTouchDown, playedA_Yr, decentStarter, g
```

Predicting NFL Success for Players at Combine

*more interested in modeling great and good starter, played a year, contributor

```
combine_data <- combine_college_data %>%
  merge(response_data, by = 'player_id', all.x = TRUE) %>%
  distinct(player_id, .keep_all = TRUE) %>%
  drop_na(grades_offense_pre) %>%
  mutate(playedA_Yr = as.factor(coalesce(playedA_Yr, 0)),
         scoredTouchDown = as.factor(coalesce(scoredTouchDown, 0)),
         decentStarter = as.factor(coalesce(decentStarter, 0)),
         greatStarter = as.factor(coalesce(greatStarter, 0)),
         eliteStarter = as.factor(coalesce(eliteStarter, 0)))

combine_cleaned <- combine_data |>
  select(-c(Shuttle, Cone, Bench))

combine_cleaned$X40.Yard[is.na(combine_cleaned$X40.Yard)]<-mean(combine_cleaned$X40.Yard, na.rm=TRUE)
combine_cleaned$Arm[is.na(combine_cleaned$Arm)]<-mean(combine_cleaned$Arm, na.rm=TRUE)
combine_cleaned$Broad[is.na(combine_cleaned$Broad)]<-mean(combine_cleaned$Broad, na.rm=TRUE)
combine_cleaned$Vertical[is.na(combine_cleaned$Vertical)]<-mean(combine_cleaned$Vertical, na.rm=TRUE)
combine_cleaned$Hand[is.na(combine_cleaned$Hand)]<-mean(combine_cleaned$Hand, na.rm=TRUE)

install.packages("caret")

## Installing package into '/home/guest/R/x86_64-pc-linux-gnu-library/4.2'
## (as 'lib' is unspecified)

snap_model_com <- combine_cleaned %>%
  select(-c(player_id, player, position, team_name_draft, scoredTouchDown, decentStarter, greatStarter,

set.seed(1)
index<-createDataPartition(snap_model_com$playedA_Yr,p=0.7,list=FALSE)
train<-snap_model_com[index,]
test<-snap_model_com[-index,]
snap_model_com_res <- glm(playedA_Yr~., data=train, family = "binomial")

## Warning: glm.fit: algorithm did not converge

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred

summary(snap_model_com_res)

##
## Call:
## glm(formula = playedA_Yr ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -1.102e-04 -2.100e-08 -2.100e-08  2.100e-08  1.056e-04
##
```



```

## Coefficients: (8 not defined because of singularities)
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)    4.474e+04  1.474e+08  0.000    1.000
## player_game_count_draft -5.744e+01  4.451e+05  0.000    1.000
## caught_percent_draft    3.361e+01  7.780e+04  0.000    1.000
## drop_rate_draft        1.221e+02  5.385e+04  0.002    0.998
## drops_draft          1.319e+02  3.431e+05  0.000    1.000
## first_downs_draft     -3.579e+01  4.528e+04 -0.001    0.999
## grades_hands_drop_draft  4.224e+01  9.810e+04  0.000    1.000
## grades_hands_fumble_draft  4.534e+01  7.614e+03  0.006    0.995
## grades_offense_draft   -2.808e+02  1.340e+05 -0.002    0.998
## grades_pass_route_draft  2.491e+02  1.364e+05  0.002    0.999
## pass_plays_draft       3.993e+01  1.912e+05  0.000    1.000
## receptions_draft       3.418e+01  2.121e+04  0.002    0.999
## route_rate_draft       2.648e+02  3.697e+05  0.001    0.999
## routes_draft          -3.902e+01  2.131e+05  0.000    1.000
## targeted_qb_rating_draft -1.391e+00  1.715e+04  0.000    1.000
## targets_draft          4.293e+01  1.518e+04  0.003    0.998
## touchdowns_draft       6.173e+00  1.087e+04  0.001    1.000
## yards_draft           -6.101e+00  6.664e+03 -0.001    0.999
## yards_after_catch_draft  2.469e+00  2.423e+03  0.001    0.999
## yards_after_catch_per_reception_draft  1.779e+01  1.882e+05  0.000    1.000
## yards_per_reception_draft  1.448e+02  8.433e+04  0.002    0.999
## yprp_draft           -1.589e+02  1.481e+06  0.000    1.000
## player_game_count_pre  -8.655e+01  3.769e+05  0.000    1.000
## caught_percent_pre     -2.549e+01  8.007e+04  0.000    1.000
## drop_rate_pre         -6.433e+01  3.547e+04 -0.002    0.999
## drops_pre            2.237e+01  1.081e+05  0.000    1.000
## first_downs_pre       4.299e-01  1.002e+04  0.000    1.000
## grades_hands_drop_pre  -2.251e+01  5.460e+04  0.000    1.000
## grades_hands_fumble_pre  5.053e+01  7.981e+03  0.006    0.995
## grades_offense_pre    -2.563e+02  1.386e+05 -0.002    0.999
## grades_pass_route_pre  2.099e+02  1.343e+05  0.002    0.999
## pass_plays_pre        -4.736e+01  1.331e+05  0.000    1.000
## receptions_pre        2.403e+01  7.184e+04  0.000    1.000
## route_rate_pre        5.793e+00  4.548e+05  0.000    1.000
## routes_pre            5.124e+01  1.363e+05  0.000    1.000
## targeted_qb_rating_pre  5.415e+00  5.425e+03  0.001    0.999
## targets_pre           1.471e+01  2.610e+04  0.001    1.000
## touchdowns_pre       -1.131e+01  7.926e+04  0.000    1.000
## yards_pre            -1.573e+00  1.759e+03 -0.001    0.999
## yards_after_catch_pre  -5.074e-01  1.902e+03  0.000    1.000
## yards_after_catch_per_reception_pre  1.030e+02  3.409e+04  0.003    0.998
## yards_per_reception_pre -1.108e+02  6.153e+04 -0.002    0.999
## yprp_pre             -2.685e+02  5.904e+05  0.000    1.000
## total_yards              NA          NA      NA      NA
## total_catch_percent     -6.322e+03  1.372e+07  0.000    1.000
## total_target_percent     6.163e+03  1.400e+07  0.000    1.000
## total_route_percent     -3.517e+04  1.899e+08  0.000    1.000
## total_drop_percent     -9.263e+03  6.741e+06 -0.001    0.999
## total_yprp              NA          NA      NA      NA
## total_first_downs       NA          NA      NA      NA
## total_yards_per_reception NA          NA      NA      NA
## total_yards_after_catch_per_reception NA          NA      NA      NA

```

```
## total_player_game_count      NA      NA      NA      NA
## total_touchdowns             NA      NA      NA      NA
## total_yards_per_game         1.084e+02 1.004e+05 0.001 0.999
## total_yards_after_catch_per_game -5.403e+01 9.335e+04 -0.001 1.000
## total_targets_per_game        -1.315e+03 2.010e+05 -0.007 0.995
## total_targeted_qb_rating       NA      NA      NA      NA
## grades_hands_drop             3.780e+00 1.219e+05 0.000 1.000
## grades_hands_fumble          -8.835e+01 2.923e+04 -0.003 0.998
## grades_offense                6.052e+02 2.818e+05 0.002 0.998
## grades_pass_route            -4.867e+02 2.887e+05 -0.002 0.999
## Power5_draft1                 3.909e+01 6.554e+04 0.001 1.000
## Date                          -1.726e+01 3.286e+04 -0.001 1.000
## TitlePro Day                  -3.861e+02 4.501e+05 -0.001 0.999
## Height                        -6.615e+00 5.734e+04 0.000 1.000
## Weight                         2.056e+00 6.439e+03 0.000 1.000
## Arm                           -5.435e+01 1.516e+05 0.000 1.000
## Hand                          -1.717e+02 1.941e+05 -0.001 0.999
## X40.Yard                       -4.460e+02 5.965e+05 -0.001 0.999
## Vertical                       3.091e+01 2.933e+04 0.001 0.999
## Broad                          8.345e-01 5.983e+03 0.000 1.000
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 2.3776e+02 on 183 degrees of freedom
## Residual deviance: 2.4848e-07 on 120 degrees of freedom
## (3 observations deleted due to missingness)
## AIC: 128
##
## Number of Fisher Scoring iterations: 25
```

```
pred <- predict(snap_model_com_res, test, type = "response")
```

```
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :
## prediction from a rank-deficient fit may be misleading
```

```
pred <- as.integer(pred>0.5)
conf_snap_1 <- confusionMatrix(as.factor(pred),test$playedA_Yr)
conf_snap_1
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction 0  1
##           0 30 14
##           1 22 12
##
##           Accuracy : 0.5385
##           95% CI : (0.4218, 0.6521)
##           No Information Rate : 0.6667
##           P-Value [Acc > NIR] : 0.9932
##
##           Kappa : 0.0357
##
```

```
## McNemar's Test P-Value : 0.2433
##
##          Sensitivity : 0.5769
##          Specificity : 0.4615
##          Pos Pred Value : 0.6818
##          Neg Pred Value : 0.3529
##          Prevalence : 0.6667
##          Detection Rate : 0.3846
##          Detection Prevalence : 0.5641
##          Balanced Accuracy : 0.5192
##
##          'Positive' Class : 0
##
```

```
set.seed(1)
snap_model_com2 <- snap_model_com %>%
  select(total_yards, total_catch_percent, total_target_percent, total_route_percent, total_drop_percent)
index<-createDataPartition(snap_model_com2$playedA_Yr,p=0.7,list=FALSE)
train<-snap_model_com2[index,]
test<-snap_model_com2[-index,]
snap_model_com2_res <- glm(playedA_Yr~., data=train, family = "binomial")
summary(snap_model_com2_res)
```

```
##
## Call:
## glm(formula = playedA_Yr ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.0378  -0.6888  -0.2533   0.6177   2.7134
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -15.479408   28.531671  -0.543  0.58745
## total_yards         0.003746    0.003709   1.010  0.31244
## total_catch_percent -21.905152    8.884256  -2.466  0.01368 *
## total_target_percent  36.948502   25.271006   1.462  0.14372
## total_route_percent  -0.518359   21.887565  -0.024  0.98111
## total_drop_percent   58.382298   31.678751   1.843  0.06534 .
## total_yprrr        -2.891597    1.329052  -2.176  0.02958 *
## total_first_downs   -0.027434    0.016304  -1.683  0.09245 .
## total_yards_per_reception -0.032826    0.125188  -0.262  0.79316
## total_yards_after_catch_per_reception  0.242409    0.090971   2.665  0.00771 **
## total_player_game_count  0.191500    0.243657   0.786  0.43190
## total_touchdowns    -0.117801    0.078383  -1.503  0.13287
## total_yards_per_game   0.064985    0.116301   0.559  0.57632
## total_targets_per_game -1.204014    0.677875  -1.776  0.07571 .
## total_targeted_qb_rating  0.068526    0.034444   1.990  0.04665 *
## grades_hands_drop     0.141980    0.077659   1.828  0.06751 .
## grades_hands_fumble    0.012763    0.019074   0.669  0.50339
## grades_offense        0.043497    0.207140   0.210  0.83368
## grades_pass_route      0.230877    0.225154   1.025  0.30517
## Power5_draft1         0.537470    0.578408   0.929  0.35277
## Height              0.073072    0.164893   0.443  0.65766
```

```
## Weight                0.019820    0.022723    0.872  0.38306
## Arm                   0.049955    0.255638    0.195  0.84507
## Hand                  -0.524630    0.562346   -0.933  0.35086
## X40.Yard              -5.531470    2.743037   -2.017  0.04374 *
## Broad                 0.017730    0.032728    0.542  0.58800
## Vertical              0.088620    0.088446    1.002  0.31636
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##    Null deviance: 240.30  on 186  degrees of freedom
## Residual deviance: 157.59  on 160  degrees of freedom
## AIC: 211.59
##
## Number of Fisher Scoring iterations: 6
```

```
pred_2 <- predict(snap_model_com2_res, test, type = "response")
pred_2 <- as.integer(pred_2>0.5)
conf_snap_2 <- confusionMatrix(as.factor(pred_2),test$playedA_Yr)
conf_snap_2
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction  0  1
##           0 39 13
##           1 13 14
##
##           Accuracy : 0.6709
##           95% CI : (0.556, 0.7725)
##    No Information Rate : 0.6582
##    P-Value [Acc > NIR] : 0.4578
##
##           Kappa : 0.2685
##
## Mcnemar's Test P-Value : 1.0000
##
##           Sensitivity : 0.7500
##           Specificity : 0.5185
##           Pos Pred Value : 0.7500
##           Neg Pred Value : 0.5185
##           Prevalence : 0.6582
##           Detection Rate : 0.4937
##    Detection Prevalence : 0.6582
##           Balanced Accuracy : 0.6343
##
##           'Positive' Class : 0
##
```

```
decent_starter_com <- combine_cleaned %>%
  select(-c(player_id, player, position, team_name_draft, scoredTouchDown, playedA_Yr, greatStarter, el
```

```

set.seed(2)
index<-createDataPartition(decent_starter_com$decentStarter,p=0.7,list=FALSE)
train<-decent_starter_com[index,]
test<-decent_starter_com[-index,]
decent_starter_com_res <- glm(decentStarter~., data=train, family = "binomial")

```

```
## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
```

```
summary(decent_starter_com_res)
```

```

##
## Call:
## glm(formula = decentStarter ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.03392  -0.40434  -0.03734   0.21910   2.75779
##
## Coefficients: (8 not defined because of singularities)
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)      8.650e+01  1.973e+02   0.438  0.6611
## player_game_count_draft  2.334e+00  9.354e-01   2.495  0.0126 *
## caught_percent_draft   -1.325e-01  3.339e-01  -0.397  0.6915
## drop_rate_draft        -1.915e-01  7.334e-01  -0.261  0.7940
## drops_draft           1.891e+00  8.552e-01   2.211  0.0271 *
## first_downs_draft     -2.634e-01  1.667e-01  -1.580  0.1141
## grades_hands_drop_draft  4.176e-01  4.044e-01   1.033  0.3018
## grades_hands_fumble_draft 1.781e-01  1.679e-01   1.061  0.2888
## grades_offense_draft    1.061e+00  3.064e+00   0.346  0.7291
## grades_pass_route_draft -6.424e-01  3.047e+00  -0.211  0.8330
## pass_plays_draft       -8.071e-02  3.033e-01  -0.266  0.7902
## receptions_draft       6.231e-01  2.733e-01   2.280  0.0226 *
## route_rate_draft       1.631e+00  1.719e+00   0.949  0.3426
## routes_draft           8.554e-02  3.140e-01   0.272  0.7853
## targeted_qb_rating_draft 1.497e-02  4.545e-02   0.329  0.7419
## targets_draft         -4.930e-01  2.822e-01  -1.747  0.0806 .
## touchdowns_draft      -2.215e-01  1.852e-01  -1.196  0.2319
## yards_draft           -2.004e-02  2.832e-02  -0.708  0.4791
## yards_after_catch_draft  1.614e-02  2.573e-02   0.627  0.5305
## yards_after_catch_per_reception_draft 5.612e-01  6.960e-01   0.806  0.4201
## yards_per_reception_draft 1.247e+00  6.037e-01   2.066  0.0389 *
## ypr_r_draft          -2.154e+00  4.149e+00  -0.519  0.6036
## player_game_count_pre   2.147e+00  9.549e-01   2.249  0.0245 *
## caught_percent_pre     -3.622e-01  2.797e-01  -1.295  0.1954
## drop_rate_pre         -6.755e-01  5.140e-01  -1.314  0.1888
## drops_pre             7.740e-01  5.697e-01   1.359  0.1742
## first_downs_pre       6.873e-02  4.067e-02   1.690  0.0910 .
## grades_hands_drop_pre   1.285e-01  3.190e-01   0.403  0.6872
## grades_hands_fumble_pre 1.793e-01  1.773e-01   1.011  0.3118
## grades_offense_pre     1.028e+00  3.109e+00   0.331  0.7410
## grades_pass_route_pre  -9.195e-01  3.083e+00  -0.298  0.7655
## pass_plays_pre        -2.678e-02  3.108e-01  -0.086  0.9313

```

```

## receptions_pre          3.483e-01  2.400e-01  1.452  0.1466
## route_rate_pre          2.147e+00  1.229e+00  1.747  0.0807 .
## routes_pre              -1.391e-02  3.272e-01 -0.042  0.9661
## targeted_qb_rating_pre   3.248e-03  4.386e-02  0.074  0.9410
## targets_pre             -5.804e-01  2.495e-01 -2.327  0.0200 *
## touchdowns_pre          6.685e-02  2.214e-01  0.302  0.7627
## yards_pre               2.969e-02  2.731e-02  1.087  0.2770
## yards_after_catch_pre    -3.896e-03  2.269e-02 -0.172  0.8636
## yards_after_catch_per_reception_pre  1.568e+00  7.139e-01  2.196  0.0281 *
## yards_per_reception_pre  -9.308e-01  5.224e-01 -1.782  0.0748 .
## yprp_pre                -5.538e+00  3.612e+00 -1.533  0.1253
## total_yards              NA          NA      NA      NA
## total_catch_percent      -3.426e+01  4.792e+01 -0.715  0.4746
## total_target_percent     -5.472e+01  7.241e+01 -0.756  0.4499
## total_route_percent      -5.256e+02  3.294e+02 -1.596  0.1106
## total_drop_percent       -4.006e+01  1.047e+02 -0.383  0.7020
## total_yprp              NA          NA      NA      NA
## total_first_downs        NA          NA      NA      NA
## total_yards_per_reception NA          NA      NA      NA
## total_yards_after_catch_per_reception NA      NA      NA      NA
## total_player_game_count  NA          NA      NA      NA
## total_touchdowns         NA          NA      NA      NA
## total_yards_per_game      5.080e-02  7.206e-01  0.071  0.9438
## total_yards_after_catch_per_game -5.235e-01  6.298e-01 -0.831  0.4058
## total_targets_per_game    7.531e+00  5.943e+00  1.267  0.2051
## total_targeted_qb_rating  NA          NA      NA      NA
## grades_hands_drop        -3.876e-01  5.961e-01 -0.650  0.5156
## grades_hands_fumble      -3.793e-01  3.358e-01 -1.129  0.2587
## grades_offense           -1.052e-01  6.139e+00 -0.017  0.9863
## grades_pass_route         2.600e-01  6.122e+00  0.042  0.9661
## Power5_draft1            -1.071e-01  9.748e-01 -0.110  0.9125
## Height                   6.147e-01  3.095e-01  1.986  0.0470 *
## Weight                   -7.575e-02  4.880e-02 -1.552  0.1206
## Arm                      2.452e-01  4.123e-01  0.595  0.5520
## Hand                     -1.667e+00  1.081e+00 -1.543  0.1229
## X40.Yard                 -5.782e+00  5.259e+00 -1.099  0.2716
## Vertical                 2.053e-01  1.458e-01  1.408  0.1590
## Broad                    3.139e-02  2.762e-02  1.136  0.2558
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 226.57 on 186 degrees of freedom
## Residual deviance: 101.60 on 125 degrees of freedom
## AIC: 225.6
##
## Number of Fisher Scoring iterations: 8

```

```
pred_dec <- predict(decent_starter_com_res, test, type = "response")
```

```

## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :
## prediction from a rank-deficient fit may be misleading

```



```

pred_dec <- as.integer(pred_dec>0.5)
conf_dec <- confusionMatrix(as.factor(pred_dec), test$decentStarter)
conf_dec

```

```

## Confusion Matrix and Statistics
##
##           Reference
## Prediction  0   1
##           0 46 11
##           1   9 12
##
##           Accuracy : 0.7436
##           95% CI : (0.6321, 0.8358)
##       No Information Rate : 0.7051
##       P-Value [Acc > NIR] : 0.2710
##
##           Kappa : 0.3674
##
##  Mcnemar's Test P-Value : 0.8231
##
##           Sensitivity : 0.8364
##           Specificity : 0.5217
##       Pos Pred Value : 0.8070
##       Neg Pred Value : 0.5714
##           Prevalence : 0.7051
##       Detection Rate : 0.5897
##       Detection Prevalence : 0.7308
##       Balanced Accuracy : 0.6791
##
##       'Positive' Class : 0
##

```

```

set.seed(2)
decent_starter_com2 <- decent_starter_com %>%
  select(total_yards, total_catch_percent, total_target_percent, total_route_percent, total_drop_percent)
index<-createDataPartition(decent_starter_com2$decentStarter,p=0.7,list=FALSE)
train<-decent_starter_com2[index,]
test<-decent_starter_com2[-index,]
decent_starter_com2_res <- glm(decentStarter~., data=train, family = "binomial")
summary(decent_starter_com2_res)

```

```

##
## Call:
## glm(formula = decentStarter ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.1712  -0.6498  -0.2697   0.4792   2.4121
##
## Coefficients:
##
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) 12.527932  29.279321   0.428  0.66874

```

```
## total_yards          0.001986    0.004748    0.418    0.67576
## total_catch_percent  -19.427403    8.828657   -2.200    0.02777 *
## total_target_percent    7.566070   23.269776    0.325    0.74507
## total_route_percent   -40.735643   23.228878   -1.754    0.07949 .
## total_drop_percent     70.108000   31.705112    2.211    0.02702 *
## total_yprp           -1.855030    1.279909   -1.449    0.14724
## total_first_downs      0.020272    0.020386    0.994    0.32003
## total_yards_per_reception -0.104399    0.134447   -0.777    0.43745
## total_yards_after_catch_per_reception 0.264236    0.094945    2.783    0.00539 **
## total_player_game_count 0.184812    0.306141    0.604    0.54605
## total_touchdowns      -0.033726    0.077500   -0.435    0.66343
## total_yards_per_game    0.015386    0.138234    0.111    0.91137
## total_targets_per_game  -0.566301    0.680850   -0.832    0.40555
## total_targeted_qb_rating 0.042907    0.037503    1.144    0.25259
## grades_hands_drop      0.196265    0.078286    2.507    0.01218 *
## grades_hands_fumble   -0.003295    0.020169   -0.163    0.87024
## grades_offense         0.542966    0.242367    2.240    0.02507 *
## grades_pass_route     -0.307082    0.251826   -1.219    0.22269
## Power5_draft1         -0.035586    0.587581   -0.061    0.95171
## Height                 0.222541    0.168369    1.322    0.18625
## Weight                 -0.015194    0.025377   -0.599    0.54933
## Arm                    0.172274    0.259128    0.665    0.50616
## Hand                   -0.354861    0.519368   -0.683    0.49445
## X40.Yard               -4.378687    2.747316   -1.594    0.11098
## Broad                   0.007465    0.010875    0.686    0.49243
## Vertical               0.078267    0.078576    0.996    0.31922
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## (Dispersion parameter for binomial family taken to be 1)
```

```
##
## Null deviance: 226.57 on 186 degrees of freedom
```

```
## Residual deviance: 150.31 on 160 degrees of freedom
```

```
## AIC: 204.31
```

```
##
```

```
## Number of Fisher Scoring iterations: 6
```

```
pred_dec_2 <- predict(decent_starter_com2_res, test, type = "response")
pred_dec_2 <- as.integer(pred_dec_2>0.5)
conf_dec_2 <- confusionMatrix(as.factor(pred_dec_2),test$decentStarter)
conf_dec_2
```

```
## Confusion Matrix and Statistics
```

```
##
```

```
##           Reference
```

```
## Prediction 0 1
```

```
##           0 46 13
```

```
##           1 10 10
```

```
##
```

```
##           Accuracy : 0.7089
```

```
##           95% CI : (0.5958, 0.8057)
```

```
## No Information Rate : 0.7089
```

```
## P-Value [Acc > NIR] : 0.5560
```

```
##
```

```
##           Kappa : 0.2665
##
## Mcnemar's Test P-Value : 0.6767
##
##           Sensitivity : 0.8214
##           Specificity : 0.4348
##           Pos Pred Value : 0.7797
##           Neg Pred Value : 0.5000
##           Prevalence : 0.7089
##           Detection Rate : 0.5823
##           Detection Prevalence : 0.7468
##           Balanced Accuracy : 0.6281
##
##           'Positive' Class : 0
##
```

```
great_starter_com <- combine_cleaned %>%
  select(-c(player_id, player, position, team_name_draft, scoredTouchDown, playedA_Yr, decentStarter, e
```

```
set.seed(3)
index<-createDataPartition(great_starter_com$greatStarter,p=0.7,list=FALSE)
train<-great_starter_com[index,]
test<-great_starter_com[-index,]
great_starter_com_res <- glm(greatStarter~., data=train, family = "binomial")
```

```
## Warning: glm.fit: algorithm did not converge
```

```
## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
```

```
summary(great_starter_com_res)
```

```
##
## Call:
## glm(formula = greatStarter ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -6.128e-05 -2.100e-08 -2.100e-08 -2.100e-08  5.545e-05
##
## Coefficients: (8 not defined because of singularities)
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    1.042e+04  5.517e+07  0.000    1.000
## player_game_count_draft  6.922e+01  2.100e+05  0.000    1.000
## caught_percent_draft    2.813e+01  3.677e+04  0.001    0.999
## drop_rate_draft        2.972e+01  3.221e+04  0.001    0.999
## drops_draft           6.103e+01  6.174e+04  0.001    0.999
## first_downs_draft     -2.230e+00  1.293e+04  0.000    1.000
## grades_hands_drop_draft  6.355e+00  2.875e+04  0.000    1.000
## grades_hands_fumble_draft  2.977e+01  2.324e+04  0.001    0.999
## grades_offense_draft    1.008e+02  2.638e+05  0.000    1.000
## grades_pass_route_draft  -7.401e+01  2.612e+05  0.000    1.000
## pass_plays_draft       1.657e+01  3.807e+04  0.000    1.000
```

## receptions_draft	1.444e+01	4.200e+04	0.000	1.000
## route_rate_draft	-1.067e+02	1.424e+05	-0.001	0.999
## routes_draft	-1.941e+01	4.087e+04	0.000	1.000
## targeted_qb_rating_draft	-3.008e-01	1.162e+04	0.000	1.000
## targets_draft	-6.759e+00	4.162e+04	0.000	1.000
## touchdowns_draft	1.270e+01	2.479e+04	0.001	1.000
## yards_draft	-1.426e+00	2.860e+03	0.000	1.000
## yards_after_catch_draft	3.405e-01	3.023e+03	0.000	1.000
## yards_after_catch_per_reception_draft	1.922e+01	1.003e+05	0.000	1.000
## yards_per_reception_draft	3.267e+01	9.916e+04	0.000	1.000
## yprp_draft	-2.925e+02	3.275e+05	-0.001	0.999
## player_game_count_pre	1.914e+02	1.218e+05	0.002	0.999
## caught_percent_pre	-1.045e+01	2.918e+04	0.000	1.000
## drop_rate_pre	5.579e+00	8.636e+04	0.000	1.000
## drops_pre	6.957e+01	7.904e+04	0.001	0.999
## first_downs_pre	3.797e+00	4.439e+03	0.001	0.999
## grades_hands_drop_pre	-1.991e+00	4.868e+04	0.000	1.000
## grades_hands_fumble_pre	2.739e+01	2.804e+04	0.001	0.999
## grades_offense_pre	2.101e+01	2.771e+05	0.000	1.000
## grades_pass_route_pre	7.598e+00	2.837e+05	0.000	1.000
## pass_plays_pre	4.080e+01	4.205e+04	0.001	0.999
## receptions_pre	2.225e+01	3.970e+04	0.001	1.000
## route_rate_pre	3.407e+01	7.864e+04	0.000	1.000
## routes_pre	-4.240e+01	4.661e+04	-0.001	0.999
## targeted_qb_rating_pre	-9.444e-01	3.196e+03	0.000	1.000
## targets_pre	-3.355e+01	4.506e+04	-0.001	0.999
## touchdowns_pre	-8.974e-01	1.218e+04	0.000	1.000
## yards_pre	2.621e-01	4.637e+03	0.000	1.000
## yards_after_catch_pre	-1.568e+00	3.535e+03	0.000	1.000
## yards_after_catch_per_reception_pre	1.445e+02	5.194e+04	0.003	0.998
## yards_per_reception_pre	-8.082e+01	5.992e+04	-0.001	0.999
## yprp_pre	5.859e+01	8.360e+05	0.000	1.000
## total_yards	NA	NA	NA	NA
## total_catch_percent	-4.658e+03	6.531e+06	-0.001	0.999
## total_target_percent	-1.850e+03	6.519e+06	0.000	1.000
## total_route_percent	2.834e+04	4.033e+07	0.001	0.999
## total_drop_percent	-8.077e+03	2.877e+07	0.000	1.000
## total_yprp	NA	NA	NA	NA
## total_first_downs	NA	NA	NA	NA
## total_yards_per_reception	NA	NA	NA	NA
## total_yards_after_catch_per_reception	NA	NA	NA	NA
## total_player_game_count	NA	NA	NA	NA
## total_touchdowns	NA	NA	NA	NA
## total_yards_per_game	3.754e+01	8.342e+04	0.000	1.000
## total_yards_after_catch_per_game	-2.044e+01	6.858e+04	0.000	1.000
## total_targets_per_game	9.968e+01	7.578e+05	0.000	1.000
## total_targeted_qb_rating	NA	NA	NA	NA
## games_draft	2.333e+03	5.945e+06	0.000	1.000
## grades_hands_drop	1.408e+01	7.285e+04	0.000	1.000
## grades_hands_fumble	-5.283e+01	5.325e+04	-0.001	0.999
## grades_offense	-9.316e+01	5.241e+05	0.000	1.000
## grades_pass_route	4.544e+01	5.310e+05	0.000	1.000
## Power5_draft1	1.207e+01	7.104e+04	0.000	1.000
## Date	-1.976e+01	1.789e+04	-0.001	0.999

```
## TitlePro Day          -5.350e+01  1.195e+05  0.000  1.000
## Height                1.621e+01  2.283e+04  0.001  0.999
## Weight               -3.758e+00  3.932e+03 -0.001  0.999
## Arm                  2.583e+01  3.060e+04  0.001  0.999
## Hand                 2.804e+01  9.358e+04  0.000  1.000
## X40.Yard             6.749e+02  2.956e+05  0.002  0.998
## Vertical             1.952e+01  2.213e+04  0.001  0.999
## Broad                3.080e+00  2.148e+03  0.001  0.999
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 1.6761e+02  on 185  degrees of freedom
## Residual deviance: 6.9062e-08  on 121  degrees of freedom
## (2 observations deleted due to missingness)
## AIC: 130
##
## Number of Fisher Scoring iterations: 25
```

```
pred_great <- predict(great_starter_com_res, test, type = "response")
```

```
## Warning in predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :
## prediction from a rank-deficient fit may be misleading
```

```
pred_great <- as.integer(pred_great>0.5)
conf_great <- confusionMatrix(as.factor(pred_great),test$greatStarter)
conf_great
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction  0  1
##           0 43  8
##           1 21  4
##
##           Accuracy : 0.6184
##           95% CI : (0.4998, 0.7275)
##           No Information Rate : 0.8421
##           P-Value [Acc > NIR] : 1.00000
##
##           Kappa : 0.0036
##
## Mcnemar's Test P-Value : 0.02586
##
##           Sensitivity : 0.6719
##           Specificity : 0.3333
##           Pos Pred Value : 0.8431
##           Neg Pred Value : 0.1600
##           Prevalence : 0.8421
##           Detection Rate : 0.5658
##           Detection Prevalence : 0.6711
##           Balanced Accuracy : 0.5026
##
##           'Positive' Class : 0
##
```

```

set.seed(1)
great_starter_com2 <- great_starter_com %>%
  select(total_yards, total_target_percent, total_route_percent, total_drop_percent, total_ypr, total_)
index<-createDataPartition(great_starter_com2$greatStarter,p=0.7,list=FALSE)
train<-great_starter_com2[index,]
test<-great_starter_com2[-index,]
great_starter_com2_res <- glm(greatStarter~., data=train, family = "binomial")
summary(great_starter_com2_res)

```

```

##
## Call:
## glm(formula = greatStarter ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.02726  -0.49535  -0.27349  -0.06297   3.13976
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -75.876298   31.166393  -2.435   0.0149 *
## total_yards     -0.001651    0.005072  -0.325   0.7449
## total_target_percent  46.024536  30.298888   1.519   0.1288
## total_route_percent -15.248270  17.549708  -0.869   0.3849
## total_drop_percent  90.868528  48.440140   1.876   0.0607 .
## total_ypr       -3.916860   1.599068  -2.449   0.0143 *
## total_first_downs   0.013007   0.019148   0.679   0.4970
## total_yards_per_reception  0.311365   0.127901   2.434   0.0149 *
## total_yards_after_catch_per_reception  0.216172   0.094729   2.282   0.0225 *
## total_player_game_count  0.306727   0.377723   0.812   0.4168
## total_touchdowns    -0.125568   0.085177  -1.474   0.1404
## total_yards_per_game   0.082197   0.152587   0.539   0.5901
## total_targets_per_game -0.133977   0.773990  -0.173   0.8626
## total_targeted_qb_rating  0.081660   0.041551   1.965   0.0494 *
## grades_hands_drop     0.198058   0.108802   1.820   0.0687 .
## grades_hands_fumble   -0.041248   0.024327  -1.696   0.0900 .
## grades_offense        0.207687   0.237377   0.875   0.3816
## grades_pass_route      0.066750   0.251618   0.265   0.7908
## Power5_draft1         0.208495   0.669296   0.312   0.7554
## Height              0.473006   0.199517   2.371   0.0178 *
## Weight             -0.043439   0.027201  -1.597   0.1103
## Arm                 0.322431   0.291931   1.104   0.2694
## Hand                0.877814   0.671164   1.308   0.1909
## X40.Yard            -4.549636   3.411974  -1.333   0.1824
## Broad               0.019586   0.018258   1.073   0.2834
## Vertical            0.087968   0.096228   0.914   0.3606
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 168.33  on 187  degrees of freedom
## Residual deviance: 114.90  on 162  degrees of freedom
## AIC: 166.9

```

```
##
## Number of Fisher Scoring iterations: 7

pred_great_2 <- predict(great_starter_com2_res, test, type = "response")
pred_great_2 <- as.integer(pred_great_2>0.5)
conf_great_2 <- confusionMatrix(as.factor(pred_great_2),test$greatStarter)
conf_great_2

## Confusion Matrix and Statistics
##
##           Reference
## Prediction  0   1
##           0 55   8
##           1 11   4
##
##           Accuracy : 0.7564
##           95% CI : (0.646, 0.8465)
##           No Information Rate : 0.8462
##           P-Value [Acc > NIR] : 0.9870
##
##           Kappa : 0.1512
##
## Mcnemar's Test P-Value : 0.6464
##
##           Sensitivity : 0.8333
##           Specificity : 0.3333
##           Pos Pred Value : 0.8730
##           Neg Pred Value : 0.2667
##           Prevalence : 0.8462
##           Detection Rate : 0.7051
##           Detection Prevalence : 0.8077
##           Balanced Accuracy : 0.5833
##
##           'Positive' Class : 0
##
```

Predicting NFL Success for Players in College

more interested in modeling great and decent starter, played a year, contributor

```
college_data <- all_college_data %>%
  merge(response_data, by = 'player_id', all.x = TRUE) %>%
  distinct(player_id, .keep_all = TRUE) %>%
  drop_na(grades_offense_pre) %>%
  mutate(playedA_Yr = as.factor(coalesce(playedA_Yr, 0)),
         scoredTouchDown = as.factor(coalesce(scoredTouchDown, 0)),
         decentStarter = as.factor(coalesce(decentStarter, 0)),
         greatStarter = as.factor(coalesce(greatStarter, 0)),
         eliteStarter = as.factor(coalesce(eliteStarter, 0)))
college_data %>%
  head()
```


##	player_id	player	position	team_name_draft	player_game_count_draft
## 1	10649	Corey Coleman	WR	BAYLOR	12
## 2	10655	Will Fuller V	WR	NOTRE DAME	13
## 3	10656	Josh Doctson	WR	TCU	10
## 4	10657	Laquon Treadwell	WR	OLE MISS	13
## 5	10674	Sterling Shepard	WR	OKLAHOMA	13
## 6	10681	Michael Thomas	WR	OHIO STATE	13
##	caught_percent_draft	drop_rate_draft	drops_draft	first_downs_draft	
## 1	63.8	11.9	10	51	
## 2	62.0	12.7	9	40	
## 3	72.2	7.1	6	62	
## 4	67.2	9.9	9	54	
## 5	72.9	4.4	4	64	
## 6	67.5	6.7	4	39	
##	grades_hands_drop_draft	grades_hands_fumble_draft	grades_offense_draft		
## 1	56.9		79.5	90.0	
## 2	53.3		74.8	77.2	
## 3	77.4		76.3	92.9	
## 4	63.2		56.3	85.3	
## 5	83.4		76.4	91.5	
## 6	73.5		74.3	83.4	
##	grades_pass_route_draft	pass_plays_draft	receptions_draft	route_rate_draft	
## 1	90.4	367	74	93.2	
## 2	75.7	458	62	94.5	
## 3	93.0	347	78	93.7	
## 4	85.2	494	82	95.1	
## 5	90.8	469	86	95.5	
## 6	83.4	320	56	96.3	
##	routes_draft	targeted_qb_rating_draft	targets_draft	touchdowns_draft	
## 1	342	133.1	116	20	
## 2	433	124.6	100	14	
## 3	325	149.2	108	14	
## 4	470	106.9	122	11	
## 5	448	135.9	118	11	
## 6	308	133.7	83	9	
##	yards_draft	yards_after_catch_draft	yards_after_catch_per_reception_draft		
## 1	1365	569		7.7	
## 2	1259	414		6.7	
## 3	1327	310		4.0	
## 4	1148	442		5.4	
## 5	1289	495		5.8	
## 6	781	271		4.8	
##	yards_per_reception_draft	yprp_draft	team_name_pre	player_game_count_pre	
## 1	18.4	3.99	BAYLOR	10	
## 2	20.3	2.91	NOTRE DAME	13	
## 3	17.0	4.08	TCU	13	
## 4	14.0	2.44	OLE MISS	9	
## 5	15.0	2.88	OKLAHOMA	10	
## 6	13.9	2.54	OHIO STATE	15	
##	caught_percent_pre	drop_rate_pre	drops_pre	first_downs_pre	
## 1	70.3	9.9	7	1	
## 2	68.5	12.6	11	0	
## 3	60.7	3.0	2	0	
## 4	66.2	5.8	3	1	

## 5	62.2	1.9	1	0	
## 6	73.0	1.8	1	0	
##	grades_hands_drop_pre	grades_hands_fumble_pre	grades_offense_pre		
## 1	58.0		77.2	81.3	
## 2	53.7		75.8	75.0	
## 3	81.8		29.6	75.9	
## 4	75.4		74.3	75.2	
## 5	88.0		75.9	85.8	
## 6	89.0		47.4	77.6	
##	grades_pass_route_pre	pass_plays_pre	receptions_pre	route_rate_pre	routes_pre
## 1	83.8	324	64	96.3	312
## 2	76.8	533	76	95.7	510
## 3	75.0	461	65	95.4	440
## 4	75.6	319	49	96.2	307
## 5	86.9	262	51	96.2	252
## 6	78.7	303	54	96.4	292
##	targeted_qb_rating_pre	targets_pre	touchdowns_pre	yards_pre	
## 1	146.9	91	11	1119	
## 2	136.0	111	15	1094	
## 3	126.6	107	11	1018	
## 4	115.7	74	5	638	
## 5	103.2	82	5	970	
## 6	130.6	74	9	799	
##	yards_after_catch_pre	yards_after_catch_per_reception_pre			
## 1	421			6.6	
## 2	420			5.5	
## 3	361			5.6	
## 4	313			6.4	
## 5	343			6.7	
## 6	413			7.6	
##	yards_per_reception_pre	yprp_pre	total_yards	total_catch_percent	
## 1	17.5	3.59	2484	0.6666667	
## 2	14.4	2.15	2353	0.6540284	
## 3	15.7	2.31	2345	0.6651163	
## 4	13.0	2.08	1786	0.6683673	
## 5	19.0	3.85	2259	0.6850000	
## 6	14.8	2.74	1580	0.7006369	
##	total_target_percent	total_route_percent	total_drop_percent	total_yprp	
## 1	0.3165138	0.9464544	0.08212560	7.58	
## 2	0.2237540	0.9515641	0.09478673	5.06	
## 3	0.2810458	0.9467822	0.03720930	6.39	
## 4	0.2522523	0.9557196	0.06122449	4.52	
## 5	0.2857143	0.9575923	0.02500000	6.73	
## 6	0.2616667	0.9630819	0.03184713	5.28	
##	total_first_downs	total_yards_per_reception			
## 1	52			35.9	
## 2	40			34.7	
## 3	62			32.7	
## 4	55			27.0	
## 5	64			34.0	
## 6	39			28.7	
##	total_yards_after_catch_per_reception	total_player_game_count			
## 1		14.3		22	
## 2		12.2		26	

```
## 3          9.6          23
## 4         11.8          22
## 5         12.5          23
## 6         12.4          28
##   total_touchdowns total_yards_per_game total_yards_after_catch_per_game
## 1             31         112.90909         45.00000
## 2             29          90.50000         32.07692
## 3             25         101.95652         29.17391
## 4             16          81.18182         34.31818
## 5             16          98.21739         36.43478
## 6             18          56.42857         24.42857
##   total_targets_per_game total_targeted_qb_rating games_draft grades_hands_drop
## 1          9.409091         140.00  0.5454545         57.40000
## 2          8.115385         130.30  0.5000000         53.50000
## 3          9.347826         137.90  0.4347826         79.88696
## 4          8.909091         111.30  0.5909091         68.19091
## 5          8.695652         119.55  0.5652174         85.40000
## 6          5.607143         132.15  0.4642857         81.80357
##   grades_hands_fumble grades_offense grades_pass_route Power5_draft Power5_pre
## 1          78.45455         86.04545         87.40000          1          1
## 2          75.30000         76.10000         76.25000          1          1
## 3          49.90435         83.29130         82.82609          1          1
## 4          63.66364         81.16818         81.27273          1          1
## 5          76.18261         89.02174         89.10435          1          1
## 6          59.88929         80.29286         80.88214          1          1
##   playedA_Yr scoredTouchDown decentStarter greatStarter eliteStarter
## 1           1             1             1             0             0
## 2           0             0             0             0             0
## 3           1             1             1             1             0
## 4           1             0             1             0             0
## 5           1             1             1             1             0
## 6           0             0             0             0             0
```

```
snap_model_coll_df <- college_data %>%
  select(-c(player_id, player, position, team_name_draft, scoredTouchDown, decentStarter, greatStarter,
```

```
decent_starter_coll_df <- college_data %>%
  select(-c(player_id, player, position, team_name_draft, scoredTouchDown, playedA_Yr, greatStarter, el
```

```
great_starter_coll_df <- college_data %>%
  select(-c(player_id, player, position, team_name_draft, scoredTouchDown, playedA_Yr, decentStarter, e
```

```
set.seed(1)
index<-createDataPartition(snap_model_coll_df$playedA_Yr,p=0.7,list=FALSE)
train<-snap_model_coll_df[index,]
test<-snap_model_coll_df[-index,]
snap_model_coll <- glm(playedA_Yr~., data=train, family = "binomial")
summary(snap_model_coll)
```

```
##
## Call:
## glm(formula = playedA_Yr ~ ., family = "binomial", data = train)
```

```

##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.2086  -0.2554  -0.0776  -0.0138   3.5581
##
## Coefficients: (8 not defined because of singularities)
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -42.691838   51.015206  -0.837   0.4027
## player_game_count_draft      1.049727   0.576480   1.821   0.0686
## caught_percent_draft     -0.114606   0.130669  -0.877   0.3804
## drop_rate_draft           0.107275   0.153704   0.698   0.4852
## drops_draft              0.365025   0.247654   1.474   0.1405
## first_downs_draft        -0.071116   0.062931  -1.130   0.2585
## grades_hands_drop_draft    0.109276   0.115506   0.946   0.3441
## grades_hands_fumble_draft  0.084031   0.074645   1.126   0.2603
## grades_offense_draft     -0.067607   0.833723  -0.081   0.9354
## grades_pass_route_draft    0.031468   0.813659   0.039   0.9691
## pass_plays_draft         -0.077109   0.117768  -0.655   0.5126
## receptions_draft         -0.014868   0.086408  -0.172   0.8634
## route_rate_draft         -0.474070   0.540199  -0.878   0.3802
## routes_draft             0.070161   0.122967   0.571   0.5683
## targeted_qb_rating_draft   0.031912   0.020427   1.562   0.1182
## targets_draft            0.158991   0.110969   1.433   0.1519
## touchdowns_draft         -0.014137   0.094677  -0.149   0.8813
## yards_draft              -0.010216   0.010155  -1.006   0.3144
## yards_after_catch_draft    -0.002976   0.010234  -0.291   0.7712
## yards_after_catch_per_reception_draft -0.082367   0.241946  -0.340   0.7335
## yards_per_reception_draft   0.234516   0.165024   1.421   0.1553
## yprp_draft              -0.968257   1.689318  -0.573   0.5665
## player_game_count_pre     -0.313893   0.589625  -0.532   0.5945
## caught_percent_pre        -0.068278   0.060188  -1.134   0.2566
## drop_rate_pre            -0.165699   0.121593  -1.363   0.1730
## drops_pre               -0.237408   0.209318  -1.134   0.2567
## first_downs_pre           0.004595   0.014934   0.308   0.7583
## grades_hands_drop_pre     -0.052139   0.115713  -0.451   0.6523
## grades_hands_fumble_pre    0.105032   0.072452   1.450   0.1471
## grades_offense_pre        0.235073   0.788323   0.298   0.7656
## grades_pass_route_pre     -0.287980   0.772319  -0.373   0.7092
## pass_plays_pre            0.063191   0.092813   0.681   0.4960
## receptions_pre           -0.088683   0.084957  -1.044   0.2965
## route_rate_pre            0.075762   0.278805   0.272   0.7858
## routes_pre               -0.071365   0.097478  -0.732   0.4641
## targeted_qb_rating_pre     0.033440   0.018302   1.827   0.0677
## targets_pre              0.164384   0.102030   1.611   0.1072
## touchdowns_pre           -0.031453   0.102490  -0.307   0.7589
## yards_pre                -0.004705   0.009786  -0.481   0.6306
## yards_after_catch_pre     -0.008916   0.009973  -0.894   0.3713
## yards_after_catch_per_reception_pre    0.036004   0.164212   0.219   0.8265
## yards_per_reception_pre   -0.104765   0.138798  -0.755   0.4504
## yprp_pre                 -1.349522   1.266751  -1.065   0.2867
## total_yards              NA         NA         NA         NA
## total_catch_percent        4.579795   15.389699   0.298   0.7660
## total_target_percent      -7.519418   24.213991  -0.311   0.7562
## total_route_percent       59.696991   82.027840   0.728   0.4668

```

## total_drop_percent	40.485027	29.800687	1.359	0.1743
## total_ypr	NA	NA	NA	NA
## total_first_downs	NA	NA	NA	NA
## total_yards_per_reception	NA	NA	NA	NA
## total_yards_after_catch_per_reception	NA	NA	NA	NA
## total_player_game_count	NA	NA	NA	NA
## total_touchdowns	NA	NA	NA	NA
## total_yards_per_game	0.239162	0.254156	0.941	0.3467
## total_yards_after_catch_per_game	0.218943	0.234595	0.933	0.3507
## total_targets_per_game	-2.635227	2.417822	-1.090	0.2757
## total_targeted_qb_rating	NA	NA	NA	NA
## games_draft	-18.001466	21.635138	-0.832	0.4054
## grades_hands_drop	0.074586	0.193744	0.385	0.7003
## grades_hands_fumble	-0.190009	0.143884	-1.321	0.1866
## grades_offense	0.080618	1.650037	0.049	0.9610
## grades_pass_route	0.215906	1.614243	0.134	0.8936
## Power5_draft1	2.007177	0.481188	4.171	3.03e-05
##				
## (Intercept)				
## player_game_count_draft	.			
## caught_percent_draft				
## drop_rate_draft				
## drops_draft				
## first_downs_draft				
## grades_hands_drop_draft				
## grades_hands_fumble_draft				
## grades_offense_draft				
## grades_pass_route_draft				
## pass_plays_draft				
## receptions_draft				
## route_rate_draft				
## routes_draft				
## targeted_qb_rating_draft				
## targets_draft				
## touchdowns_draft				
## yards_draft				
## yards_after_catch_draft				
## yards_after_catch_per_reception_draft				
## yards_per_reception_draft				
## ypr_draft				
## player_game_count_pre				
## caught_percent_pre				
## drop_rate_pre				
## drops_pre				
## first_downs_pre				
## grades_hands_drop_pre				
## grades_hands_fumble_pre				
## grades_offense_pre				
## grades_pass_route_pre				
## pass_plays_pre				
## receptions_pre				
## route_rate_pre				
## routes_pre				
## targeted_qb_rating_pre	.			

```

## targets_pre
## touchdowns_pre
## yards_pre
## yards_after_catch_pre
## yards_after_catch_per_reception_pre
## yards_per_reception_pre
## yprp_pre
## total_yards
## total_catch_percent
## total_target_percent
## total_route_percent
## total_drop_percent
## total_yprp
## total_first_downs
## total_yards_per_reception
## total_yards_after_catch_per_reception
## total_player_game_count
## total_touchdowns
## total_yards_per_game
## total_yards_after_catch_per_game
## total_targets_per_game
## total_targeted_qb_rating
## games_draft
## grades_hands_drop
## grades_hands_fumble
## grades_offense
## grades_pass_route
## Power5_draft1 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##    Null deviance: 437.59  on 750  degrees of freedom
## Residual deviance: 231.72  on 695  degrees of freedom
##   (32 observations deleted due to missingness)
## AIC: 343.72
##
## Number of Fisher Scoring iterations: 9

set.seed(12321)
snap_model_coll_df2 <- snap_model_coll_df %>%
  select(total_yards, total_catch_percent, total_target_percent, total_route_percent, total_drop_percent)
index<-createDataPartition(snap_model_coll_df2$playedA_Yr,p=0.7,list=FALSE)
train<-snap_model_coll_df2[index,]
test<-snap_model_coll_df2[-index,]
snap_model_coll_2 <- glm(playedA_Yr~., data=train, family = "binomial")

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred

summary(snap_model_coll_2)

##

```

```

## Call:
## glm(formula = playedA_Yr ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.5203  -0.2614  -0.1064  -0.0336   3.1842
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)      -40.990653   17.231426  -2.379 0.017368
## total_yards         0.001121    0.002676   0.419 0.675440
## total_catch_percent -12.395593    5.882604  -2.107 0.035104
## total_target_percent  17.170663   12.837720   1.338 0.181054
## total_route_percent  14.227273   15.368739   0.926 0.354587
## total_drop_percent  29.020991   20.607355   1.408 0.159047
## total_yprrr        -0.810107    0.724940  -1.117 0.263789
## total_first_downs   -0.006886    0.013113  -0.525 0.599521
## total_yards_per_reception  0.008915    0.082938   0.107 0.914401
## total_yards_after_catch_per_reception  0.062363    0.062243   1.002 0.316374
## total_player_game_count  0.251147    0.173116   1.451 0.146852
## total_touchdowns   -0.014436    0.058387  -0.247 0.804717
## total_yards_per_game  0.042474    0.086857   0.489 0.624837
## total_targets_per_game -0.422270    0.415799  -1.016 0.309838
## total_targeted_qb_rating  0.047148    0.023469   2.009 0.044543
## games_draft        3.583940    2.738533   1.309 0.190633
## grades_hands_drop    0.101012    0.053617   1.884 0.059571
## grades_hands_fumble  0.005421    0.015036   0.361 0.718462
## grades_offense       0.098440    0.131483   0.749 0.454047
## grades_pass_route    0.014669    0.144949   0.101 0.919390
## Power5_draft1       1.475763    0.420777   3.507 0.000453
##
## (Intercept)      *
## total_yards
## total_catch_percent      *
## total_target_percent
## total_route_percent
## total_drop_percent
## total_yprrr
## total_first_downs
## total_yards_per_reception
## total_yards_after_catch_per_reception
## total_player_game_count
## total_touchdowns
## total_yards_per_game
## total_targets_per_game
## total_targeted_qb_rating      *
## games_draft
## grades_hands_drop      .
## grades_hands_fumble
## grades_offense
## grades_pass_route
## Power5_draft1      ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```



```
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 443.16 on 782 degrees of freedom
## Residual deviance: 245.61 on 762 degrees of freedom
## AIC: 287.61
##
## Number of Fisher Scoring iterations: 9

set.seed(1)
snap_model_coll_df3 <- snap_model_coll_df %>%
  select(total_yards, total_target_percent, total_drop_percent, total_ypr, total_yards_after_catch_per,
index<-createDataPartition(snap_model_coll_df2$playedA_Yr,p=0.7,list=FALSE)
train<-snap_model_coll_df3[index,]
test<-snap_model_coll_df3[-index,]
snap_model_coll_3 <- glm(playedA_Yr~., data=train, family = "binomial")
summary(snap_model_coll_3)

##
## Call:
## glm(formula = playedA_Yr ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.67730  -0.31400  -0.14818  -0.05553   2.99673
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)      -2.398e+01  5.795e+00  -4.138  3.5e-05
## total_yards      -6.105e-04  2.283e-03  -0.267  0.789166
## total_target_percent  9.840e+00  1.022e+01   0.963  0.335699
## total_drop_percent  9.550e+00  1.827e+01   0.523  0.601237
## total_ypr       -7.736e-01  5.357e-01  -1.444  0.148737
## total_yards_after_catch_per_reception  7.874e-02  5.184e-02   1.519  0.128765
## total_player_game_count  2.433e-01  1.493e-01   1.630  0.103178
## total_touchdowns    5.188e-02  4.875e-02   1.064  0.287280
## total_yards_per_game    8.370e-02  7.398e-02   1.131  0.257866
## total_targets_per_game  -5.262e-01  3.456e-01  -1.522  0.127946
## total_targeted_qb_rating  3.515e-03  1.728e-02   0.203  0.838800
## games_draft      5.004e+00  2.408e+00   2.078  0.037729
## grades_hands_drop    1.107e-02  4.210e-02   0.263  0.792524
## grades_offense     1.348e-01  5.466e-02   2.466  0.013670
## Power5_draft1      1.365e+00  3.798e-01   3.594  0.000325
##
## (Intercept)          ***
## total_yards
## total_target_percent
## total_drop_percent
## total_ypr
## total_yards_after_catch_per_reception
## total_player_game_count
## total_touchdowns
## total_yards_per_game
## total_targets_per_game
```

```
## total_targeted_qb_rating
## games_draft          *
## grades_hands_drop
## grades_offense       *
## Power5_draft1        ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##    Null deviance: 443.16  on 782  degrees of freedom
## Residual deviance: 273.81  on 768  degrees of freedom
## AIC: 303.81
##
## Number of Fisher Scoring iterations: 8
```

```
pred_snap <- predict(snap_model_coll_3, test, type = "response")
pred_snap <- as.integer(pred_snap>0.5)
conf_snap <- confusionMatrix(as.factor(pred_snap),test$playedA_Yr)
conf_snap
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction  0    1
##           0 303  16
##           1   4  11
##
##           Accuracy : 0.9401
##           95% CI : (0.909, 0.963)
##    No Information Rate : 0.9192
##    P-Value [Acc > NIR] : 0.09201
##
##           Kappa : 0.4946
##
##  McNemar's Test P-Value : 0.01391
##
##           Sensitivity : 0.9870
##           Specificity : 0.4074
##           Pos Pred Value : 0.9498
##           Neg Pred Value : 0.7333
##           Prevalence : 0.9192
##           Detection Rate : 0.9072
##    Detection Prevalence : 0.9551
##           Balanced Accuracy : 0.6972
##
##           'Positive' Class : 0
##
```

```
set.seed(1)
decent_starter_coll_df2 <- decent_starter_coll_df %>%
  select(total_yards, total_catch_percent, total_target_percent, total_route_percent, total_drop_percent)
index<-createDataPartition(decent_starter_coll_df2$decentStarter,p=0.7,list=FALSE)
```

```

train<-decent_starter_coll_df2[index,]
test<-decent_starter_coll_df2[-index,]
decent_starter_coll_df2 <- glm(decentStarter~., data=train, family = "binomial")
summary(decent_starter_coll_df2)

```

```

##
## Call:
## glm(formula = decentStarter ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.01008  -0.23119  -0.07938  -0.02221   3.13985
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -3.140e+01  1.660e+01  -1.892  0.05854 .
## total_yards      2.795e-03  3.046e-03   0.918  0.35871
## total_catch_percent -1.564e+01  6.108e+00  -2.560  0.01045 *
## total_target_percent  1.904e+01  1.567e+01   1.215  0.22444
## total_route_percent  6.612e+00  1.572e+01   0.421  0.67405
## total_drop_percent  1.782e+01  2.072e+01   0.860  0.38997
## total_yprrr      -8.769e-01  8.026e-01  -1.092  0.27461
## total_first_downs   7.123e-04  1.332e-02   0.053  0.95737
## total_yards_per_reception -3.203e-02  7.822e-02  -0.409  0.68218
## total_yards_after_catch_per_reception 2.001e-01  6.389e-02   3.132  0.00174 **
## total_player_game_count  2.602e-01  2.104e-01   1.237  0.21619
## total_touchdowns    -2.125e-02  6.222e-02  -0.341  0.73274
## total_yards_per_game  2.492e-02  1.037e-01   0.240  0.81004
## total_targets_per_game -4.499e-01  4.801e-01  -0.937  0.34873
## total_targeted_qb_rating  5.400e-02  2.732e-02   1.976  0.04812 *
## games_draft       9.086e+00  4.020e+00   2.260  0.02382 *
## grades_hands_drop   6.725e-02  5.483e-02   1.227  0.21996
## grades_hands_fumble  1.856e-03  1.640e-02   0.113  0.90988
## grades_offense      2.758e-01  1.530e-01   1.803  0.07144 .
## grades_pass_route   -2.097e-01  1.689e-01  -1.242  0.21428
## Power5_draft1      1.422e+00  4.460e-01   3.188  0.00143 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 398.18  on 782  degrees of freedom
## Residual deviance: 209.89  on 762  degrees of freedom
## AIC: 251.89
##
## Number of Fisher Scoring iterations: 9

```

```

set.seed(1)
decent_starter_coll_df2 <- decent_starter_coll_df %>%
  select(total_yards, total_target_percent, total_drop_percent, total_yprrr, total_yards_after_catch_per.
index<-createDataPartition(decent_starter_coll_df2$decentStarter,p=0.7,list=FALSE)
train<-decent_starter_coll_df2[index,]
test<-decent_starter_coll_df2[-index,]

```

```
decent_starter_coll_2 <- glm(decentStarter~., data=train, family = "binomial")
summary(decent_starter_coll_2)
```

```
##
## Call:
## glm(formula = decentStarter ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -1.67708  -0.25420  -0.11299  -0.04376   3.15033
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -16.941980    6.170599  -2.746 0.006040
## total_yards      0.002777    0.002854   0.973 0.330586
## total_target_percent 14.146895   13.023101   1.086 0.277350
## total_drop_percent  -9.072099   22.251638  -0.408 0.683490
## total_yprrr     -1.008886    0.683437  -1.476 0.139892
## total_yards_after_catch_per_reception  0.193209    0.054933   3.517 0.000436
## total_player_game_count  0.130294    0.179295   0.727 0.467407
## total_touchdowns    0.042900    0.055585   0.772 0.440246
## total_yards_per_game  0.007639    0.092780   0.082 0.934379
## total_targets_per_game -0.447130    0.431074  -1.037 0.299621
## total_targeted_qb_rating  0.009581    0.021482   0.446 0.655590
## grades_hands_drop   -0.035526    0.050425  -0.705 0.481098
## grades_offense      0.127492    0.061731   2.065 0.038896
## Power5_draft1       1.148162    0.411041   2.793 0.005217
##
## (Intercept)          **
## total_yards
## total_target_percent
## total_drop_percent
## total_yprrr
## total_yards_after_catch_per_reception ***
## total_player_game_count
## total_touchdowns
## total_yards_per_game
## total_targets_per_game
## total_targeted_qb_rating
## grades_hands_drop
## grades_offense          *
## Power5_draft1          **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 398.18  on 782  degrees of freedom
## Residual deviance: 227.52  on 769  degrees of freedom
## AIC: 255.52
##
## Number of Fisher Scoring iterations: 9
```

```

pred_decent <- predict(decent_starter_coll_2, test, type = "response")
pred_decent <- as.integer(pred_snap>0.5)
conf_decent <- confusionMatrix(as.factor(pred_decent),test$decentStarter)
conf_decent

```

```
## Confusion Matrix and Statistics
```

```

##
##           Reference
## Prediction    0    1
##           0 304  15
##           1   7   8
##
##           Accuracy : 0.9341
##           95% CI : (0.902, 0.9583)
##       No Information Rate : 0.9311
##       P-Value [Acc > NIR] : 0.4693
##
##           Kappa : 0.3878
##
##  McNemar's Test P-Value : 0.1356
##
##           Sensitivity : 0.9775
##           Specificity : 0.3478
##       Pos Pred Value : 0.9530
##       Neg Pred Value : 0.5333
##           Prevalence : 0.9311
##       Detection Rate : 0.9102
##       Detection Prevalence : 0.9551
##       Balanced Accuracy : 0.6627
##
##       'Positive' Class : 0
##

```

```

set.seed(1)
great_starter_coll_df2 <- great_starter_coll_df %>%
  select(total_yards, total_target_percent, total_route_percent, total_drop_percent, total_ypr, total_
index<-createDataPartition(great_starter_coll_df2$greatStarter,p=0.7,list=FALSE)
train<-great_starter_coll_df2[index,]
test<-great_starter_coll_df2[-index,]
great_starter_coll_1 <- glm(greatStarter~., data=train, family = "binomial")

```

```
## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
```

```
summary(great_starter_coll_1)
```

```

##
## Call:
## glm(formula = greatStarter ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -1.4688  -0.1819  -0.0516  -0.0078   3.3781

```

```
##
## Coefficients:
##
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -41.447023   23.210437  -1.786  0.07415 .
## total_yards     -0.002783    0.004397  -0.633  0.52675
## total_target_percent 28.962163   23.814180   1.216  0.22392
## total_route_percent  2.074316   21.746924   0.095  0.92401
## total_drop_percent 20.066263   33.068275   0.607  0.54397
## total_yprrr     -1.243429    1.232186  -1.009  0.31291
## total_first_downs  0.018332    0.016990   1.079  0.28057
## total_yards_per_reception 0.232567    0.087212   2.667  0.00766 **
## total_yards_after_catch_per_reception -0.010424    0.077543  -0.134  0.89306
## total_player_game_count 0.498748    0.332015   1.502  0.13305
## total_touchdowns  -0.043984    0.068809  -0.639  0.52268
## total_yards_per_game  0.070178    0.136677   0.513  0.60763
## total_targets_per_game 0.270271    0.698075   0.387  0.69863
## total_targeted_qb_rating 0.065024    0.030247   2.150  0.03158 *
## grades_hands_drop  0.048689    0.078717   0.619  0.53622
## grades_hands_fumble -0.005642    0.018946  -0.298  0.76588
## grades_offense     0.020068    0.194315   0.103  0.91775
## grades_pass_route   0.003048    0.206575   0.015  0.98823
## Power5_draft1      1.360195    0.541640   2.511  0.01203 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##    Null deviance: 260.96  on 782  degrees of freedom
## Residual deviance: 156.37  on 764  degrees of freedom
## AIC: 194.37
##
## Number of Fisher Scoring iterations: 10
```

```
set.seed(1)
great_starter_coll_df2 <- great_starter_coll_df %>%
  select(total_yards, total_target_percent, total_drop_percent, total_yprrr, total_yards_after_catch_per
index<-createDataPartition(great_starter_coll_df2$greatStarter,p=0.7,list=FALSE)
train<-great_starter_coll_df2[index,]
test<-great_starter_coll_df2[-index,]
great_starter_coll_2 <- glm(greatStarter~., data=train, family = "binomial")
summary(great_starter_coll_2)
```

```
##
## Call:
## glm(formula = greatStarter ~ ., family = "binomial", data = train)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -1.65278  -0.20380  -0.07558  -0.01670   3.11871
##
## Coefficients:
##
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -2.010e+01  9.168e+00  -2.193  0.0283 *
## total_yards     -7.314e-04  3.999e-03  -0.183  0.8549
```

```
## total_target_percent      -1.425e+00  1.197e+01  -0.119  0.9052
## total_drop_percent        -2.040e+01  3.012e+01  -0.677  0.4981
## total_ypr                 1.886e-01  4.334e-01   0.435  0.6634
## total_yards_after_catch_per_reception -1.203e-02  7.505e-02  -0.160  0.8726
## total_player_game_count    4.108e-01  3.042e-01   1.350  0.1769
## total_touchdowns          -4.645e-02  6.906e-02  -0.673  0.5012
## total_yards_per_game       2.217e-02  1.044e-01   0.212  0.8318
## total_targets_per_game     3.887e-01  4.243e-01   0.916  0.3596
## total_targeted_qb_rating    5.026e-02  2.699e-02   1.862  0.0626
## grades_hands_drop         -6.416e-02  6.702e-02  -0.957  0.3384
## grades_offense             5.302e-02  7.555e-02   0.702  0.4828
## Power5_draft1              1.166e+00  5.087e-01   2.291  0.0219 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 260.96  on 782  degrees of freedom
## Residual deviance: 163.60  on 769  degrees of freedom
## AIC: 191.6
##
## Number of Fisher Scoring iterations: 10
```

```
pred_great <- predict(great_starter_coll_2, test, type = "response")
pred_great <- as.integer(pred_great>0.50)
conf_great <- confusionMatrix(as.factor(pred_decent),test$greatStarter)
conf_great
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction  0    1
##           0 309  10
##           1  13   2
##
##           Accuracy : 0.9311
##           95% CI : (0.8985, 0.9558)
##           No Information Rate : 0.9641
##           P-Value [Acc > NIR] : 0.9988
##
##           Kappa : 0.1127
##
## Mcnemar's Test P-Value : 0.6767
##
##           Sensitivity : 0.9596
##           Specificity : 0.1667
##           Pos Pred Value : 0.9687
##           Neg Pred Value : 0.1333
##           Prevalence : 0.9641
##           Detection Rate : 0.9251
##           Detection Prevalence : 0.9551
##           Balanced Accuracy : 0.5631
##
##           'Positive' Class : 0
```


##