Changes/Additions to data:

1. **combined\_tracking\_data** bined all tracking data into one dataframe
   1. New variables added:
      1. deltaxsign: determines if the player is going right or left on the field
         1. x <= 180, 1
         2. x > 180, -1
      2. deltaysign: determines if the player is going right or left on the field
         1. x <= 90 or x >= 270, 1
         2. x >= 90 and x <= 270, -1
2. **expanded\_pbp\_full** data frame has further information useful for defensive disruption (this is on an individual player basis --- 22 rows, representing each player, for every specific play)
   1. New variables include:
      1. Motion variables (NA if not in motion for specific play):
         1. motion\_start\_frameId: frame in which the player begins motion
         2. motion\_end\_frameId: frame in which the player ends motion
         3. motion\_time: the amount of time the player was in motion
         4. motion\_distance: the amount of distance the player covered with motion
         5. avg\_motion\_speed: average speed of motion
         6. max\_motion\_speed: max speed of motion
         7. avg\_motion\_accel: average acceleration of motion
         8. max\_motion\_accel: max acceleration of motion
      2. Defensive movement
         1. ps\_distance\_traveled: the amount of distance (in yards) a defensive player traveled from line\_set to ball\_snap
         2. ps\_dir\_change: counts the times a player moves direction by more than 15°
         3. def\_as\_dis\_traveled: the amount of distance an defensive player traveled after the snap for a given play
         4. off\_as\_dis\_traveled: the amount of distance an offensive player traveled after the snap for a given play
3. **play\_disruption** data frame has all of the information and data necessary to calculate a defensive\_disruption variable at the play level for a given play and host variables needed to make predictions
   1. New relevant variables included:
      1. PLAY INDEX
         1. play\_index: nominal identifier showing when a play happened in a given play (1 = first play, 2 = second play, etc.)
      2. MOTION / SHIFT (think of averages as on a player basis)
         1. inMotionAtBallSnap: logical variable for if a player was in motion at ball snap for the given play
         2. inMotionAtBallSnap\_speed: speed of player in motion at ball snap
         3. inMotionAtBallSnap\_accel: acceleration of player in motion at ball snap
         4. shiftSinceLineset\_count: count of players that shifted for a given play
         5. motionSinceLineset\_count: count of players that went in motion for a given play
         6. tot\_avg\_motion\_speed: the average speed of all players in motion for a given play
         7. tot\_max\_motion\_speed: the maximum speed of all players in motion for a given play
         8. tot\_avg\_motion\_accel: the average acceleration of all players in motion for a given play
         9. tot\_max\_motion\_accel: the maximum acceleration of all players in motion for a given play
         10. tot\_motion\_distance: the total distance (in yards) covered by players in motion for a given play
         11. avg\_motion\_distance: the average distance (in yards) covered by players in motion for a given play
         12. tot\_motion\_time: the total time (in sec) players were in motion for a given play
         13. avg\_motion\_time: the average time (in sec) players were in motion for a given play
      3. DISTANCE TRAVELED
         1. tot\_ps\_def\_dis\_traveled: the total distance traveled by defensive players prior to the snap and after lineset
         2. avg\_ps\_def\_dis\_traveled: the average distance traveled by defensive players prior to the snap and after lineset
         3. tot\_ps\_def\_dir\_changes: the total number of times players on the defense change directions prior to the snap
         4. avg\_ps\_def\_dir\_changes: the average number of times players on the defense change directions prior to the snap
         5. tot\_def\_as\_dis\_traveled: the total distance traveled by defensive players after the snap
         6. avg\_def\_as \_dis\_traveled: the average distance traveled by defensive players after the snap
         7. tot\_off\_as\_dis\_traveled: the total distance traveled by offensive players after the snap
         8. avg\_off\_as\_dis\_traveled: the average distance traveled by offensive players after the snap
      4. TIMING
         1. time\_to\_line: seconds it took for the offense to go from huddle\_break to line set
            1. This is NULL if the team when in no huddle
         2. time\_at\_line: seconds it took for the offense to snap the ball after being set at the line
      5. PREVIOUS PLAY VALUES
         1. prev\_down: down of the previous play
         2. prev\_yardsGained: yards gained of the previous play
         3. prev\_net\_yards: yards gained on the previous play compared to the yards need for the previous play to be successful
         4. prev\_success\_play: logical variable for if the previous play was deemed successful
         5. prev\_inMotionAtBallSnap
         6. prev\_shiftSinceLineset\_count
         7. prev\_motionSinceLineset\_count
         8. prev\_tot\_ps\_def\_dis\_traveled
         9. prev\_avg\_ps\_def\_dis\_traveled
         10. prev\_tot\_ps\_def\_dir\_changes
         11. prev\_avg\_ps\_def\_dir\_changes
         12. prev\_tot\_def\_as\_dis\_traveled
         13. prev\_avg\_def\_as\_dis\_traveled
         14. prev\_tot\_off\_as\_dis\_traveled
         15. prev\_avg\_off\_as\_dis\_traveled
      6. OTHER EXISTING RELEVANT VARIABLES
         1. offenseFormation
         2. recieverAlignment
         3. playClockAtSnap
         4. pff\_passCoverage
         5. pff\_manZone
      7. OTHER MAYBE RELEVANT EXISTING
         1. playAction