**Official Spread Meeting with Brian**

Looking for trends in DVOA data:

* EGO Pick Percentage vs Year
* WDVOA shows no trend
* DVOA shows slight decrease in prediction success with year
* EGO Pick Percentage vs Week
* WDVOA shows no trend
* DVOA shows noticeable increase in prediction success later in year
* EGO Pick Percentage vs EGO-spread
* WDVOA shows stronger prediction when avoiding very low and very high EGO-spread values
* DVOA shows very little, slight decrease with increasing EGO-spread
* Both WDVOA and DVOA show a strange trend of EGO-spread of 6ish having low predictability but 8+ having high predictability. May look into games with QB injuries to see if taking those out changes anything.
* EGO Pick Percentage vs Game Spread
* Using spread classes/intervals from 1 to 5 – class 3 and 5 have high predictability and class 4 has low predictability, especially for DVOA. Trend has a large number of data points but hard to make sense of.

Matchup Trends Observations:

1. Stronger trends are recorded earlier in the season. This is likely because there are fewer games to “interfere” with the trends – easier to happen to get a strong trend when only a few games are present
2. Point #1 below will filter many of these situations where we get a very high or low matchup EGO because a team happened to play opponents whose rankings were closely grouped together and a new opponent was far from the grouping

Matchup Trends To Do’s:

1. Account for full range of possible opponent ratings in matchup trends – if played only teams with 65, 71, 80, 84 ratings then no real trends since missing a lot of ratings
2. Try centering the middle EGO-score diff to 0 – opps with ~50 ratings will get a 0 EGO-spread diff
3. Try accounting for relative strengths of teams – the bengals suck at everything, so a rating of 40 might actually be a strength for them and we can discount it to be higher than 40 on the plots and thus in the predictions – this would cover the scenario by which it’s not the absolute strengths/weaknesses of teams but rather their relative strengths
4. Try discounting teams’ ratings relative to their opponents rating (Pats stats relative to shitty teams they played in 2019)

#1 is a filter we must apply to rid the data of outliers

#2 Is something that can be added independently to see if it produces better results

#3 is something that can be added independently to see if it produces better results

#4 is something that can be added in fine tuning later

Result of this analysis will give a score to ego difference that can be append to the DVOA EGO for a Final EGO

Matchup Trend EGO Prediction:

Using Neural Network:

2 approaches can be taken to make an EGO prediction from Matchup Trend Data

1. Do regression NN to predict an ego-result diff then add it to dvoa ego then evaluate accuracy of this total ego.
   1. So in our training data, we will have a distribution of EGO-Result differences with max and min of something like 45 and the rest distributed in between. The neural network will predict this value, likely generating values from 0-15 typically.
   2. If there is any correlation between the matchup data and the ego-result difference, it should appear if we graph the prediction ego-result diff against the actual ego-result diff. This would be a positive indication.
   3. However, the magnitudes of the predictions (0-15) may be too high to be appended to our stable dvoa ego prediction and would come to dwarf out these results perhaps, making the Accuracy of the total ego prediction dominated by the matchup EGO.
2. Use classification NN to predict whether the dvoa ego prediction is right or wrong. Then, final prediction = EGO prediction\*NN prediction (-1\*1, -1\*-1, 1\*-1, 1\*1).
   1. The “Class” will be whether our dvoa ego is correct or incorrect. The NN will make a prediction about our ego prediction. If the NN predicts our prediction to be wrong, we will flip our prediction. Then we evaluate the accuracy of our new, total prediction.
   2. This is similar to prediction the Spread-Result-Class however we get the extra prediction accuracy that comes from using our EGO prediction rather than the spread.

Using Manual Model:

Determine when the EGO model will make a wrong predication similarly to the goal of the classification NN model. Need the following to occur to signal a bad EGO-based pick that should be switched:

Steps:

1. Re-run scripts up to this point and create All WDVOA/DVOA Model Data with the EGO pick for every game + only make graphs for “good” Matchup games
2. In the Matchup Analyzer Script, add the Matchup EGO and Matchup Pick based on the following filters:
   1. At least 2 of 6 stats have strong matchups showing >= a value of Y where Y is the Matchup EGO Adj\*correlation value
   2. No other columns show a strong matchup meeting the same criteria in the opposite direction
   3. The opponent can’t have the same strong matchups/weak also (If both teams have good or bad matchups they cancel out)
3. The Matchup EGO is the sum of the good columns’ (point a) EGO Adj\*correlation divided by some value Z. So can get values ranging from minimum 2Y to some maximum.
4. The Matchup Pick is the decision of whether the Matchup EGO is enough to outweigh the DVOA EGO. Couple options that need to be tried:
   1. So the minimum needed 2Y will count as a 1 point adjustment (if DVOA EGO-Spread Diff = -2 and get a 2Y Matchup EGO, then EGO becomes -1 so don’t actually flip the pick). Every factor more of 2Y will give another point allowable adjustment. Probably something like 4Y = 2 points, 6Y = 3 points etc
   2. No decision, just flip the pick if matchup EGO is opposite to WDVOA EGO and had satisfied all the requirements of #2 above.
5. The week may need to be taken into account if it turns out that there are more datapoints from earlier weeks due to less “ruined” matchups