# Internet Appendix

**A Sample Splitting**

This paper studies a few sample splitting methods discussed in the prior literature (West, 2006). The first sample split method is the fixed splits where the data are divided into training, validation, and testing samples. This method trains models with training dataset and validates models with validation dataset to get all models’ accuracy performances. Finally, this method uses the best model with test dataset to make a prediction.

The second sample split method is the rolling method, where the training and validation datasets regularly change before training and validating to contain fresher data and keeps all time periods in each training and validation dataset fixed. For every rolling window, scholars can refit the model from the current training and verification datasets, and track the accuracy of the model in the residual test dataset that is not fitted in the rolling window. The result is a series of accuracy simulations regarding every rolling window. This method shows the advantage of using more up-to-date information to make predictions than fixed solutions.

The third sample splitting method is the recursive sample splitting method. Similar to the rolling method, it regularly contains more up-to-date sample in the training and validation datasets. However, the recursive method usually holds the whole history in the training dataset. Therefore, the size of the window regularly goes up. The rolling and recursive method are quite expensive, especially for more complex models.

In this paper, I adopt the fixed split and split the whole dataset into three sub-datasets, train dataset, validation dataset, and test dataset. I first split the whole dataset into 80% and 20%, and then split the 80% one to 64% and 16%. As a result, the proportion of the train, validation, and test datasets are 64%, 16%, and 20%. The observation number of these three datasets are 9444, 2362, 2952.

**B Summary Statistics for different datasets.**

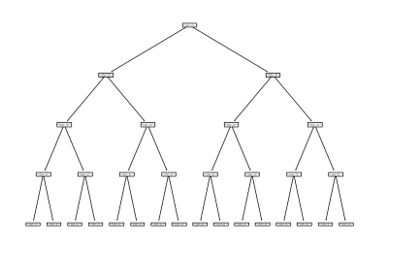
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TABLE 1**  **Summary Statistics for Original Dataset** | | | | | |
| **Variable** | **Obs** | **Mean** | **Std.Dev.** | **Min** | **Max** |
| *gmDate* | 14758 | 20290.04 | 622.54 | 19296.00 | 21285.00 |
| *pointspread* | 14758 | 0.00 | 13.70 | -61.00 | 61.00 |
| *teamLocx* | 14758 | 0.50 | 0.50 | 0.00 | 1.00 |
| *teamDayOff* | 14758 | 1.94 | 1.07 | 0.00 | 11.00 |
| *teamMinx* | 14758 | 48.36 | 0.52 | 47.50 | 53.00 |
| *teamPTSx* | 14758 | 102.15 | 6.54 | 75.00 | 140.00 |
| *teamASTx* | 14758 | 22.28 | 2.58 | 9.00 | 36.00 |
| *teamTOturN~x* | 14758 | 14.47 | 1.78 | 8.00 | 27.00 |
| *teamSTLx* | 14758 | 7.76 | 1.33 | 2.00 | 16.00 |
| *teamBLKx* | 14758 | 4.90 | 1.19 | 0.00 | 18.00 |
| *teamPFpers~x* | 14758 | 20.28 | 2.12 | 13.00 | 32.00 |
| *teamFGAx* | 14758 | 84.06 | 3.62 | 66.00 | 107.00 |
| *teamFGMx* | 14758 | 38.12 | 2.42 | 24.00 | 53.00 |
| *teamFGx* | 14758 | 0.45 | 0.02 | 0.31 | 0.57 |
| *team2PAx* | 14758 | 60.19 | 5.35 | 36.40 | 84.00 |
| *team2PMx* | 14758 | 29.61 | 2.52 | 17.00 | 44.00 |
| *team2Px* | 14758 | 0.49 | 0.03 | 0.31 | 0.65 |
| *team3PAx* | 14758 | 23.87 | 5.39 | 9.00 | 48.00 |
| *team3PMx* | 14758 | 8.51 | 2.23 | 0.00 | 19.00 |
| *team3Px* | 14758 | 0.35 | 0.04 | 0.00 | 0.68 |
| *teamFTAx* | 14758 | 22.92 | 3.53 | 10.00 | 50.00 |
| *teamFTMx* | 14758 | 17.41 | 2.78 | 5.00 | 34.00 |
| *teamFTx* | 14758 | 0.76 | 0.05 | 0.39 | 1.00 |
| *teamORBx* | 14758 | 10.57 | 1.86 | 2.00 | 26.00 |
| *teamDRBx* | 14758 | 32.61 | 2.48 | 19.00 | 47.00 |
| *teamTRBx* | 14758 | 43.18 | 2.94 | 30.00 | 62.00 |
| *teamPTS1x* | 14758 | 25.59 | 2.50 | 10.00 | 43.00 |
| *teamPTS2x* | 14758 | 25.61 | 2.44 | 7.00 | 37.00 |
| *teamPTS3x* | 14758 | 25.23 | 2.44 | 12.00 | 41.00 |
| *teamPTS4x* | 14758 | 25.01 | 2.32 | 12.00 | 41.00 |
| *teamPTS5x* | 14758 | 0.60 | 0.90 | 0.00 | 17.00 |
| *teamPTS6x* | 14758 | 0.09 | 0.33 | 0.00 | 6.50 |
| *teamPTS7x* | 14758 | 0.01 | 0.12 | 0.00 | 1.88 |
| *teamPTS8x* | 14758 | 0.00 | 0.08 | 0.00 | 2.00 |
| *teamTREBx* | 14758 | 50.00 | 2.32 | 36.67 | 63.33 |
| *teamASSTx* | 14758 | 58.36 | 5.15 | 27.27 | 81.58 |
| *teamTSx* | 14758 | 0.54 | 0.03 | 0.39 | 0.68 |
| *teamEeffec~x* | 14758 | 0.51 | 0.03 | 0.33 | 0.65 |
| *teamOREBx* | 14758 | 24.27 | 3.82 | 5.88 | 46.15 |
| *teamDREBx* | 14758 | 75.73 | 3.22 | 53.85 | 94.12 |
| *teamTOTurn~x* | 14758 | 13.31 | 1.55 | 6.71 | 23.24 |
| *AS* | 14758 | 8.10 | 1.35 | 1.99 | 16.11 |
| *AT* | 14758 | 5.12 | 1.25 | 0.00 | 18.66 |
| *teamBLKRx* | 14758 | 8.28 | 2.12 | 0.00 | 33.33 |
| *teamPPSpoi~x* | 14758 | 1.22 | 0.07 | 0.85 | 1.53 |
| *teamFICflo~x* | 14758 | 75.87 | 8.38 | 29.75 | 115.75 |
| *teamFIC40p~x* | 14758 | 62.78 | 6.96 | 24.69 | 96.46 |
| *teamOrtgo~10* | 14758 | 106.83 | 5.37 | 75.25 | 130.60 |
| *teamDrtgd~10* | 14758 | 106.82 | 4.93 | 75.25 | 130.60 |
| *teamEDiffe~e* | 14758 | 0.01 | 6.75 | -48.14 | 48.14 |
| *teamPlayx* | 14758 | 0.43 | 0.02 | 0.27 | 0.53 |
| *teamARx* | 14758 | 16.94 | 1.62 | 7.59 | 24.24 |
| *teamASTTOx* | 14758 | 1.68 | 0.31 | 0.48 | 3.45 |
| *teamSTLTOx* | 14758 | 57.72 | 11.98 | 14.29 | 155.56 |
| *pointspr~10x* | 14758 | 0.01 | 6.46 | -48.00 | 48.00 |
| *teamMiny* | 14758 | 241.78 | 2.60 | 237.50 | 265.00 |
| *teamDayOffy* | 14758 | 1.89 | 0.41 | 0.00 | 3.20 |
| *teamPTSy* | 14758 | 102.15 | 6.54 | 75.00 | 140.00 |
| *teamASTy* | 14758 | 22.28 | 2.58 | 9.00 | 36.00 |
| *teamTOTurn~y* | 14758 | 14.47 | 1.78 | 8.00 | 27.00 |
| *teamSTLy* | 14758 | 7.76 | 1.33 | 2.00 | 16.00 |
| *teamBLKy* | 14758 | 4.90 | 1.19 | 0.00 | 18.00 |
| *teamPFpers~y* | 14758 | 20.28 | 2.12 | 13.00 | 32.00 |
| *teamFGAy* | 14758 | 84.06 | 3.62 | 66.00 | 107.00 |
| *teamFGMy* | 14758 | 38.12 | 2.42 | 24.00 | 53.00 |
| *teamFGy* | 14758 | 0.45 | 0.02 | 0.31 | 0.57 |
| *team2PAy* | 14758 | 60.19 | 5.35 | 36.40 | 84.00 |
| *team2PMy* | 14758 | 29.61 | 2.52 | 17.00 | 44.00 |
| *team2Py* | 14758 | 0.49 | 0.03 | 0.31 | 0.65 |
| *team3PAy* | 14758 | 23.87 | 5.39 | 9.00 | 48.00 |
| *team3PMy* | 14758 | 8.51 | 2.23 | 0.00 | 19.00 |
| *team3Py* | 14758 | 0.35 | 0.04 | 0.00 | 0.68 |
| *teamFTAy* | 14758 | 22.92 | 3.53 | 10.00 | 50.00 |
| *teamFTMy* | 14758 | 17.41 | 2.78 | 5.00 | 34.00 |
| *teamFTy* | 14758 | 0.76 | 0.05 | 0.39 | 1.00 |
| *teamORBy* | 14758 | 10.57 | 1.86 | 2.00 | 26.00 |
| *teamDRBy* | 14758 | 32.61 | 2.48 | 19.00 | 47.00 |
| *teamTRBy* | 14758 | 43.18 | 2.94 | 30.00 | 62.00 |
| *teamPTS1y* | 14758 | 25.59 | 2.50 | 10.00 | 43.00 |
| *teamPTS2y* | 14758 | 25.61 | 2.44 | 7.00 | 37.00 |
| *teamPTS3y* | 14758 | 25.23 | 2.44 | 12.00 | 41.00 |
| *teamPTS4y* | 14758 | 25.01 | 2.32 | 12.00 | 41.00 |
| *teamPTS5y* | 14758 | 0.60 | 0.90 | 0.00 | 17.00 |
| *teamPTS6y* | 14758 | 0.09 | 0.33 | 0.00 | 6.50 |
| *teamPTS7y* | 14758 | 0.01 | 0.12 | 0.00 | 1.88 |
| *teamPTS8y* | 14758 | 0.00 | 0.08 | 0.00 | 2.00 |
| *teamTREBy* | 14758 | 50.00 | 2.32 | 36.67 | 63.33 |
| *teamASSTy* | 14758 | 58.36 | 5.15 | 27.27 | 81.58 |
| *teamTSy* | 14758 | 0.54 | 0.03 | 0.39 | 0.68 |
| *teamEeffec~y* | 14758 | 0.51 | 0.03 | 0.33 | 0.65 |
| *teamOREBy* | 14758 | 24.27 | 3.82 | 5.88 | 46.15 |
| *teamDREBy* | 14758 | 75.73 | 3.22 | 53.85 | 94.12 |
| *teamTOturn~y* | 14758 | 13.31 | 1.55 | 6.71 | 23.24 |
| *CS* | 14758 | 8.10 | 1.35 | 1.99 | 16.11 |
| *CT* | 14758 | 5.12 | 1.25 | 0.00 | 18.66 |
| *teamBLKRy* | 14758 | 8.28 | 2.12 | 0.00 | 33.33 |
| *teamPPSpoi~y* | 14758 | 1.22 | 0.07 | 0.85 | 1.53 |
| *teamFICflo~y* | 14758 | 75.87 | 8.38 | 29.75 | 115.75 |
| *teamFIC40p~y* | 14758 | 62.78 | 6.96 | 24.69 | 96.46 |
| *CY* | 14758 | 106.83 | 5.37 | 75.25 | 130.60 |
| *CZ* | 14758 | 106.82 | 4.93 | 75.25 | 130.60 |
| *DA* | 14758 | 0.01 | 6.75 | -48.14 | 48.14 |
| *teamPlayy* | 14758 | 0.43 | 0.02 | 0.27 | 0.53 |
| *teamARy* | 14758 | 16.94 | 1.62 | 7.59 | 24.24 |
| *teamASTTOy* | 14758 | 1.68 | 0.31 | 0.48 | 3.45 |
| *teamSTLTOy* | 14758 | 57.72 | 11.98 | 14.29 | 155.56 |
| *pointspr~10y* | 14758 | 0.01 | 6.46 | -48.00 | 48.00 |
| *pointsprea~g* | 14758 | 0.01 | 13.59 | -61.00 | 61.00 |
| *pointsprea~5* | 14758 | 0.00 | 7.81 | -28.80 | 28.80 |
| *season* | 14758 | 2015.50 | 1.71 | 2013.00 | 2018.00 |
| *area* | 14758 | 0.50 | 0.50 | 0.00 | 1.00 |
| Note: This table reports the summary statistics for NBA games observations from season 2013 to season 2018 where numbers of observations, mean, standard deviation, maximum, and minimum values are shown.  All variables in this table are defined in Appendix E.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **TABLE 2**  **Summary Statistics for Original Train Dataset** | | | | | | | **Variable** | **Obs** | **Mean** | **Std.Dev.** | **Min** | **Max** | | *v1* | 9444 | 7369.39 | 4261.07 | 0.00 | 14755.00 | | *pointspread* | 9444 | 0.23 | 13.53 | -61.00 | 61.00 | | *teamlocx* | 9444 | 0.50 | 0.50 | 0.00 | 1.00 | | *teamdayoff* | 9444 | 1.93 | 1.04 | 0.00 | 11.00 | | *teamminx* | 9444 | 48.36 | 0.53 | 47.60 | 53.00 | | *teamptsx* | 9444 | 102.19 | 6.56 | 75.00 | 131.00 | | *teamastx* | 9444 | 22.28 | 2.57 | 9.00 | 36.00 | | *teamto~pverx* | 9444 | 14.44 | 1.78 | 8.00 | 27.00 | | *teamstlx* | 9444 | 7.77 | 1.34 | 3.00 | 16.00 | | *teamblkx* | 9444 | 4.90 | 1.19 | 0.00 | 17.00 | | *teampfpers~x* | 9444 | 20.28 | 2.10 | 14.00 | 32.00 | | *teamfgax* | 9444 | 84.08 | 3.63 | 70.00 | 104.00 | | *teamfgmx* | 9444 | 38.13 | 2.43 | 24.00 | 49.00 | | *teamfgx* | 9444 | 0.45 | 0.02 | 0.31 | 0.56 | | *team2pax* | 9444 | 60.23 | 5.42 | 36.40 | 84.00 | | *team2pmx* | 9444 | 29.64 | 2.54 | 19.00 | 43.00 | | *team2px* | 9444 | 0.49 | 0.03 | 0.31 | 0.65 | | *team3pax* | 9444 | 23.85 | 5.46 | 9.00 | 48.00 | | *team3pmx* | 9444 | 8.49 | 2.26 | 0.00 | 18.00 | | *team3px* | 9444 | 0.35 | 0.04 | 0.00 | 0.68 | | *teamftax* | 9444 | 22.97 | 3.53 | 10.00 | 50.00 | | *teamftmx* | 9444 | 17.44 | 2.78 | 5.00 | 34.00 | | *teamftx* | 9444 | 0.76 | 0.05 | 0.39 | 1.00 | | *teamorbx* | 9444 | 10.58 | 1.88 | 3.00 | 26.00 | | *teamdrbx* | 9444 | 32.61 | 2.47 | 20.00 | 47.00 | | *teamtrbx* | 9444 | 43.19 | 2.94 | 30.00 | 62.00 | | *teampts1x* | 9444 | 25.59 | 2.51 | 10.00 | 43.00 | | *teampts2x* | 9444 | 25.63 | 2.44 | 14.00 | 37.00 | | *teampts3x* | 9444 | 25.23 | 2.44 | 12.00 | 38.00 | | *teampts4x* | 9444 | 25.01 | 2.33 | 12.00 | 41.00 | | *teampts5x* | 9444 | 0.60 | 0.90 | 0.00 | 17.00 | | *teampts6x* | 9444 | 0.09 | 0.34 | 0.00 | 6.50 | | *teampts7x* | 9444 | 0.01 | 0.11 | 0.00 | 1.70 | | *teampts8x* | 9444 | 0.00 | 0.09 | 0.00 | 2.00 | | *teamtrebx* | 9444 | 50.00 | 2.32 | 36.67 | 63.33 | | *teamasstx* | 9444 | 58.34 | 5.14 | 27.27 | 81.58 | | *teamtsx* | 9444 | 0.54 | 0.03 | 0.39 | 0.68 | | *teameeffec~x* | 9444 | 0.51 | 0.03 | 0.33 | 0.64 | | *teamorebx* | 9444 | 24.29 | 3.84 | 7.32 | 46.15 | | *teamdrebx* | 9444 | 75.71 | 3.23 | 53.85 | 92.50 | | *teamto~overx* | 9444 | 13.29 | 1.55 | 7.28 | 22.43 | | *v42* | 9444 | 8.11 | 1.35 | 3.11 | 15.90 | | *v43* | 9444 | 5.13 | 1.25 | 0.00 | 17.86 | | *teamblkrx* | 9444 | 8.28 | 2.12 | 0.00 | 29.43 | | *teamppspoi~x* | 9444 | 1.22 | 0.07 | 0.85 | 1.51 | | *teamficflo~x* | 9444 | 75.92 | 8.38 | 29.75 | 115.75 | | *teamfic40p~x* | 9444 | 62.82 | 6.97 | 24.69 | 96.46 | | *teamortgof~s* | 9444 | 106.87 | 5.39 | 75.25 | 128.20 | | *teamdrtgde~s* | 9444 | 106.78 | 4.94 | 75.25 | 130.60 | | *teamediffe~x* | 9444 | 0.09 | 6.79 | -48.14 | 48.14 | | *teamplayx* | 9444 | 0.43 | 0.02 | 0.27 | 0.53 | | *teamarx* | 9444 | 16.93 | 1.62 | 7.59 | 24.24 | | *teamasttox* | 9444 | 1.68 | 0.31 | 0.48 | 3.45 | | *teamstltox* | 9444 | 57.86 | 12.02 | 15.79 | 145.45 | | *pointspr~10x* | 9444 | 0.08 | 6.49 | -48.00 | 48.00 | | *teamminy* | 9444 | 241.80 | 2.63 | 238.00 | 265.00 | | *teamdayoffy* | 9444 | 1.90 | 0.41 | 0.00 | 3.10 | | *teamptsy* | 9444 | 102.07 | 6.50 | 75.00 | 140.00 | | *teamasty* | 9444 | 22.27 | 2.55 | 10.00 | 36.00 | | *teamtoturn~y* | 9444 | 14.47 | 1.78 | 8.00 | 27.00 | | *teamstly* | 9444 | 7.77 | 1.33 | 3.00 | 16.00 | | *teamblky* | 9444 | 4.90 | 1.21 | 0.00 | 18.00 | | *teampfpers~y* | 9444 | 20.28 | 2.13 | 13.00 | 32.00 | | *teamfgay* | 9444 | 84.09 | 3.63 | 70.00 | 107.00 | | *teamfgmy* | 9444 | 38.11 | 2.42 | 24.00 | 53.00 | | *teamfgy* | 9444 | 0.45 | 0.02 | 0.31 | 0.57 | | *team2pay* | 9444 | 60.26 | 5.28 | 37.10 | 84.00 | | *team2pmy* | 9444 | 29.62 | 2.51 | 19.00 | 44.00 | | *team2py* | 9444 | 0.49 | 0.03 | 0.31 | 0.65 | | *team3pay* | 9444 | 23.83 | 5.33 | 9.00 | 48.00 | | *team3pmy* | 9444 | 8.48 | 2.21 | 0.00 | 18.00 | | *team3py* | 9444 | 0.35 | 0.04 | 0.00 | 0.59 | | *teamftay* | 9444 | 22.89 | 3.51 | 10.00 | 50.00 | | *teamftmy* | 9444 | 17.38 | 2.75 | 5.00 | 34.00 | | *teamfty* | 9444 | 0.76 | 0.05 | 0.39 | 1.00 | | *teamorby* | 9444 | 10.58 | 1.86 | 3.00 | 26.00 | | *teamdrby* | 9444 | 32.63 | 2.48 | 21.00 | 47.00 | | *teamtrby* | 9444 | 43.20 | 2.93 | 31.00 | 62.00 | | *teampts1y* | 9444 | 25.55 | 2.47 | 10.00 | 43.00 | | *teampts2y* | 9444 | 25.57 | 2.44 | 7.00 | 37.00 | | *teampts3y* | 9444 | 25.21 | 2.43 | 14.00 | 41.00 | | *teampts4y* | 9444 | 25.01 | 2.33 | 12.50 | 41.00 | | *teampts5y* | 9444 | 0.61 | 0.90 | 0.00 | 15.00 | | *teampts6y* | 9444 | 0.09 | 0.33 | 0.00 | 6.50 | | *teampts7y* | 9444 | 0.01 | 0.12 | 0.00 | 1.70 | | *teampts8y* | 9444 | 0.00 | 0.08 | 0.00 | 2.00 | | *teamtreby* | 9444 | 50.00 | 2.32 | 36.67 | 63.33 | | *teamassty* | 9444 | 58.35 | 5.11 | 35.14 | 81.58 | | *teamtsy* | 9444 | 0.54 | 0.03 | 0.39 | 0.68 | | *teameeffec~y* | 9444 | 0.50 | 0.03 | 0.33 | 0.64 | | *teamoreby* | 9444 | 24.28 | 3.84 | 7.89 | 46.15 | | *teamdreby* | 9444 | 75.73 | 3.23 | 53.85 | 92.68 | | *v93* | 9444 | 13.31 | 1.56 | 7.28 | 23.24 | | *v94* | 9444 | 8.11 | 1.35 | 2.94 | 16.11 | | *v95* | 9444 | 5.13 | 1.27 | 0.00 | 18.66 | | *teamblkry* | 9444 | 8.27 | 2.14 | 0.00 | 33.33 | | *teamppspoi~y* | 9444 | 1.22 | 0.07 | 0.85 | 1.53 | | *teamficflo~y* | 9444 | 75.80 | 8.33 | 29.75 | 115.75 | | *teamfic40p~y* | 9444 | 62.72 | 6.92 | 24.69 | 96.46 | | *v100* | 9444 | 106.74 | 5.36 | 75.25 | 130.60 | | *v101* | 9444 | 106.80 | 4.95 | 75.25 | 128.20 | | *teamediffe~y* | 9444 | -0.05 | 6.75 | -48.14 | 48.14 | | *teamplayy* | 9444 | 0.43 | 0.02 | 0.27 | 0.52 | | *teamary* | 9444 | 16.93 | 1.61 | 8.14 | 24.24 | | *teamasttoy* | 9444 | 1.68 | 0.31 | 0.48 | 3.45 | | *teamstltoy* | 9444 | 57.82 | 12.09 | 15.79 | 155.56 | | *pointspr~10y* | 9444 | -0.05 | 6.46 | -48.00 | 48.00 | | *pointsprea~g* | 9444 | 0.14 | 13.63 | -61.00 | 61.00 | | *pointsprea~5* | 9444 | 0.11 | 7.82 | -27.80 | 28.80 | | Note: This table reports the summary statistics for original train dataset from season 2013 to season 2018 where numbers of observations, mean, standard deviation, maximum, and minimum values are shown.  All variables in this table are defined in Appendix E. | | | | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **TABLE 3**  **Summary Statistics for Original Validation Dataset** | | | | | | | **Variable** | **Obs** | **Mean** | **Std.Dev.** | **Min** | **Max** | | *v1* | 2362 | 7325.67 | 4260.84 | 4.00 | 14751.00 | | *pointspread* | 2362 | -0.46 | 14.01 | -49.00 | 49.00 | | *teamlocx* | 2362 | 0.49 | 0.50 | 0.00 | 1.00 | | *teamdayoff* | 2362 | 1.94 | 1.10 | 0.00 | 10.00 | | *teamminx* | 2362 | 48.36 | 0.52 | 47.71 | 51.50 | | *teamptsx* | 2362 | 102.11 | 6.50 | 79.00 | 140.00 | | *teamastx* | 2362 | 22.25 | 2.54 | 13.50 | 32.80 | | *teamto~pverx* | 2362 | 14.50 | 1.77 | 8.00 | 24.00 | | *teamstlx* | 2362 | 7.79 | 1.35 | 2.00 | 16.00 | | *teamblkx* | 2362 | 4.88 | 1.19 | 0.00 | 11.00 | | *teampfpers~x* | 2362 | 20.31 | 2.13 | 14.00 | 30.00 | | *teamfgax* | 2362 | 84.05 | 3.58 | 71.00 | 102.00 | | *teamfgmx* | 2362 | 38.11 | 2.38 | 29.00 | 53.00 | | *teamfgx* | 2362 | 0.45 | 0.02 | 0.36 | 0.57 | | *team2pax* | 2362 | 60.17 | 5.19 | 37.50 | 77.33 | | *team2pmx* | 2362 | 29.60 | 2.46 | 17.00 | 44.00 | | *team2px* | 2362 | 0.49 | 0.03 | 0.35 | 0.65 | | *team3pax* | 2362 | 23.88 | 5.31 | 9.00 | 45.70 | | *team3pmx* | 2362 | 8.51 | 2.19 | 2.00 | 19.00 | | *team3px* | 2362 | 0.35 | 0.04 | 0.17 | 0.60 | | *teamftax* | 2362 | 22.87 | 3.54 | 12.00 | 39.13 | | *teamftmx* | 2362 | 17.39 | 2.80 | 10.00 | 32.00 | | *teamftx* | 2362 | 0.76 | 0.05 | 0.52 | 0.95 | | *teamorbx* | 2362 | 10.53 | 1.86 | 2.00 | 21.00 | | *teamdrbx* | 2362 | 32.61 | 2.51 | 21.00 | 42.33 | | *teamtrbx* | 2362 | 43.14 | 2.96 | 31.00 | 55.00 | | *teampts1x* | 2362 | 25.58 | 2.48 | 15.00 | 37.33 | | *teampts2x* | 2362 | 25.62 | 2.42 | 13.00 | 36.00 | | *teampts3x* | 2362 | 25.23 | 2.43 | 16.00 | 41.00 | | *teampts4x* | 2362 | 24.97 | 2.36 | 14.00 | 34.00 | | *teampts5x* | 2362 | 0.62 | 0.92 | 0.00 | 8.50 | | *teampts6x* | 2362 | 0.08 | 0.31 | 0.00 | 2.40 | | *teampts7x* | 2362 | 0.02 | 0.14 | 0.00 | 1.70 | | *teampts8x* | 2362 | 0.00 | 0.03 | 0.00 | 1.70 | | *teamtrebx* | 2362 | 49.96 | 2.36 | 38.30 | 61.11 | | *teamasstx* | 2362 | 58.31 | 5.16 | 39.47 | 75.80 | | *teamtsx* | 2362 | 0.54 | 0.03 | 0.43 | 0.67 | | *teameeffec~x* | 2362 | 0.51 | 0.03 | 0.39 | 0.64 | | *teamorebx* | 2362 | 24.19 | 3.82 | 5.88 | 43.75 | | *teamdrebx* | 2362 | 75.71 | 3.18 | 55.77 | 87.50 | | *teamto~overx* | 2362 | 13.34 | 1.54 | 7.46 | 23.24 | | *v42* | 2362 | 8.12 | 1.36 | 1.99 | 16.11 | | *v43* | 2362 | 5.11 | 1.25 | 0.00 | 11.64 | | *teamblkrx* | 2362 | 8.25 | 2.07 | 0.00 | 16.67 | | *teamppspoi~x* | 2362 | 1.22 | 0.07 | 0.94 | 1.53 | | *teamficflo~x* | 2362 | 75.75 | 8.30 | 39.13 | 113.75 | | *teamfic40p~x* | 2362 | 62.68 | 6.89 | 32.60 | 94.79 | | *teamortgof~s* | 2362 | 106.75 | 5.36 | 81.54 | 130.60 | | *teamdrtgde~s* | 2362 | 106.83 | 4.95 | 87.31 | 125.92 | | *teamediffe~x* | 2362 | -0.08 | 6.73 | -28.89 | 33.31 | | *teamplayx* | 2362 | 0.43 | 0.02 | 0.34 | 0.52 | | *teamarx* | 2362 | 16.92 | 1.61 | 10.69 | 22.61 | | *teamasttox* | 2362 | 1.68 | 0.31 | 0.79 | 3.13 | | *teamstltox* | 2362 | 57.75 | 11.85 | 14.29 | 105.98 | | *pointspr~10x* | 2362 | -0.08 | 6.43 | -29.00 | 33.00 | | *teamminy* | 2362 | 241.77 | 2.54 | 238.80 | 257.50 | | *teamdayoffy* | 2362 | 1.89 | 0.40 | 0.00 | 3.20 | | *teamptsy* | 2362 | 102.35 | 6.64 | 85.00 | 131.00 | | *teamasty* | 2362 | 22.29 | 2.64 | 9.00 | 33.30 | | *teamtoturn~y* | 2362 | 14.44 | 1.78 | 8.00 | 22.14 | | *teamstly* | 2362 | 7.73 | 1.34 | 2.00 | 16.00 | | *teamblky* | 2362 | 4.89 | 1.16 | 1.00 | 11.00 | | *teampfpers~y* | 2362 | 20.31 | 2.10 | 14.20 | 29.50 | | *teamfgay* | 2362 | 84.05 | 3.72 | 66.00 | 102.00 | | *teamfgmy* | 2362 | 38.16 | 2.46 | 30.00 | 49.00 | | *teamfgy* | 2362 | 0.46 | 0.02 | 0.35 | 0.56 | | *team2pay* | 2362 | 60.13 | 5.50 | 36.70 | 81.00 | | *team2pmy* | 2362 | 29.62 | 2.58 | 20.25 | 43.00 | | *team2py* | 2362 | 0.50 | 0.03 | 0.39 | 0.63 | | *team3pay* | 2362 | 23.92 | 5.44 | 10.90 | 45.20 | | *team3pmy* | 2362 | 8.54 | 2.26 | 3.00 | 17.90 | | *team3py* | 2362 | 0.35 | 0.04 | 0.20 | 0.50 | | *teamftay* | 2362 | 23.04 | 3.58 | 12.20 | 46.00 | | *teamftmy* | 2362 | 17.50 | 2.81 | 8.40 | 32.00 | | *teamfty* | 2362 | 0.76 | 0.04 | 0.61 | 0.93 | | *teamorby* | 2362 | 10.57 | 1.83 | 4.00 | 17.50 | | *teamdrby* | 2362 | 32.58 | 2.45 | 24.20 | 42.00 | | *teamtrby* | 2362 | 43.16 | 2.91 | 33.00 | 53.40 | | *teampts1y* | 2362 | 25.67 | 2.52 | 15.50 | 37.33 | | *teampts2y* | 2362 | 25.67 | 2.54 | 11.00 | 36.00 | | *teampts3y* | 2362 | 25.28 | 2.52 | 15.67 | 37.00 | | *teampts4y* | 2362 | 25.01 | 2.34 | 14.67 | 35.00 | | *teampts5y* | 2362 | 0.60 | 0.87 | 0.00 | 6.50 | | *teampts6y* | 2362 | 0.09 | 0.33 | 0.00 | 3.33 | | *teampts7y* | 2362 | 0.01 | 0.11 | 0.00 | 1.88 | | *teampts8y* | 2362 | 0.01 | 0.10 | 0.00 | 2.00 | | *teamtreby* | 2362 | 50.02 | 2.29 | 38.89 | 58.63 | | *teamassty* | 2362 | 58.31 | 5.26 | 27.27 | 75.16 | | *teamtsy* | 2362 | 0.54 | 0.03 | 0.45 | 0.64 | | *teameeffec~y* | 2362 | 0.51 | 0.03 | 0.39 | 0.61 | | *teamoreby* | 2362 | 24.30 | 3.72 | 10.26 | 37.90 | | *teamdreby* | 2362 | 75.77 | 3.28 | 56.25 | 94.12 | | *v93* | 2362 | 13.29 | 1.59 | 6.71 | 21.89 | | *v94* | 2362 | 8.06 | 1.37 | 1.99 | 15.90 | | *v95* | 2362 | 5.12 | 1.22 | 1.08 | 11.64 | | *teamblkry* | 2362 | 8.28 | 2.04 | 1.67 | 16.54 | | *teamppspoi~y* | 2362 | 1.22 | 0.07 | 1.01 | 1.45 | | *teamficflo~y* | 2362 | 75.99 | 8.49 | 44.25 | 107.43 | | *teamfic40p~y* | 2362 | 62.88 | 7.06 | 36.88 | 89.36 | | *v100* | 2362 | 107.04 | 5.40 | 89.23 | 126.40 | | *v101* | 2362 | 106.91 | 4.97 | 81.54 | 130.60 | | *teamediffe~y* | 2362 | 0.13 | 6.91 | -29.36 | 28.89 | | *teamplayy* | 2362 | 0.43 | 0.02 | 0.34 | 0.53 | | *teamary* | 2362 | 16.94 | 1.66 | 7.59 | 23.01 | | *teamasttoy* | 2362 | 1.68 | 0.31 | 0.64 | 3.00 | | *teamstltoy* | 2362 | 57.55 | 12.01 | 14.29 | 125.00 | | *pointspr~10y* | 2362 | 0.13 | 6.60 | -29.00 | 29.00 | | *pointsprea~g* | 2362 | -0.25 | 13.60 | -49.00 | 49.00 | | *pointsprea~5* | 2362 | -0.32 | 7.61 | -22.60 | 24.40 | | Note: This table reports the summary statistics for original validation dataset from season 2013 to season 2018 where numbers of observations, mean, standard deviation, maximum, and minimum values are shown.  All variables in this table are defined in Appendix E. | | | | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **TABLE 4**  **Summary Statistics for Original Test Dataset** | | | | | | | | | **Variable** | **Obs** | **Mean** | **Std.Dev.** | **Min** | **Max** | | *v1* | 2952 | 7449.93 | 4258.51 | 9.00 | 14757.00 | | *pointspread* | 2952 | -0.36 | 13.95 | -51.00 | 51.00 | | *teamlocx* | 2952 | 0.52 | 0.50 | 0.00 | 1.00 | | *teamdayoff* | 2952 | 1.96 | 1.13 | 0.00 | 11.00 | | *teamminx* | 2952 | 48.36 | 0.50 | 47.50 | 51.50 | | *teamptsx* | 2952 | 102.08 | 6.51 | 82.00 | 125.00 | | *teamastx* | 2952 | 22.31 | 2.62 | 12.00 | 34.00 | | *teamto~pverx* | 2952 | 14.52 | 1.78 | 8.00 | 26.00 | | *teamstlx* | 2952 | 7.72 | 1.31 | 3.00 | 14.00 | | *teamblkx* | 2952 | 4.90 | 1.20 | 0.00 | 18.00 | | *teampfpers~x* | 2952 | 20.29 | 2.15 | 13.00 | 31.50 | | *teamfgax* | 2952 | 84.02 | 3.60 | 66.00 | 107.00 | | *teamfgmx* | 2952 | 38.10 | 2.42 | 30.20 | 46.90 | | *teamfgx* | 2952 | 0.45 | 0.02 | 0.37 | 0.55 | | *team2pax* | 2952 | 60.09 | 5.22 | 39.30 | 78.00 | | *team2pmx* | 2952 | 29.54 | 2.50 | 19.67 | 40.00 | | *team2px* | 2952 | 0.49 | 0.03 | 0.40 | 0.59 | | *team3pax* | 2952 | 23.94 | 5.26 | 11.00 | 45.40 | | *team3pmx* | 2952 | 8.56 | 2.18 | 2.67 | 17.50 | | *team3px* | 2952 | 0.36 | 0.04 | 0.17 | 0.56 | | *teamftax* | 2952 | 22.80 | 3.50 | 12.00 | 46.00 | | *teamftmx* | 2952 | 17.32 | 2.75 | 8.00 | 32.67 | | *teamftx* | 2952 | 0.76 | 0.05 | 0.53 | 1.00 | | *teamorbx* | 2952 | 10.56 | 1.80 | 6.00 | 17.00 | | *teamdrbx* | 2952 | 32.63 | 2.48 | 19.00 | 42.50 | | *teamtrbx* | 2952 | 43.19 | 2.91 | 31.00 | 59.00 | | *teampts1x* | 2952 | 25.60 | 2.47 | 17.00 | 36.30 | | *teampts2x* | 2952 | 25.55 | 2.47 | 7.00 | 36.00 | | *teampts3x* | 2952 | 25.21 | 2.44 | 15.00 | 39.00 | | *teampts4x* | 2952 | 25.01 | 2.28 | 12.50 | 37.00 | | *teampts5x* | 2952 | 0.60 | 0.86 | 0.00 | 6.50 | | *teampts6x* | 2952 | 0.09 | 0.31 | 0.00 | 2.30 | | *teampts7x* | 2952 | 0.01 | 0.13 | 0.00 | 1.88 | | *teampts8x* | 2952 | 0.00 | 0.07 | 0.00 | 2.00 | | *teamtrebx* | 2952 | 50.05 | 2.31 | 40.40 | 59.34 | | *teamasstx* | 2952 | 58.46 | 5.19 | 32.43 | 75.71 | | *teamtsx* | 2952 | 0.54 | 0.03 | 0.41 | 0.66 | | *teameeffec~x* | 2952 | 0.51 | 0.03 | 0.40 | 0.65 | | *teamorebx* | 2952 | 24.30 | 3.74 | 13.95 | 37.73 | | *teamdrebx* | 2952 | 75.81 | 3.21 | 57.78 | 94.12 | | *teamto~overx* | 2952 | 13.37 | 1.56 | 6.71 | 22.85 | | *v42* | 2952 | 8.05 | 1.33 | 2.99 | 14.14 | | *v43* | 2952 | 5.13 | 1.26 | 0.00 | 18.66 | | *teamblkrx* | 2952 | 8.30 | 2.15 | 0.00 | 33.33 | | *teamppspoi~x* | 2952 | 1.22 | 0.07 | 0.87 | 1.45 | | *teamficflo~x* | 2952 | 75.81 | 8.42 | 42.75 | 114.63 | | *teamfic40p~x* | 2952 | 62.73 | 6.99 | 35.63 | 95.52 | | *teamortgof~s* | 2952 | 106.78 | 5.33 | 83.53 | 125.67 | | *teamdrtgde~s* | 2952 | 106.94 | 4.89 | 86.05 | 122.11 | | *teamediffe~x* | 2952 | -0.15 | 6.65 | -24.91 | 30.08 | | *teamplayx* | 2952 | 0.43 | 0.02 | 0.34 | 0.52 | | *teamarx* | 2952 | 16.96 | 1.64 | 9.14 | 23.43 | | *teamasttox* | 2952 | 1.68 | 0.31 | 0.50 | 2.95 | | *teamstltox* | 2952 | 57.24 | 11.93 | 15.79 | 155.56 | | *pointspr~10x* | 2952 | -0.14 | 6.37 | -25.00 | 31.00 | | *teamminy* | 2952 | 241.74 | 2.55 | 237.50 | 265.00 | | *teamdayoffy* | 2952 | 1.89 | 0.41 | 0.00 | 2.90 | | *teamptsy* | 2952 | 102.26 | 6.58 | 82.00 | 123.30 | | *teamasty* | 2952 | 22.32 | 2.60 | 13.50 | 33.80 | | *teamtoturn~y* | 2952 | 14.48 | 1.75 | 8.00 | 21.50 | | *teamstly* | 2952 | 7.76 | 1.33 | 3.00 | 14.00 | | *teamblky* | 2952 | 4.90 | 1.16 | 0.00 | 12.00 | | *teampfpers~y* | 2952 | 20.27 | 2.09 | 14.00 | 31.00 | | *teamfgay* | 2952 | 83.99 | 3.51 | 71.00 | 100.00 | | *teamfgmy* | 2952 | 38.13 | 2.41 | 29.00 | 46.90 | | *teamfgy* | 2952 | 0.46 | 0.02 | 0.36 | 0.55 | | *team2pay* | 2952 | 60.03 | 5.43 | 36.40 | 80.00 | | *team2pmy* | 2952 | 29.56 | 2.51 | 17.00 | 40.00 | | *team2py* | 2952 | 0.50 | 0.03 | 0.35 | 0.64 | | *team3pay* | 2952 | 23.96 | 5.54 | 10.00 | 45.70 | | *team3pmy* | 2952 | 8.57 | 2.29 | 2.00 | 19.00 | | *team3py* | 2952 | 0.36 | 0.04 | 0.12 | 0.68 | | *teamftay* | 2952 | 22.92 | 3.54 | 10.00 | 40.00 | | *teamftmy* | 2952 | 17.43 | 2.81 | 6.00 | 32.60 | | *teamfty* | 2952 | 0.76 | 0.05 | 0.52 | 1.00 | | *teamorby* | 2952 | 10.53 | 1.86 | 2.00 | 23.00 | | *teamdrby* | 2952 | 32.59 | 2.49 | 19.00 | 46.00 | | *teamtrby* | 2952 | 43.12 | 2.98 | 30.00 | 59.50 | | *teampts1y* | 2952 | 25.63 | 2.56 | 17.00 | 38.00 | | *teampts2y* | 2952 | 25.69 | 2.37 | 15.00 | 33.10 | | *teampts3y* | 2952 | 25.25 | 2.40 | 12.00 | 39.00 | | *teampts4y* | 2952 | 24.97 | 2.30 | 12.00 | 36.00 | | *teampts5y* | 2952 | 0.59 | 0.91 | 0.00 | 17.00 | | *teampts6y* | 2952 | 0.09 | 0.33 | 0.00 | 2.50 | | *teampts7y* | 2952 | 0.01 | 0.12 | 0.00 | 1.70 | | *teampts8y* | 2952 | 0.00 | 0.06 | 0.00 | 1.70 | | *teamtreby* | 2952 | 49.99 | 2.35 | 40.00 | 60.30 | | *teamassty* | 2952 | 58.45 | 5.22 | 36.75 | 79.49 | | *teamtsy* | 2952 | 0.54 | 0.03 | 0.42 | 0.67 | | *teameeffec~y* | 2952 | 0.51 | 0.03 | 0.38 | 0.65 | | *teamoreby* | 2952 | 24.23 | 3.82 | 5.88 | 42.22 | | *teamdreby* | 2952 | 75.72 | 3.14 | 57.14 | 90.19 | | *v93* | 2952 | 13.33 | 1.51 | 7.35 | 19.60 | | *v94* | 2952 | 8.09 | 1.35 | 3.11 | 13.92 | | *v95* | 2952 | 5.13 | 1.21 | 0.00 | 12.66 | | *teamblkry* | 2952 | 8.32 | 2.11 | 0.00 | 22.22 | | *teamppspoi~y* | 2952 | 1.22 | 0.07 | 0.92 | 1.51 | | *teamficflo~y* | 2952 | 76.01 | 8.42 | 47.00 | 111.07 | | *teamfic40p~y* | 2952 | 62.91 | 7.00 | 39.17 | 91.34 | | *v100* | 2952 | 106.95 | 5.40 | 86.05 | 125.88 | | *v101* | 2952 | 106.83 | 4.84 | 83.53 | 121.74 | | *teamediffe~y* | 2952 | 0.13 | 6.63 | -30.34 | 24.63 | | *teamplayy* | 2952 | 0.43 | 0.02 | 0.33 | 0.52 | | *teamary* | 2952 | 16.97 | 1.64 | 9.90 | 23.33 | | *teamasttoy* | 2952 | 1.68 | 0.30 | 0.72 | 2.98 | | *teamstltoy* | 2952 | 57.55 | 11.58 | 20.00 | 120.00 | | *pointspr~10y* | 2952 | 0.12 | 6.35 | -30.67 | 25.00 | | *pointsprea~g* | 2952 | -0.21 | 13.46 | -51.00 | 48.00 | | *pointsprea~5* | 2952 | -0.09 | 7.91 | -28.80 | 28.40 | | Note: This table reports the summary statistics for original test dataset from season 2013 to season 2018 where numbers of observations, mean, standard deviation, maximum, and minimum values are shown.  All variables in this table are defined in Appendix E. | | | | | | | | | | | |

**C Results for All Models**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Results for All Models and Comparison between Linear Regressions and Machine Learning Algorithms and Prior Literature Variables** | | | | | | | | | | | | | | |
| **Panel A: Results for Linear Regression** | | | | | | | | | | | | | |  |
| **Target Training Parameter** | **Datasets** | **MAE** | | | | | **RMSE** | | | | **Explained Variance** | | | |
| **Accuracy Measures** |  | **Explained Variance** | **Max Error** | | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** |
| **Normalization** | **All Features** | 0.12 | 51.82 | | 10.94 | -0.02 | 0.12 | 51.82 | 10.94 | -0.02 | 0.12 | 51.82 | 10.94 | -0.02 |
| **Feature Selected** | - | + | | + | - | - | + | + | - | - | + | + | - |
| **PCA** | 0.14 | 51.22 | | 13.07 | -0.39 | 0.14 | 51.22 | 13.07 | -0.39 | 0.14 | 51.22 | 13.07 | -0.39 |
| **Standardization** | **All Features** | 0.13 | 56.72 | | 9.97 | 0.13 | 0.13 | 56.72 | 9.97 | 0.13 | 0.13 | 56.72 | 9.97 | 0.13 |
| **Feature Selected** | - | + | | + | - | - | + | + | - | - | + | + | - |
| **PCA** | 0.17 | 55.10 | | 9.77 | 0.16 | 0.17 | 55.10 | 9.77 | 0.16 | 0.17 | 55.10 | 9.77 | 0.16 |
| **Panel B: Results for Decision Tree** | | | | | | | | | | | | | | |
| **Target Training Parameter** | **Datasets** | **MAE** | | | | | **RMSE** | | | | **Explained Variance** | | | |
| **Accuracy Measures** |  | **Explained Variance** | | **Max Error** | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** |
| **Normalization** | **All Features** | 0.10 | 50.69 | | 12.00 | -0.21 | 0.10 | 50.69 | 12.00 | -0.21 | 0.10 | 50.69 | 12.00 | -0.21 |
| **Feature Selected** | 0.10 | 50.69 | | 12.00 | -0.21 | 0.10 | 50.69 | 12.00 | -0.21 | 0.10 | 50.69 | 12.00 | -0.21 |
| **PCA** | 0.08 | 52.67 | | 12.20 | -0.26 | 0.08 | 52.67 | 12.20 | -0.26 | 0.08 | 52.67 | 12.20 | -0.26 |
| **Standardization** | **All Features** | 0.14 | 55.60 | | 9.88 | 0.14 | 0.13 | 54.13 | 9.98 | 0.13 | 0.14 | 55.60 | 9.88 | 0.14 |
| **Feature Selected** | 0.14 | 55.60 | | 9.88 | 0.14 | 0.14 | 55.60 | 9.88 | 0.14 | 0.14 | 55.60 | 9.88 | 0.14 |
| **PCA** | 0.10 | 55.07 | | 10.08 | 0.10 | 0.10 | 55.07 | 10.08 | 0.10 | 0.10 | 55.07 | 10.08 | 0.10 |
| **Prior Literature** | **All** | 0.08 | 67.52 | | 10.64 | 0.08 |  |  |  |  |  |  |  |  |
| **Panel C: Results for Random Forest** | | | | | | | | | | | | | | |
| **Target Training Parameter** | **Datasets** | **MAE** | | | | | **RMSE** | | | | **Explained Variance** | | | |
| **Accuracy Measures** |  | **Explained Variance** | **Max Error** | | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** |
| **Normalization** | **All Features** | 0.14 | 50.77 | | 11.07 | -0.06 | 0.15 | 50.02 | 11.10 | -0.06 | 0.14 | 51.20 | 11.13 | -0.07 |
| **Feature Selected** | 0.07 | 53.68 | | 10.89 | -0.05 | 0.07 | 54.30 | 10.70 | -0.01 | 0.07 | 54.29 | 10.72 | -0.02 |
| **PCA** | 0.07 | 54.24 | | 11.41 | -0.14 | 0.07 | 54.01 | 11.42 | -0.14 | 0.07 | 54.12 | 11.36 | -0.13 |
| **Standardization** | **All Features** | 0.16 | 54.11 | | 9.77 | 0.16 | 0.16 | 54.86 | 9.77 | 0.16 | 0.16 | 54.20 | 9.75 | 0.16 |
| **Feature Selected** | 0.16 | 55.42 | | 9.74 | 0.15 | 0.15 | 55.35 | 9.77 | 0.15 | 0.13 | 59.79 | 9.91 | 0.13 |
| **PCA** | 0.11 | 54.95 | | 10.08 | 0.11 | 0.11 | 54.99 | 10.06 | 0.11 | 0.11 | 54.77 | 10.07 | 0.11 |
| **Prior Literature** | **All** | 0.12 | 61.38 | | 10.19 | 0.12 |  |  |  |  |  |  |  |  |
| **Panel D: Results for XGBoost** | | | | | | | | | | | | | | |
| **Target Training Parameter** | **Datasets** | **MAE** | | | | | **RMSE** | | | | **Explained Variance** | | | |
| **Accuracy Measures** |  | **Explained Variance** | **Max Error** | | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** |
| **Normalization** | **All Features** | 0.15 | 51.01 | | 10.64 | 0.02 | 0.14 | 52.74 | 10.57 | 0.03 | 0.15 | 50.84 | 10.64 | 0.02 |
| **Feature Selected** | 0.14 | 54.03 | | 10.47 | 0.04 | 0.16 | 51.62 | 10.32 | 0.07 | 0.14 | 49.91 | 10.44 | 0.04 |
| **PCA** | 0.13 | 52.69 | | 11.58 | -0.14 | 0.12 | 52.76 | 11.69 | -0.17 | 0.14 | 54.66 | 13.36 | -0.43 |
| **Standardization** | **All Features** | 0.15 | 53.87 | | 9.84 | 0.15 | 0.17 | 54.28 | 9.71 | 0.16 | 0.16 | 54.26 | 9.84 | 0.16 |
| **Feature Selected** | 0.15 | 55.79 | | 9.82 | 0.15 | 0.15 | 55.61 | 9.86 | 0.15 | 0.16 | 55.40 | 9.84 | 0.15 |
| **PCA** | 0.14 | 54.16 | | 9.93 | 0.14 | 0.16 | 53.79 | 9.86 | 0.15 | 0.14 | 51.89 | 10.27 | 0.08 |
| **Prior Literature** | **All** | 0.11 | 59.87 | | 10.19 | 0.11 |  |  |  |  |  |  |  |  |
| **Panel E: Results for Support Vector Machine** | | | | | | | | | | | | | | |
| **Target Training Parameter** | **Datasets** | **MAE** | | | | | **RMSE** | | | | **Explained Variance** | | | |
| **Accuracy Measures** |  | **Explained Variance** | **Max Error** | | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** |
| **Normalization** | **All Features** | 0.16 | 52.25 | | 10.24 | 0.08 | 0.16 | 52.25 | 10.24 | 0.08 | 0.16 | 52.25 | 10.24 | 0.08 |
| **Feature Selected** | 0.16 | 53.62 | | 10.11 | 0.10 | 0.16 | 53.62 | 10.11 | 0.10 | 0.16 | 53.62 | 10.11 | 0.10 |
| **PCA** | 0.12 | 53.17 | | 13.44 | -0.45 | 0.15 | 50.93 | 12.22 | -0.23 | 0.15 | 50.93 | 12.22 | -0.23 |
| **Standardization** | **All Features** | 0.17 | 55.81 | | 9.72 | 0.17 | 0.17 | 55.81 | 9.72 | 0.17 | 0.17 | 55.81 | 9.72 | 0.17 |
| **Feature Selected** | 0.17 | 56.83 | | 9.73 | 0.16 | 0.17 | 56.83 | 9.73 | 0.16 | 0.17 | 56.83 | 9.73 | 0.16 |
| **PCA** | 0.16 | 55.47 | | 9.77 | 0.16 | 0.16 | 55.47 | 9.77 | 0.16 | 0.16 | 55.47 | 9.77 | 0.16 |
| **Prior Literature** | **All** | 0.03 | 62.88 | | 11.13 | 0.03 |  |  |  |  |  |  |  |  |
| **Panel F: Results for Light GBM** | | | | | | | | | | | | | | |
| **Target Training Parameter** | **Datasets** | **MAE** | | | | | **RMSE** | | | | **Explained Variance** | | | |
| **Accuracy Measures** |  | **Explained Variance** | **Max Error** | | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** | **Explained Variance** | **Max Error** | **MAE** | **R2** |
| **Normalization** | **All Features** | 0.16 | 52.23 | | 10.40 | 0.06 | 0.15 | 51.95 | 10.31 | 0.07 | 0.15 | 51.95 | 10.31 | 0.07 |
| **Feature Selected** | 0.16 | 53.05 | | 10.38 | 0.06 | 0.15 | 52.03 | 10.41 | 0.05 | 0.15 | 52.03 | 10.41 | 0.05 |
| **PCA** | 0.12 | 52.55 | | 11.68 | -0.17 | 0.12 | 52.55 | 11.68 | -0.17 | 0.12 | 52.55 | 11.68 | -0.17 |
| **Standardization** | **All Features** | 0.16 | 55.52 | | 9.81 | 0.16 | 0.16 | 55.70 | 9.77 | 0.16 | 0.16 | 55.70 | 9.77 | 0.16 |
| **Feature Selected** | 0.15 | 58.65 | | 9.84 | 0.15 | 0.15 | 58.65 | 9.84 | 0.15 | 0.15 | 58.65 | 9.84 | 0.15 |
| **PCA** | 0.15 | 55.01 | | 9.83 | 0.15 | 0.15 | 55.01 | 9.83 | 0.15 | 0.15 | 55.01 | 9.83 | 0.15 |
| **Prior Literature** | **All** | 0.12 | 58.33 | | 11.78 | 0.12 |  |  |  |  |  |  |  |  |
| **Panel G: Results for Light DNN** | | | | | | | | | | | | | | |
| **Accuracy Measures** | **Datasets** | **Max Error** | **MAE** | | **RMSE** | **R2** |  |  |  |  |  |  |  |  |
| **Normalization** | **All Features** | 55.23 | 9.84 | | 12.61 | 0.15 |  |  |  |  |  |  |  |  |
| **Feature Selected** | 54.67 | 9.82 | | 12.61 | 0.15 |  |  |  |  |  |  |  |  |
| **PCA** | 56.10 | 9.86 | | 12.71 | 0.13 |  |  |  |  |  |  |  |  |
| **Prior Literature** | **All** | 59.32 | 10.32 | | 13.28 | 0.12 |  |  |  |  |  |  |  |  |
| Table 3 reports all models’ results and compares linear regressions and ML algorithms. Panel A reports the accuracy results for the linear regressions. Panel A reports the accuracy results for the DTR. Panel C reports the accuracy results for the RFR. Panel D reports the accuracy results for the XGBoost. Panel E reports the accuracy results for the SVM. Panel F reports the accuracy results for the LightGBM. Panel G reports the accuracy results for the DNN. “+” and “-” mean a very big positive or a very big negative number. | | | | | | | | | | | | | | |

**D Best Models’ Visualization**

**Tree Based Models (Decision Tree, Random Forest, XGBoost, and LightGBM)**



**Deep Neural Network**

**Diagram

Description automatically generated**

**Chart, radar chart

Description automatically generated**

**Chart, scatter chart

Description automatically generated**

**E Additional Tables and Figures**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TABLE A.1**  **Detail of the Characteristics** | | | | | | | | |
| **NO.** | **Acronym** | **Team Characteristics** | | **Calculation or Explanation** | | | | **Average Last 10 Games or Not** |
| 1 | *gmDate* | Game date | | the day that this game started on | | | | no |
| 2 | *teamAbbr* | Team name | |  | | | | no |
| 3 | *teamID* | Team ID number | |  | | | | no |
| 4 | *opptAbbr* | Opponent team name | |  | | | | no |
| 5 | *pointspread* | Point spread | | team's total points minus opponent’s total points | | | | no |
| 6 | *teamLoc.x* | Team location | | home or away based on where this game played | | | | no |
| 7 | *teamDayOff* | Team day off | | days team rested before the coming game | | | | no |
| 8 | *teamMin.x* | Team minutes | | how long the team played for one game | | | | yes |
| 9 | *teamPTS.x* | Team points | | number of points the team get for one game | | | | yes |
| 10 | *teamAST.x* | Team assists | | number of assists the team get for one game | | | | yes |
| 11 | *teamTO.turNOPver..x* | Team turnovers | | number of turnovers the team get for one game | | | | yes |
| 12 | *teamSTL.x* | Team steal | | number of steals the team get for one game | | | | yes |
| 13 | *teamBLK.x* | Team Block | | number of Blocks the team get for one game | | | | yes |
| 14 | *teamPF.personal.fouls..x* | Team personal fouls | | number of personal fouls the team get for a game | | | | yes |
| 15 | *teamFGA.x* | Team field goal attempts | | number of field goal attempts the team have | | | | yes |
| 16 | *teamFGM.x* | Team field goal makes | | number of field goal makes the team have | | | | yes |
| 17 | *teamFG..x* | Team field goal percentage | | team field goal makes/ team field goal attempts | | | | yes |
| 18 | *team2PA.x* | 2 points attempts | | number of 2 points attempts the team have | | | | yes |
| 19 | *team2PM.x* | 2 points makes | | number of 2 points makes the team have | | | | yes |
| 20 | *team2P..x* | 2 points percentage | | team 2 points makes/ team 2 points attempts | | | | yes |
| 21 | *team3PA.x* | 3 points attempts | | number of 3 points attempts the team have | | | | yes |
| 22 | *team3PM.x* | 3 points makes | | number of 3 points makes the team have | | | | yes |
| 23 | *team3P..x* | 3 points percentage | | team 3 points makes/ team 3 points attempts | | | | yes |
| 24 | *teamFTA.x* | Free throw attempts | | number of free throws attempts the team have | | | | yes |
| 25 | *teamFTM.x* | Free throw makes | | number of free throws makes the team have | | | | yes |
| 26 | *teamFT..x* | Free throw percentage | | team free throw makes/ team free throw attempts | | | | yes |
| 27 | *teamORB.x* | Offensive rebound | | number of rebounds the team get from opponent’s side | | | | yes |
| 28 | *teamDRB.x* | Defensive rebound | | number of rebounds the team get from their own side | | | | yes |
| 29 | *teamTRB.x* | Total rebound | | total number of rebounds | | | | yes |
| 30 | *teamPTS1.x* | Team points first quarter | |  | | | | yes |
| 31 | *teamPTS2.x* | Team points second quarter | |  | | | | yes |
| 32 | *teamPTS3.x* | Team points third quarter | |  | | | | yes |
| 33 | *teamPTS4.x* | Team points fourth quarter | |  | | | | yes |
| 34 | *teamPTS5.x* | Team points over time one | |  | | | | yes |
| 35 | *teamPTS6.x* | Team points over time two | |  | | | | yes |
| 36 | *teamPTS7.x* | Team points over time three | |  | | | | yes |
| 37 | *teamPTS8.x* | Team points over time four | |  | | | | yes |
| 38 | *teamTREB%.x* | Team total rebounds percentage | | teamTRB.x/(teamTRB.x + teamTRB.y) | | | | yes |
| 39 | *teamASST%.x* | Team assists percentage | | teamAST.x/(teamAST.x +teamAST.y) | | | | yes |
| 40 | *teamTS%.x* | Team Steal percentage | | teamSTL.x/(teamSTL.x + teamSTL.y) | | | | yes |
| 41 | *teamE.effective.FG%.x* | Effective field goal percentage | | (team2PM.x + 1.5\*team3PM.x) / teamFGA.x | | | | yes |
| 42 | *teamOREB%.x* | Offensive rebound percentage | | teamORB.x/(teamORB.x +teamDRB.y) | | | | yes |
| 43 | *teamDREB%.x* | Defensive rebound percentage | | teamDRB.x/(teamDRB.x +teamORB.y) | | | | yes |
| 44 | *teamTO(TurnOver)%.x* | Turnover percentage | | 100 \* team.TO.x/(team.FGA.x + 0.44\*team.FTA.x + team.TO.x) | | | | yes |
| 45 | *teamSTL%.x* | Steal percentage | | 100 \* (team.STL.x \* (teamMin.x / 5)) / (team.Min.x \* Possessions.y) | | | | yes |
| 46 | *teamBLK%.x* | team Block percentage | | 100 \* (team.BLK.x \* (teamMin.x / 5)) / (teamMin.x \* (team.FGA.y - team.3PA.y)) | | | | yes |
| 47 | *teamBLKR.x* | team Block ratio | | team.BLK.x/teamBLK.x + teamBLK.y | | | | yes |
| 48 | *teamPPS.points.per.shot..x* | points per shot | | (3\*team3PM.x + 2\*team2PM.x)/team.FGA.x | | | | yes |
| 49 | *teamFIC.floor.impact.counter..x* | floor impact counter | | (team.PTS.x + team.ORB.x + 0.75 team.DRB.x + team.AST.x + team.STL.x + team.BLK.x –0.75 team.FGA.x – 0.375 team.FTA.x – team.TO.x – 0.5 team.PF.x) | | | | yes |
| 50 | *teamFIC40.per.40.minuts..x* | floor impact counter per 40 minutes | | using 40 minutes data in a game to calcualte floor impact counter | | | | yes |
| 51 | *teamOrtg.offensive.rating.per.100.possesion..x* | offensive rating per 100 possession | | points scored per 100 possession | | | | yes |
| 52 | *teamDrtg(defensive.rating.per.100.possesion).x* | defensive rating per 100 possession | | points allowed per 100 possession | | | | yes |
| 53 | *teamEDiff(efficiency.difference).x* | efficiency difference | | teamOrtg.x -teamDrtg.x | | | | yes |
| 54 | *teamPlay%.x* | team play percentage | | time period that the team hold the ball | | | | yes |
| 55 | *teamAR.x* | average rebounds | | number of average rebounds | | | | yes |
| 56 | *teamAST/TO.x* | assist turnover ratio | | team.AST.x/team.TO.x | | | | yes |
| 57 | *teamSTL/TO.x* | steal turnover ratio | | team.STL.x/team.TO.x | | | | yes |
| 58 | *pointspread.l10.x* | point spread last 10 games | | the average number of the point spread last 10 games | | | | yes |
| 59 | *teamMin.y* | opponent minutes | | how long the opponent played for one game | | | | yes |
| 60 | *teamDayOff.y* | Team day off | | days opponent rested before the coming game | | | | yes |
| 61 | *teamPTS.y* | opponent points | | number of points the opponent get for one game | | | | yes |
| 62 | *teamAST.y* | opponent assists | | number of assists the opponent get for one game | | | | yes |
| 63 | *teamTO(TurnOver).y* | opponent turnovers | | number of turnovers the opponent get for one game | | | | yes |
| 64 | *teamSTL.y* | opponent steal | | number of steals the opponent get for one game | | | | yes |
| 65 | *teamBLK.y* | opponent Block | | number of Blocks the opponent get for one game | | | | yes |
| 66 | *teamPF(personal.fouls).y* | opponent personal fouls | | number of personal fouls the opponent get for a game | | | | yes |
| 67 | *teamFGA.y* | opponent field goal attempts | | number of field goal attempts the opponent have | | | | yes |
| 68 | *teamFGM.y* | opponent field goal makes | | number of field goal makes the opponent have | | | | yes |
| 69 | *teamFG..y* | opponent field goal percentage | | opponent field goal makes/ opponent field goal attempts | | | | yes |
| 70 | *team2PA.y* | 2 points attempts | | number of 2 points attempts the opponent have | | | | yes |
| 71 | *team2PM.y* | 2 points makes | | number of 2 points makes the opponent have | | | | yes |
| 72 | *team2P..y* | 2 points percentage | | opponent 2 points makes/ opponent 2 points attempts | | | | yes |
| 73 | *team3PA.y* | 3 points attempts | | number of 3 points attempts the opponent have | | | | yes |
| 74 | *team3PM.y* | 3 points makes | | number of 3 points makes the opponent have | | | | yes |
| 75 | *team3P..y* | 3 points percentage | | opponent 3 points makes/ opponent 3 points attempts | | | | yes |
| 76 | *teamFTA.y* | Free throw attempts | | number of free throws attempts the opponent have | | | | yes |
| 77 | *teamFTM.y* | Free throw makes | | number of free throws makes the opponent have | | | | yes |
| 78 | *teamFT..y* | Free throw percentage | | opponent free throw makes/ opponent free throw attempts | | | | yes |
| 79 | *teamORB.y* | Offensive rebound | | number of rebounds the opponent get from opponent’s side | | | | yes |
| 80 | *teamDRB.y* | Defensive rebound | | number of rebounds the opponent get from their own side | | | | yes |
| 81 | *teamTRB.y* | Total rebound | | total number of rebounds | | | | yes |
| 82 | *teamPTS1.y* | Team points first quarter | |  | | | | yes |
| 83 | *teamPTS2.y* | Team points second quarter | |  | | | | yes |
| 84 | *teamPTS3.y* | Team points third quarter | |  | | | | yes |
| 85 | *teamPTS4.y* | Team points fourth quarter | |  | | | | yes |
| 86 | *teamPTS5.y* | Team points over time one | |  | | | | yes |
| 87 | *teamPTS6.y* | Team points over time two | |  | | | | yes |
| 88 | *teamPTS7.y* | Team points over time three | |  | | | | yes |
| 89 | *teamPTS8.y* | Team points over time four | |  | | | | yes |
| 90 | *teamTREB%.y* | Team total rebounds percentage | | teamTRB.y/(teamTRB.y + teamTRB.y) | | | | yes |
| 91 | *teamASST%.y* | Team assists percentage | | teamAST.y/(teamAST.y +teamAST.y) | | | | yes |
| 92 | *teamTS%.y* | Team Steal percentage | | teamSTL.y/(teamSTL.y + teamSTL.y) | | | | yes |
|  | | |  | |  |  |  | |
| 93 | *teamE(effective)FG%.y* | Effective field goal percentage | | (team2PM.y + 1.5\*team3PM.y) / teamFGA.y | | | | yes |
| 94 | *teamOREB%.y* | Offensive rebound percentage | | teamORB.y/(teamORB.y +teamDRB.y) | | | | yes |
| 95 | *teamDREB%.y* | Defensive rebound percentage | | teamDRB.y/(teamDRB.y +teamORB.y) | | | | yes |
| 96 | *teamTO(turnOver)%.y* | Turnover percentage | | 100 \* team.TO.y/(team.FGA.y + 0.44\*team.FTA.y + team.TO.y) | | | | yes |
| 97 | *teamSTL%.y* | Steal percentage | | 100 \* (team.STL.y \* (teamMin.y / 5)) / (team.Min.y \* Possessions.y) | | | | yes |
| 98 | *teamBLK%.y* | team Block percentage | | 100 \* (team.BLK.y \* (teamMin.y / 5)) / (teamMin.y \* (team.FGA.y - team.3PA.y)) | | | | yes |
| 99 | *teamBLKR.y* | team Block ratio | | team.BLK.y/teamBLK.y + teamBLK.y | | | | yes |
| 100 | *teamPPS(points.per.shot).y* | points per shot | | (3\*team3PM.y + 2\*team2PM.y)/team.FGA.y | | | | yes |
| 101 | *teamFIC(floor.impact.counter).y* | floor impact counter | | (team.PTS.y + team.ORB.y + 0.75 team.DRB.y + team.AST.y + team.STL.y + team.BLK.y –0.75 team.FGA.y – 0.375 team.FTA.y – team.TO.y – 0.5 team.PF.y) | | | | yes |
| 102 | *teamFIC40(per.40.minuts).y* | floor impact counter per 40 minutes | | using 40 minutes data in a game to calculate floor impact counter | | | | yes |
| 103 | *teamOrtg(offensive.rating.per.100.possesion).y* | offensive rating per 100 possession | | points scored per 100 possession | | | | yes |
| 104 | *teamDrtg(defensive.rating.per.100.possesion).y* | defensive rating per 100 possession | | points allowed per 100 possession | | | | yes |
| 105 | *teamEDiff(efficiency.difference).y* | efficiency difference | | teamOrtg.y -teamDrtg.y | | | | yes |
| 106 | *teamPlay%.y* | team play percentage | | time period that the team hold the ball | | | | yes |
| 107 | *teamAR.y* | average rebounds | | number of average rebounds | | | | yes |
| 108 | *teamAST/TO.y* | assist turnover ratio | | team.AST.y/team.TO.y | | | | yes |
| 109 | *teamSTL/TO.y* | steal turnover ratio | | team.STL.y/team.TO.y | | | | yes |
| 110 | *pointspread.l10.y* | point spread last 10 games | | the average number of point spread last 10 games | | | | yes |
| 111 | *SPAT\_H* | SumPlus Averaged Team Ability for Home team | | SumPlus measures one player’s ability in a game. *SPAT\_H* sums all players’ averaged SumPlus, who will participate to the next game. The averaged SumPlus for one player is calculated as averaged one player’s last ten games’ SumPlus. If he does not participate ten games before, just averaged his SumPlus that he has so far. | | | | yes |
| 112 | *SPAT\_A* | SumPlus Averaged Team Ability for Away team | |  |
| 113 | *pointspread.lag* | point spread lag | | last game's point spread for the team | | | | no |
| 114 | *pointspreadl5* | point spread average for last five games the team vs this opponent | |  | | | | no |
| 115 | *season* | NBA regular season | |  | | | | no |
| 116 | *area* | team's location belongs | | eastern or western | | | | no |
| 117 | *spread1* | One type of point spread | | If team1’s points add spread1 is higher than team2’s points, then team1 wins from bookmakers’ perspective. Else versa. | | | | no |
| 118 | *spread2* | One type of point spread | | If team2’s points add spread2 is higher than team1’s points, then team2 wins from bookmakers’ perspective. Else versa. | | | | no |
| 119 | *price1* | One type of price | | How much money you need to pay to get 100 dollars pay-out if you bet team1 and team1 wins. | | | | no |
| 120 | *price2* | One type of price | | How much money you need to pay to get 100 dollars pay-out if you bet team2 and team2 wins. | | | | no |
| 121 | *odds1* | Odds | | Odds for team1 | | | | no |
| 122 | *odds2* | Odds | | Odds for team2 | | | | no |
| Note: This table reports details of characteristics. | | | | | | | | |
|  | | | | | | | | |  |  |  |  |

**F Feature Importance Results**

Normalization dataset

1. Linear regression
2. scores

feature\_importance

team2PA.x 8.134863e+08

teamFGA.x 6.823920e+08

team3PA.x 6.272048e+08

teamFIC(floor.impact.counter).y 5.286506e+08

teamFIC.floor.impact.counter..x 4.114809e+08

teamPTS.y 4.114571e+08

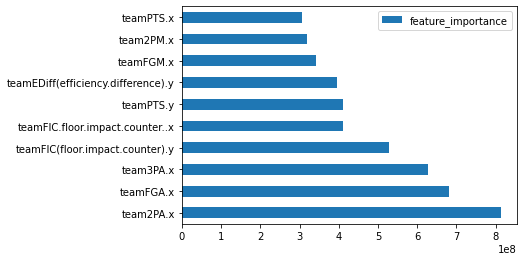
teamEDiff(efficiency.difference).y 3.966545e+08

teamFGM.x 3.415315e+08

team2PM.x 3.179791e+08

teamPTS.x 3.062201e+08

1. plot



1. DecisionTreeRegressor
2. Scores

feature\_importance

teamEDiff(efficiency.difference).x 0.106979

teamEDiff(efficiency.difference).y 0.075535

pointspreadl5 0.025703

SPAT\_H 0.021940

SPAT\_A 0.016607

teamDREB%.x 0.015401

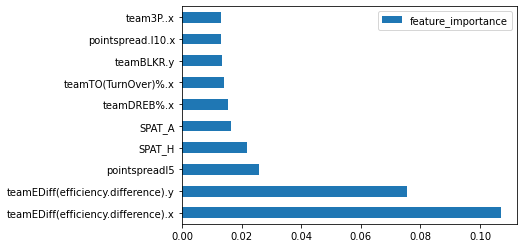
teamTO(TurnOver)%.x 0.014032

teamBLKR.y 0.013511

pointspread.l10.x 0.013170

team3P..x 0.013117

1. Plot



1. RandomForestRegressor
2. Scores

feature\_importance

teamEDiff(efficiency.difference).x 0.068635

teamEDiff(efficiency.difference).y 0.053793

pointspread.l10.x 0.040174

pointspread.l10.y 0.031437

pointspreadl5 0.024143

SPAT\_H 0.020595

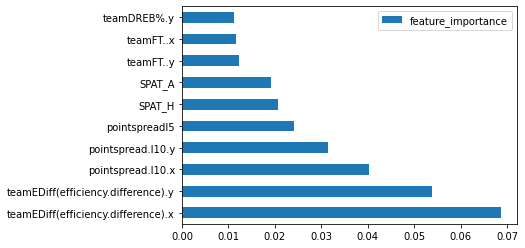
SPAT\_A 0.019255

teamFT..y 0.012239

teamFT..x 0.011537

teamDREB%.y 0.011203

1. Plot



1. XGBRegressor
2. Scores

feature\_importance

teamEDiff(efficiency.difference).x 0.077497

teamEDiff(efficiency.difference).y 0.059128

pointspread.l10.x 0.047216

pointspread.l10.y 0.046649

pointspreadl5 0.018418

teamFIC40(per.40.minuts).y 0.015727

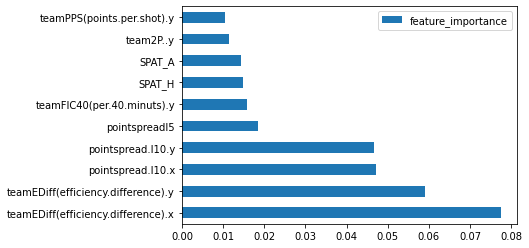
SPAT\_H 0.014941

SPAT\_A 0.014388

team2P..y 0.011429

teamPPS(points.per.shot).y 0.010525

1. Plot



1. SVR
2. Scores

feature\_importance

pointspreadl5 10.374906

teamDrtg(defensive.rating.per.100.possesion).y 8.064559

teamEDiff(efficiency.difference).x 7.593304

teamDrtg(defensive.rating.per.100.possesion).x 7.465870

pointspread.l10.x 7.205861

SPAT\_H 6.885843

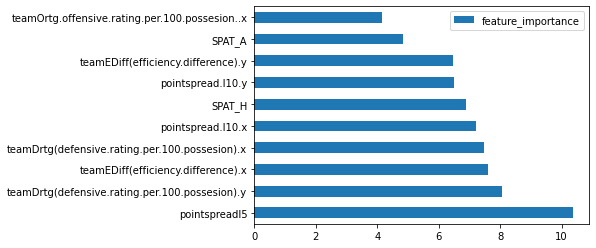
pointspread.l10.y 6.487634

teamEDiff(efficiency.difference).y 6.463246

SPAT\_A 4.836793

teamOrtg.offensive.rating.per.100.possesion..x 4.155316

1. Plot



1. LightGBM
2. Scores

feature\_importance

pointspreadl5 78

SPAT\_H 61

teamDREB%.y 55

teamEDiff(efficiency.difference).y 52

pointspread.l10.y 49

SPAT\_A 49

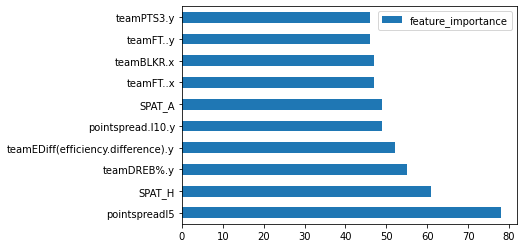
teamFT..x 47

teamBLKR.x 47

teamFT..y 46

teamPTS3.y 46

1. Plot



1. Permutation

feature\_importance

teamSTL.x 1.278015

teamE(effective)FG%.y 1.135124

teamFG..y 1.102324

pointspread.lag 1.064089

teamSTL%.x 0.931730

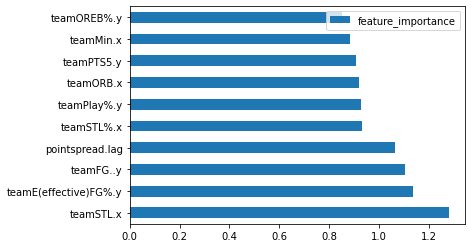
teamPlay%.y 0.927310

teamORB.x 0.917904

teamPTS5.y 0.907654

teamMin.x 0.882251

teamOREB%.y 0.850311



Standardization dataset

1. Linear regression
2. Score

feature\_importance

teamTRB.y 4.441238e+08

team3PA.y 4.241022e+08

team2PA.y 4.217652e+08

teamDRB.y 4.158042e+08

teamFGA.y 3.421623e+08

teamORB.y 3.219606e+08

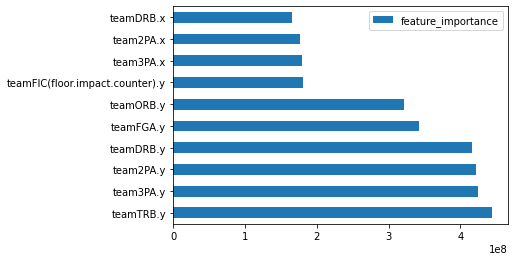
teamFIC(floor.impact.counter).y 1.809595e+08

team3PA.x 1.793690e+08

team2PA.x 1.772246e+08

teamDRB.x 1.657382e+08

1. Plot



1. DTR
2. Score

feature\_importance

teamEDiff(efficiency.difference).x 0.104284

teamEDiff(efficiency.difference).y 0.076315

pointspreadl5 0.025626

SPAT\_H 0.021719

SPAT\_A 0.016544

teamDREB%.x 0.015795

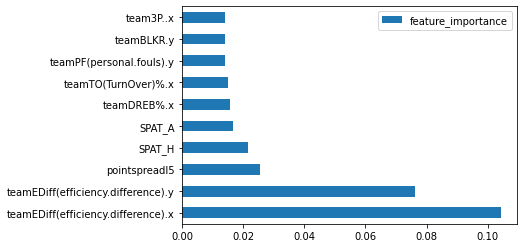
teamTO(TurnOver)%.x 0.015011

teamPF(personal.fouls).y 0.014050

teamBLKR.y 0.013933

team3P..x 0.013917

1. Plot



1. RFR
2. Score

feature\_importance

teamEDiff(efficiency.difference).x 0.069812

teamEDiff(efficiency.difference).y 0.055170

pointspread.l10.x 0.040588

pointspread.l10.y 0.030625

pointspreadl5 0.023239

SPAT\_H 0.019361

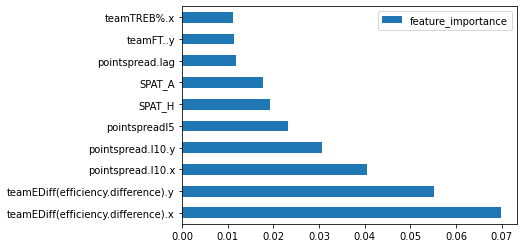
SPAT\_A 0.017838

pointspread.lag 0.011727

teamFT..y 0.011442

teamTREB%.x 0.011071

1. Plot



1. XGB
2. Score

feature\_importance

teamEDiff(efficiency.difference).x 0.077497

teamEDiff(efficiency.difference).y 0.059128

pointspread.l10.x 0.047216

pointspread.l10.y 0.046649

pointspreadl5 0.018418

teamFIC40(per.40.minuts).y 0.015727

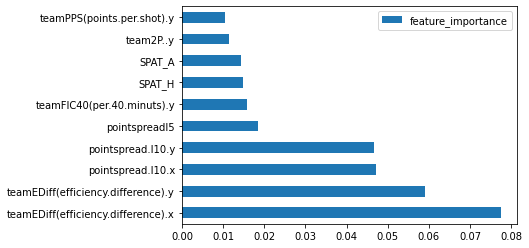
SPAT\_H 0.014941

SPAT\_A 0.014388

team2P..y 0.011429

teamPPS(points.per.shot).y 0.010525

1. Plot



1. SVR
2. Score

feature\_importance

team2P..y 2.917532

teamAR.y 2.300794

teamSTL%.x 2.107224

teamASST%.y 2.096641

teamPPS.points.per.shot..x 1.937383

teamE(effective)FG%.y 1.757093

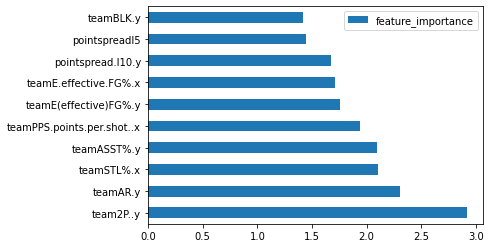
teamE.effective.FG%.x 1.706945

pointspread.l10.y 1.672402

pointspreadl5 1.442920

teamBLK.y 1.415923

1. Plot



1. LGB
2. Score

feature\_importance

pointspreadl5 75

SPAT\_H 64

teamFT..x 61

teamPTS1.x 50

teamDREB%.y 50

pointspread.l10.y 49

SPAT\_A 49

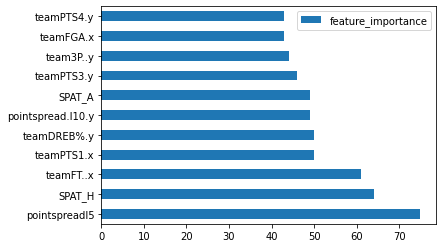
teamPTS3.y 46

team3P..y 44

teamFGA.x 43

teamPTS4.y 43

1. Plot



7) permutation

feature\_importance

teamFT..y 1.056648

teamTREB%.x 1.022956

pointspreadl5 0.767542

teamTRB.x 0.752871

SPAT\_H 0.751874

pointspread.l10.y 0.714671

teamEDiff(efficiency.difference).y 0.654805

team2P..y 0.623529

teamDRB.x 0.618481

teamPTS5.x 0.602847

