Valuing Future NHL Contracts

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Overview

- Business problem

- Data and modeling

  - Annual contract values

  - Contract lengths

- Conclusion

Business Problem

- Contract efficiency (paying players what they deserve) is a problem that both players and teams face

- For players and agents, goal is more singular: increase player payment

- Teams have more balanced constraints:

  - Optimize team salary cap

  - Retain great players with fair contracts

  - Do not overpay a single player at the expense of another

Data

- Player-specific data on roughly 3000 NHL players active since 2006

- Modeling data comprised of ~5000 contracts with 150 features

- Main sources: NHL API and CapFriendly.com

Modeling
Overall Approach

- Contracts have two components: average annual value (AAV) and length

  - Total contract value = AAV x length

- Model components separately - allows for different features to be emphasized

- Since salary cap increases over time, model AAV as percent of cap
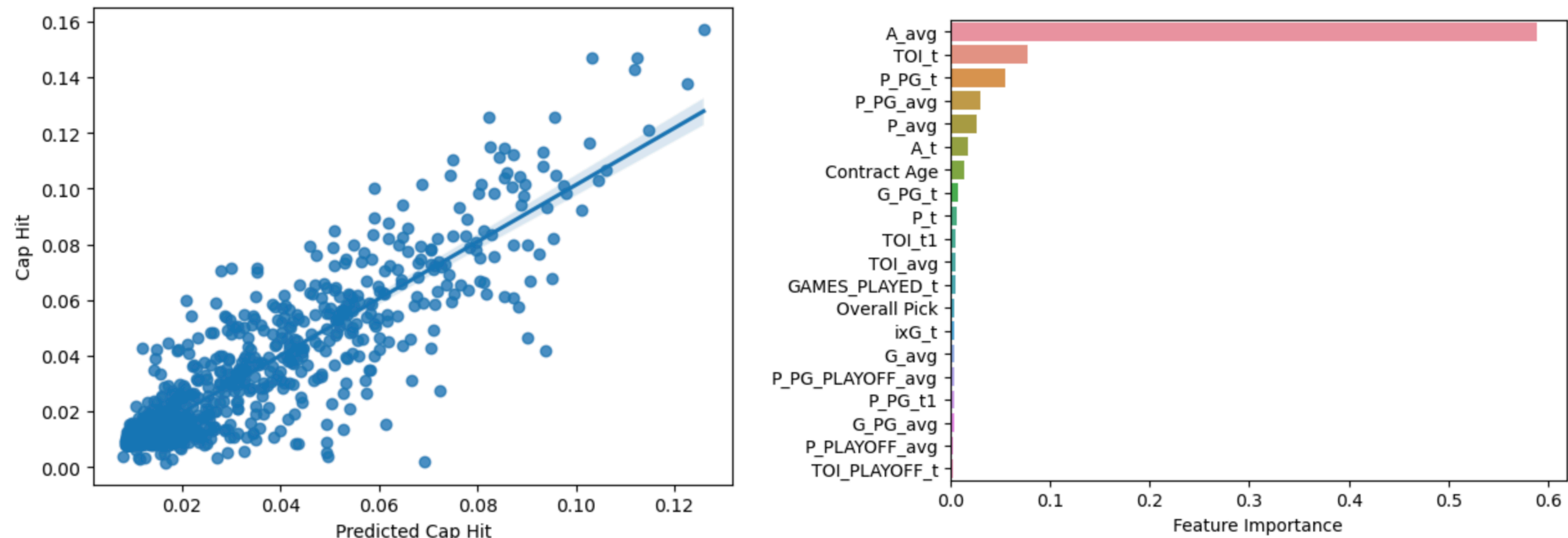
Modeling
Models Tested

- Used MAE as error metric in both models

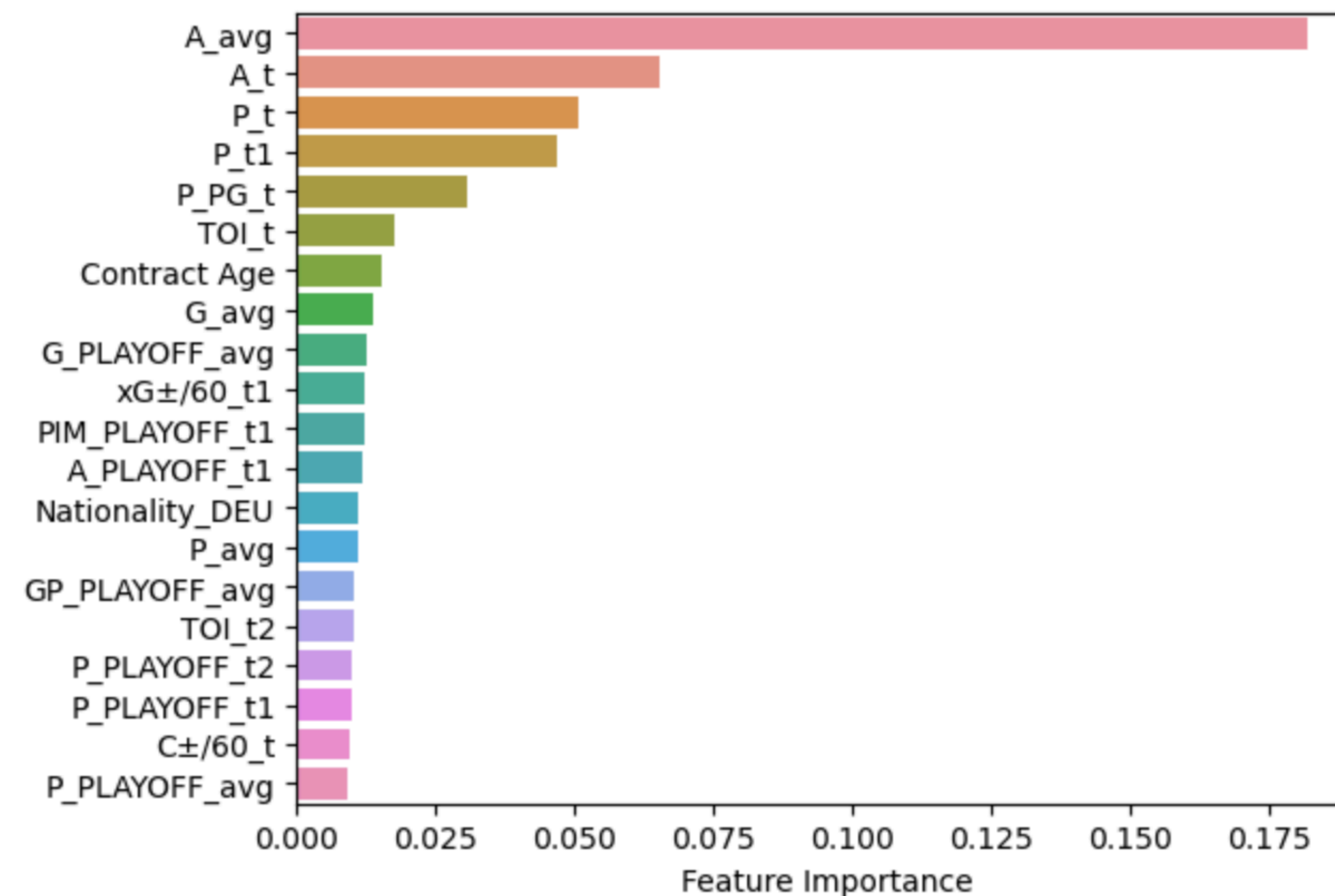|	Contract Annual Value	Contract Length
Ridge Regression	0.008227	0.868545
LASSO Regression	0.009268	0.849836
Elastic Net Regression	0.008243	0.858148
Decision Tree Regression	0.007482	0.750386
Random Forest Regression	0.005836	0.771488
XGBoost Regression	0.005943	0.742529

Modeling
Contract Annual Value

- Best model was random forest regression with MAE of ~0.005

    - Corresponds to contract annual value error of ~420k

Modeling
Contract Length

- Best model was XGBoost regression with MAE of ~0.74

  - Corresponds to contract length being off by about 9 months

Results

Name	Current Salary	Contract Annual Value	Contract Length	Contract Annual Value (mio)	Total Contract Value
Zach Parise	$6,371,794	0.036286	1.761720	3.029846	5.337740
John Moore	$2,750,000	0.009155	1.149446	0.764403	0.878640
Miles Wood	$3,200,000	0.019915	2.063231	1.662871	3.430888
Steven Santini	$750,000	0.010008	1.288769	0.835657	1.076968
Will Butcher	$750,000	0.010110	1.197933	0.844172	1.011262
Connor Carrick	$750,000	0.009088	1.263971	0.758819	0.959125
Wayne Simmonds	$900,000	0.011890	1.114284	0.992821	1.106285
John Hayden	$750,000	0.009287	1.365046	0.775505	1.058600
Dakota Mermis	$750,000	0.008700	1.344437	0.726488	0.976717
Dmitry Kulikov	$2,250,000	0.031511	2.603444	2.631199	6.850179
Ryan Murray	$750,000	0.011462	1.213162	0.957098	1.161115
Andreas Johnsson	$3,400,000	0.011593	1.152386	0.967999	1.115509
Tomas Tatar	$4,500,000	0.047308	2.512364	3.950202	9.924346
Mason Geertsen	$750,000	0.009117	1.204997	0.761305	0.917371
Ryan Graves	$3,166,666	0.062532	4.828533	5.221459	25.211987
Travis Hamonic	$3,000,000	0.021512	1.888587	1.796248	3.392371
Scott Mayfield	$1,450,000	0.059330	4.475246	4.954095	22.170795
Chris Wagner	$1,350,000	0.009726	1.348704	0.812080	1.095256

Conclusions and Future Improvements

- Point generation, mainly via assists, is the main driver of contract value in terms of yearly pay and length

- Contract annual value is fairly efficient, whereas contract length leaves room for interpretation

- Future improvements:

  - increase number of statistics as well as their granularity

  - expand analysis to goalies

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