Money Puck
A tool to help GM's value players

by Ashley Jones

Hockey is a rich man's game!

What separates one hockey player from another?

How can we determine player value?

Who Cares?

- GMs/Owners
- Players and Agents
- Sponsors
- Fans

The idea

When's payday again?

Data!

www.hockey-reference.com

www.capfriendly.com

www.corsica-hockey.com

Season	Age	Tm	Lg	GP	G	A	PTS	+/-	PIM	EV	PP	SH	GW	EV	PP	SH	S	S%	TSA	TOI	ATOI	FOW	FOL	FO%	HIT	BLK	TK	GV	Awards
2015-16	20	ANA	NHL	19	3	5	8	7	2	1	2	0	1	4	1	0	28	10.7	61	363	19:07	0	0		6	22	10	17	
2016-17	21	ANA	NHL	34	2	7	9	-6	28	1	1	0	1	5	1	1	60	3.3	126	589	17:19	0	0		14	30	4	30	
2017-18	22	VEG	NHL	61	6	23	29	5	14	5	1	0	1	15	8	0	144	4.2	262	1241	20:21	0	0		29	70	25	42	
2 yrs		ANA	NHL	53	5	12	17	1	30	2	3	0	2	9	2	1	88	5.7	187	952	17:57	0	0		20	52	14	47	
1 yr		VEG	NHL	61	6	23	29	5	14	5	1	0	1	15	8	0	144	4.2	262	1241	20:21	0	0		29	70	25	42	
Career			NHL	114	11	35	46	6	44	7	4	0	3	24	10	1	232	4.7	449	2193	19:14	0	0		49	122	39	89	

NHL Miscellaneous Share & more ▾   Glossary

					Per Game							Adjusted					Plus/Minus							Point Shares			Shootouts		
Season	Age	Tm	Lg	GP	GC	G	A	PTS	GC	PIM	S	G	A	PTS	GC	TGF	PGF	TGA	PGA	+/-	E+/-	OPS	DPS	PS	Att.	Made	Miss	Pct.
2015-16	20	ANA	NHL	19	3	0.16	0.26	0.42	0.16	0.11	1.47	3	6	9	3	18	6	5	0	7	1.1	0.8	1.5	2.3				
2016-17	21	ANA	NHL	34	3	0.06	0.21	0.26	0.09	0.82	1.76	2	8	10	3	29	7	32	4	-6	-2.4	0.5	0.9	1.4	1	1	0	100.0
2017-18	22	VEG	NHL	61	10	0.10	0.38	0.48	0.16	0.23	2.36	6	23	29	10	73	20	53	7	5	4.8	2.1	2.8	4.9	1	1	0	100.0
2 yrs		ANA	NHL	53	6	0.09	0.23	0.32	0.11	0.57	1.66	5	14	19	7	47	13	37	4	1	-1.3	1.3	2.4	3.7	1	1	0	100.0
1 yr		VEG	NHL	61	10	0.10	0.38	0.48	0.16	0.23	2.36	6	23	29	10	73	20	53	7	5	4.8	2.1	2.8	4.9	1	1	0	100.0
Career			NHL	114	16	0.10	0.31	0.40	0.14	0.39	2.04	11	37	48	16	120	33	90	11	6	3.5	3.4	5.2	8.6	2	2	0	100.0

NHL Player Stats

Seasons ⌄ | 2017-2018 ⌄ | Teams TOR ⌄ | Position Any ⌄ | Game State ES ⌄ | Venue Any ⌄ | Session Regular ⌄ | Report Summary ⌄ | TOI min to max | Options ☑ Aggregate ☐ Adjust

Player Stats | **Player Ratings**   Show 50 ⌄   Search by Player   **Show CSV**

| Player	Season	Team	Position	GP	TOI	G	A	P	P1	P/60	P1/60	GS	GS/60	CF	CA	C+/-	CF%	Rel CF%	GF	GA	G+/-	GF%	Rel GF%	xGF	xGA	xG+/-
Justin Holl	17-18	TOR	D	2	32.18	2	–	2	2	3.73	3.73	3.2	5.97	48	34	14	58.54	0.32	5	–	5	100	–	2.22	1.53	0.69
Auston Matthews	17-18	TOR	C	62	951.2	29	19	48	43	3.03	2.71	55.03	3.47	982	978	4	50.1	0.52	67	33	34	67	17.81	49.94	44	5.94
William Nylander	17-18	TOR	C	82	1163.08	14	33	47	36	2.42	1.86	48.8	2.52	1205	1187	18	50.38	0.67	76	46	30	62.3	13.15	57.59	55.08	2.51
Mitch Marner	17-18	TOR	C	82	1115.53	14	22	36	26	1.94	1.4	40.76	2.19	1120	1042	78	51.8	2.61	48	45	3	51.61	-2.97	51.23	44.59	6.64
Matt Martin	17-18	TOR	L	50	389.7	3	9	12	9	1.85	1.39	10.71	1.65	353	361	-8	49.44	-1.11	18	19	-1	48.65	-5.34	14.54	15.2	-0.66

The data

The Pipeline
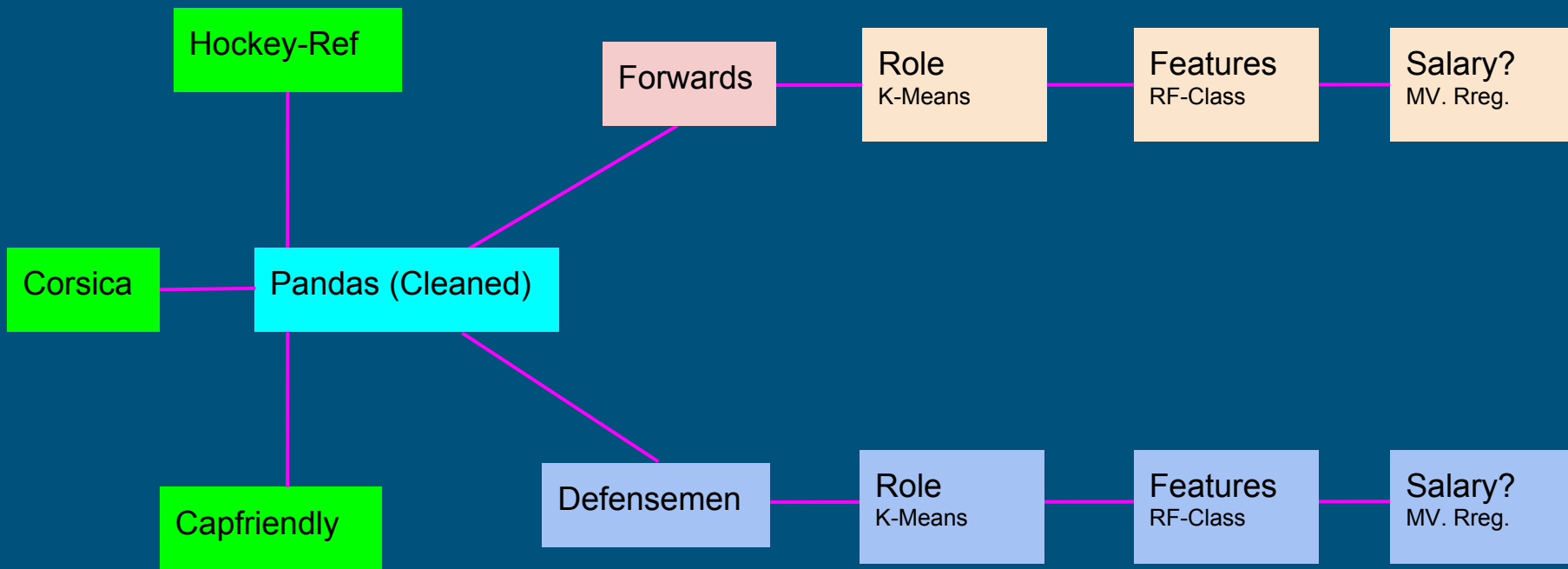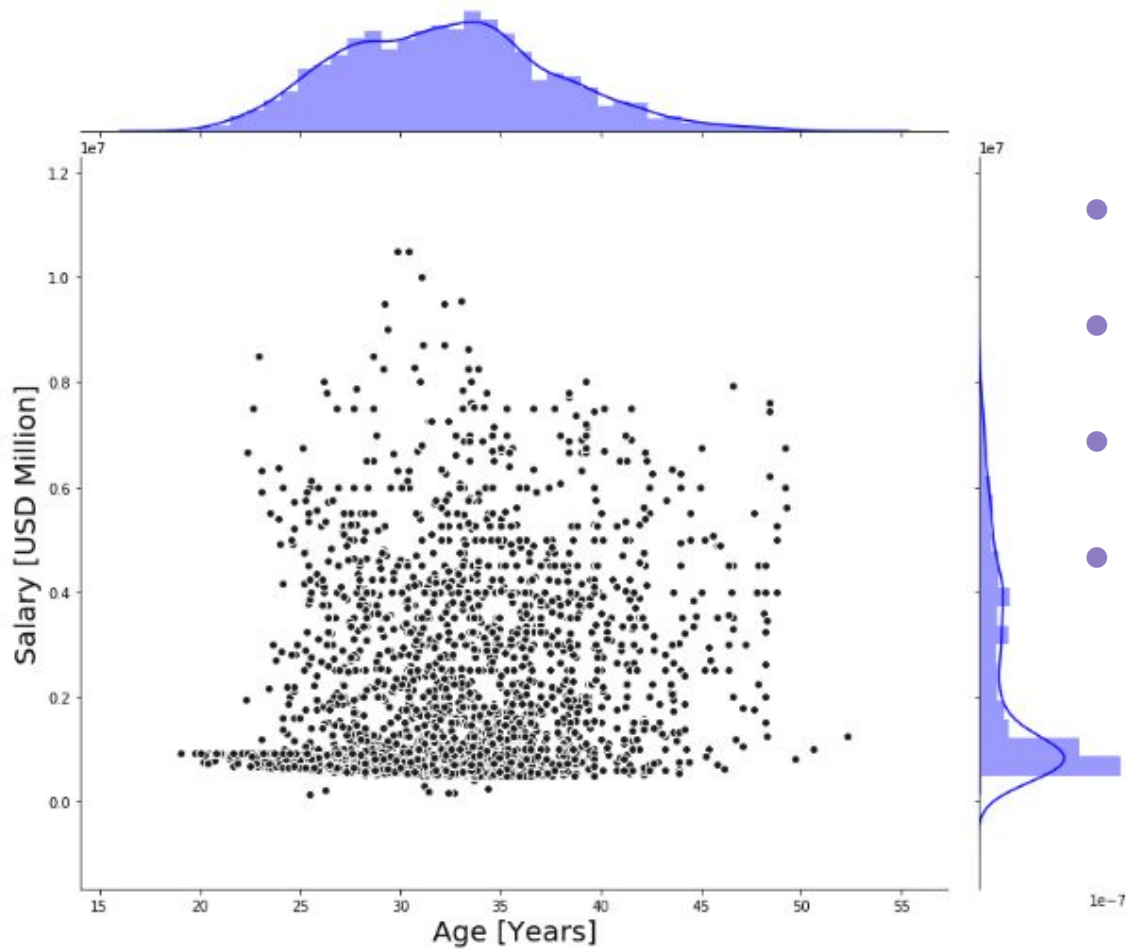
- Most salaries are below 1m USD
- Rookies on ELC make Typically < 23 years old
- Most NHL active players are between 25-35 years of age
- Salary is max when a player is between 25 and 30 years old

Data Visualization

- Traditional stats follow points as a performance metric
- Correlation between points and salary
- Outliers!

Data Visualization
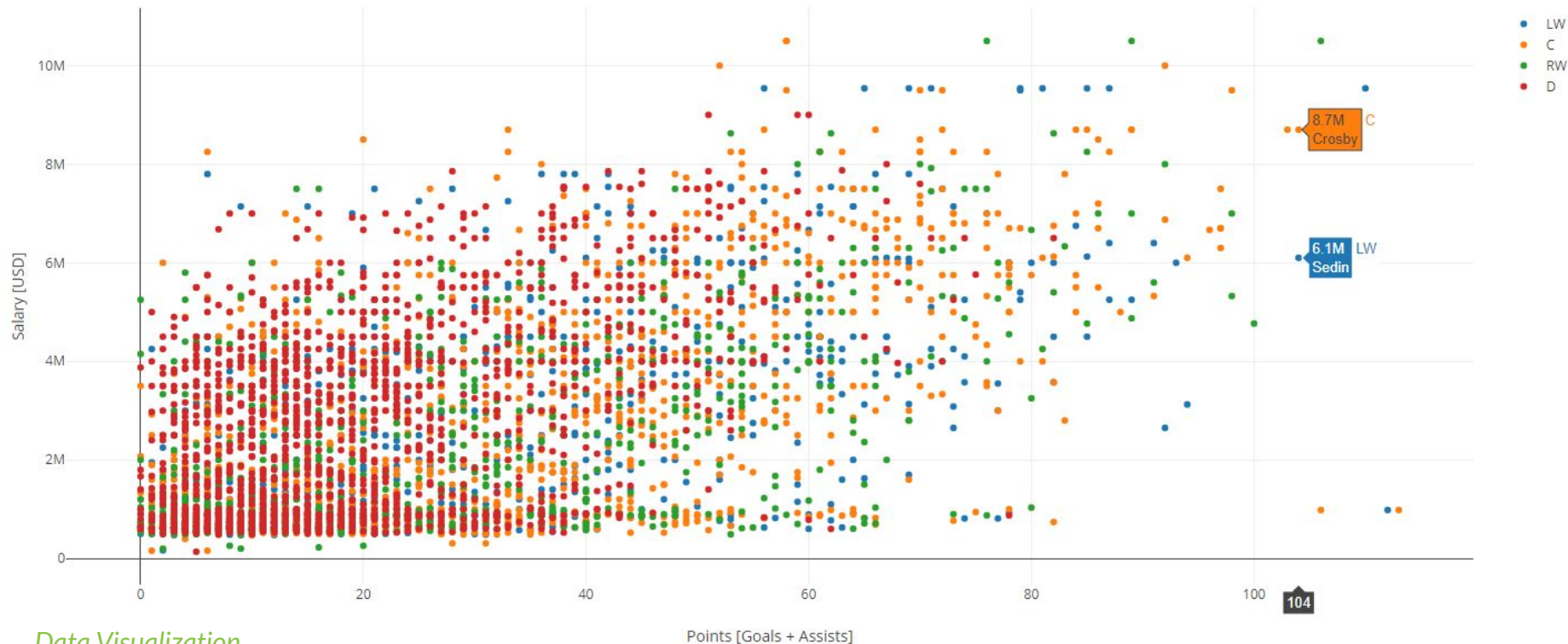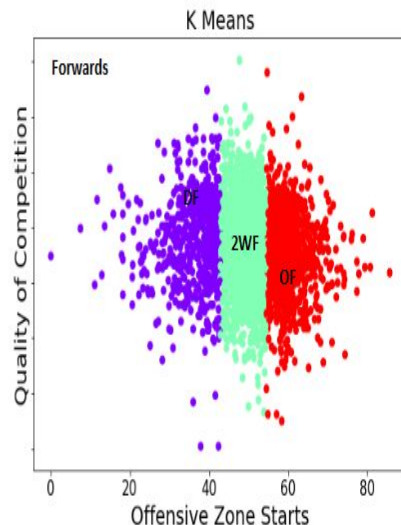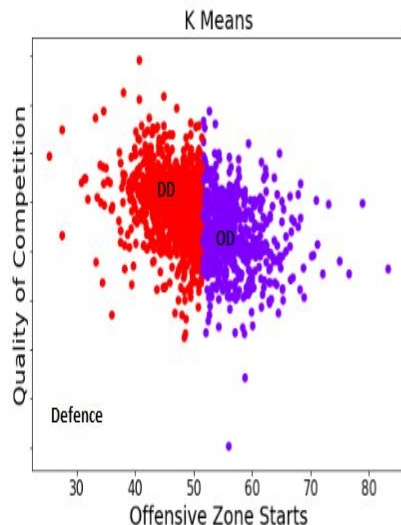
- K-means clustering to separate players into different roles:
- Defense: Defensive types (DD) / Offensive types (OD)
- Forwards: Defensive types (DF) / Two-Way types (2WF) / Offensive types (OF)

- Random-Forest classification to detect main features in each role

Analysis

Defensive D		Offensive D		Defensive F		Two-way F		Offensive F	
Test = 64%		Test = 68%		Test = 69%		Test = 73%		Test = 72%	
Feature	%	Feature	%	Feature	%	Feature	%	Feature	%
TOI_avg	20.354708	TOI_avg	24.358233	TOI_avg	25.353014	TOI_avg	23.591504	TOI_avg	24.436345
Age	16.640603	TOI%	17.570436	TOI%	15.584104	TOI%	16.523693	TOI%	18.318433
TOI%	9.892042	Age	10.152895	Age	10.003983	Age	12.831327	TOIQoC	9.374898
OPS	6.635488	TOIQoC	7.324064	TOIQoC	9.160875	TOIQoT	8.321802	Age	8.2474
TOIQoC	6.023992	Assists	5.849033	Assists	8.111288	TOIQoC	5.952717	Draft_round	5.826445
Points	3.37642	Points	5.57908	Points	3.909139	Points	3.756383	TOIQoT	5.021661
S	3.291602	OPS	3.07067	OPS	3.865951	Assists	3.721624	Assists	2.693216
SA	2.732788	xGF	2.5799	xGF	2.742467	Draft_round	3.372475	Points	2.608255
Rel CF%	2.349786	SA	1.93768	SA	1.785163	OPS	1.955185	OPS	1.888278
Draft_year	2.040921	CA	1.756143	Draft_year	1.56931	TOI	1.38577	SA	1.724716
TOI	1.742739	Draft_year	1.639753	CA	1.500917	Draft_year	1.364326	Draft_year	1.604796
CA	1.528029	xGA	1.485607	xGA	1.232964	TPS	1.272659	S	1.5539
Draft_round	1.527933	TOI	1.433961	CF	0.878511	GWY	1.18911	FOW	1.480004
Assists	1.346821	CF	1.387749	TOI	0.755777	xGF	1.138242	GWY	1.326248
Goals	1.082256	GA	1.117079	TPS	0.681849	CF	1.115826	TPS	1.218516
BLK	1.065301	S	1.024658	S	0.605768	SA	1.052011	CA	1.095158
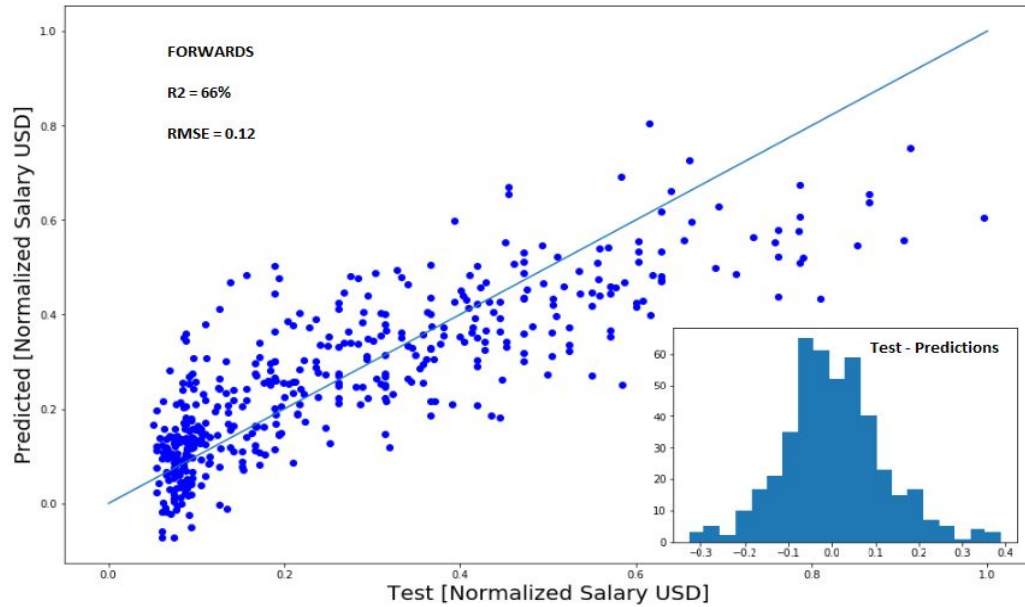
- Multiple linear regression to estimate player normalized salary
- Four sample-sets tested:
    - Forwards and Defense
    - Pay rise, Pay decrease

- 70% Training, 30% Test
- Example for forwards with a pay rise.
- Model underestimates at larger salaries (>0.66 of max salary)

	F-pay rise	D-Pay rise	F-pay decrease	D-pay decrease
Model predictions	$R^2 = 0.66$	$R^2 = 0.59$	$R^2 = 0.43$	$R^2 = 0.42$
Results	RMSE = 0.12	RMSE = 0.15	RMSE = 0.08	RMSE = 0.12