

The Application of MPT in DFS Roster Selection

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April 21, 2018

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Overview

- Introduction (this, happening now)
- Problem Statement
- Building the Model
- Comparing Collections
- Further Development

Full Disclosure

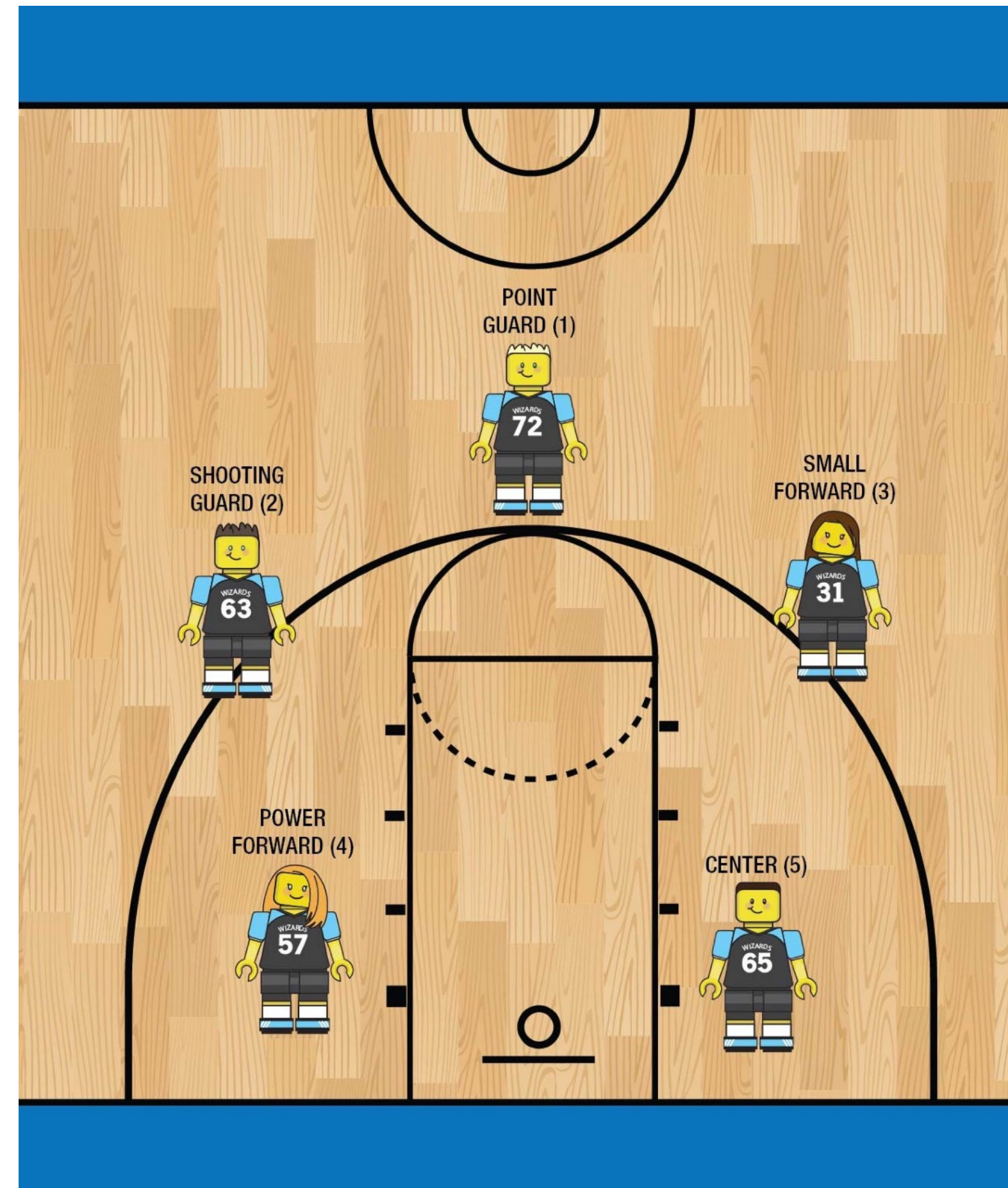


Contest Submission

- Select 8 players competing that day
- Stay under the salary cap (\$50k/\$60k)
- Submit before contest deadline

Contest Entry

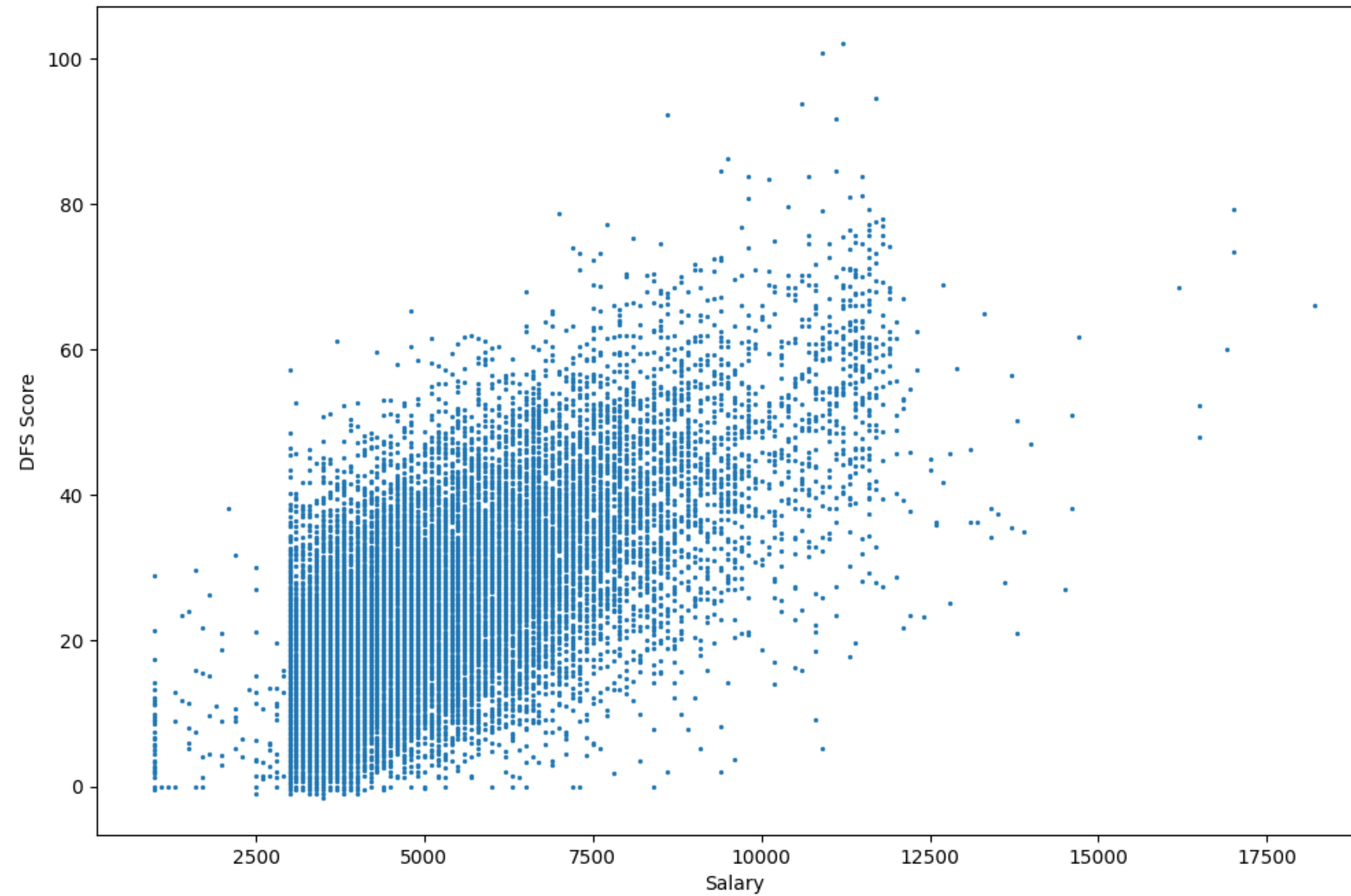
- 1 Point Guard (PG)
- 1 Shooting Guard (SG)
- 1 Small Forward (SF)
- 1 Power Forward (PF)
- 1 Center
- 1 Guard (PG/SG)
- 1 Forward (SF/PF)
- 1 Util (Any)



Player Scoring

+1	Point
+0.5	3-Point Shot Made
+1.25	Rebound
+1.5	Assist
+2	Steal
+2	Block
-0.5	Turnover
+1.5	Double-Double
+3	Triple-Double

Salary vs. Score





	Equity(39840 [TSLA])	Equity(5061 [MSFT])	Equity(8347 [XOM])
2013-01-03 00:00:00+00:00	34.760	26.479	86.197
2013-01-04 00:00:00+00:00	34.380	25.974	86.537
2013-01-07 00:00:00+00:00	34.335	25.926	85.593
2013-01-08 00:00:00+00:00	33.700	25.761	86.060
2013-01-09 00:00:00+00:00	33.610	25.916	85.807
2013-01-10 00:00:00+00:00	33.530	25.703	86.752

Portfolio



Contest Roster

“Stock Price” vs. “Player Salary”

“Portfolio Returns” vs. “Player Score”

Roster Characteristics

$$EV = \sum_{i=1}^n X_i \mu_i$$

$$VAR = \sum_{i=1}^n \sum_{j=1}^n X_i X_j \sigma_{ij}$$

$$X_i \geq 0, \quad i = 1, 2, 3 \dots 8$$

Basketball?

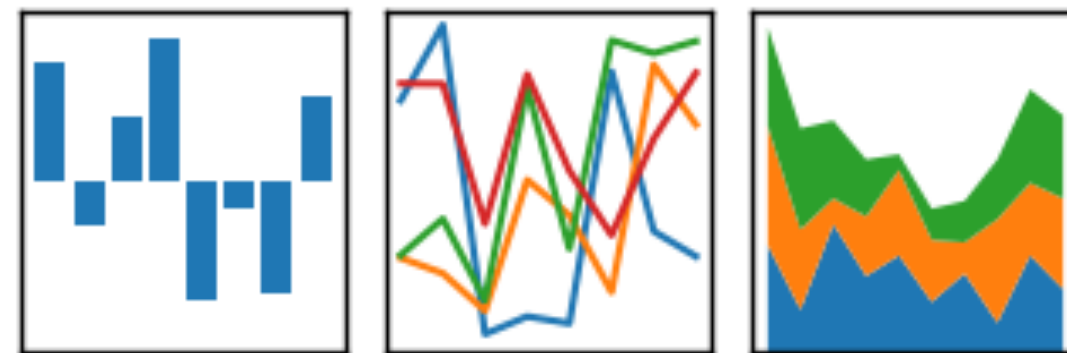
- Same scoring rubric for all positions
- Many games in a season
- High percentage of active playtime per player
- High frequency at which the ball changes hands

Implementation



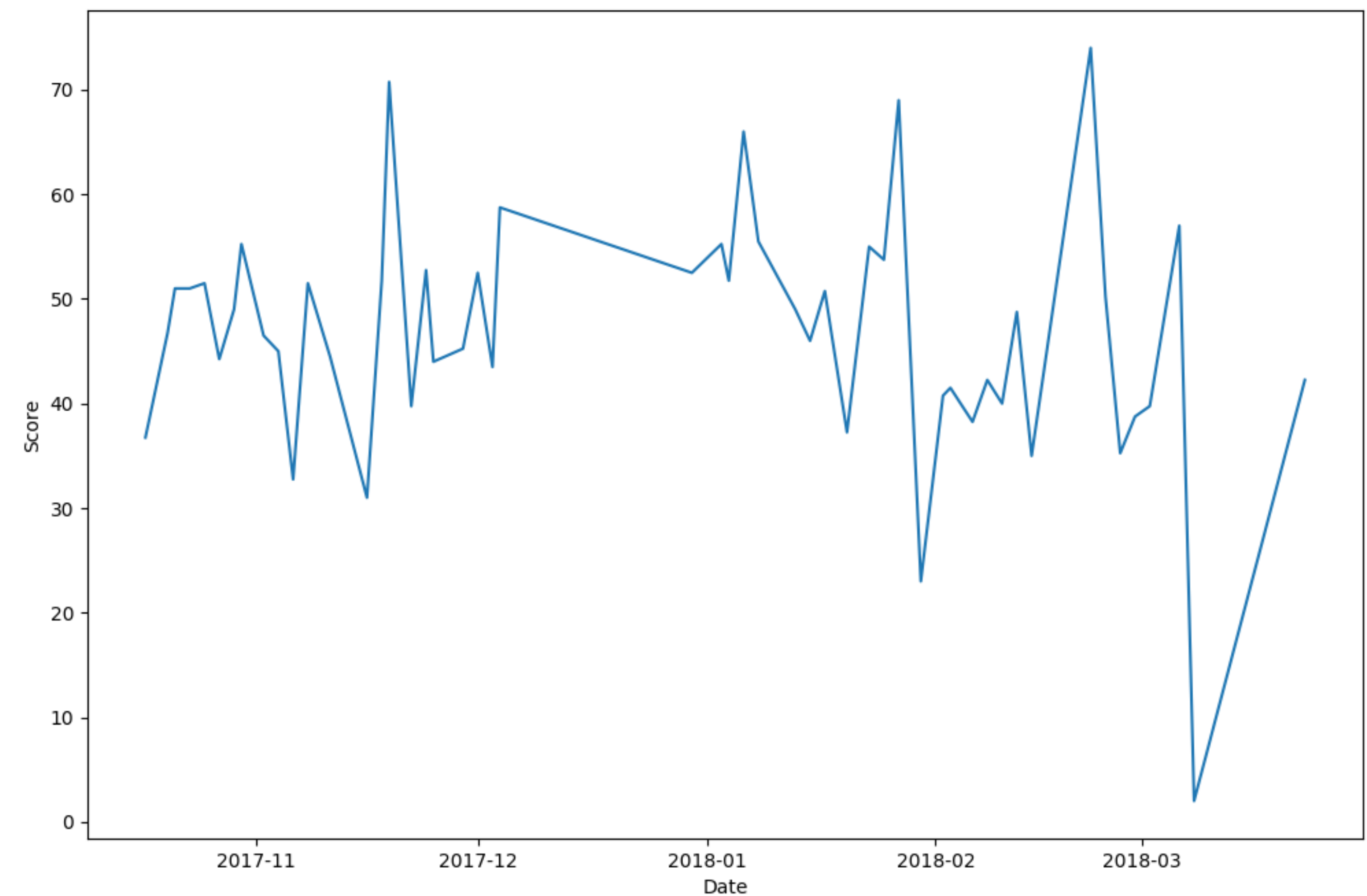
pandas

$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$



```
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```


Stephen Curry Regular Season



Summary

	score	salary
count	51	51
mean	46.8	9564.7
std	11.8	626.4
min	2	8100
25%	40.4	9100
50%	46.8	9500
75%	52.5	10000
max	74	10600

Roster Combinations

Position	Count
PFS	11
SGS	24
SFS	20
CS	3

712800 Roster Combinations

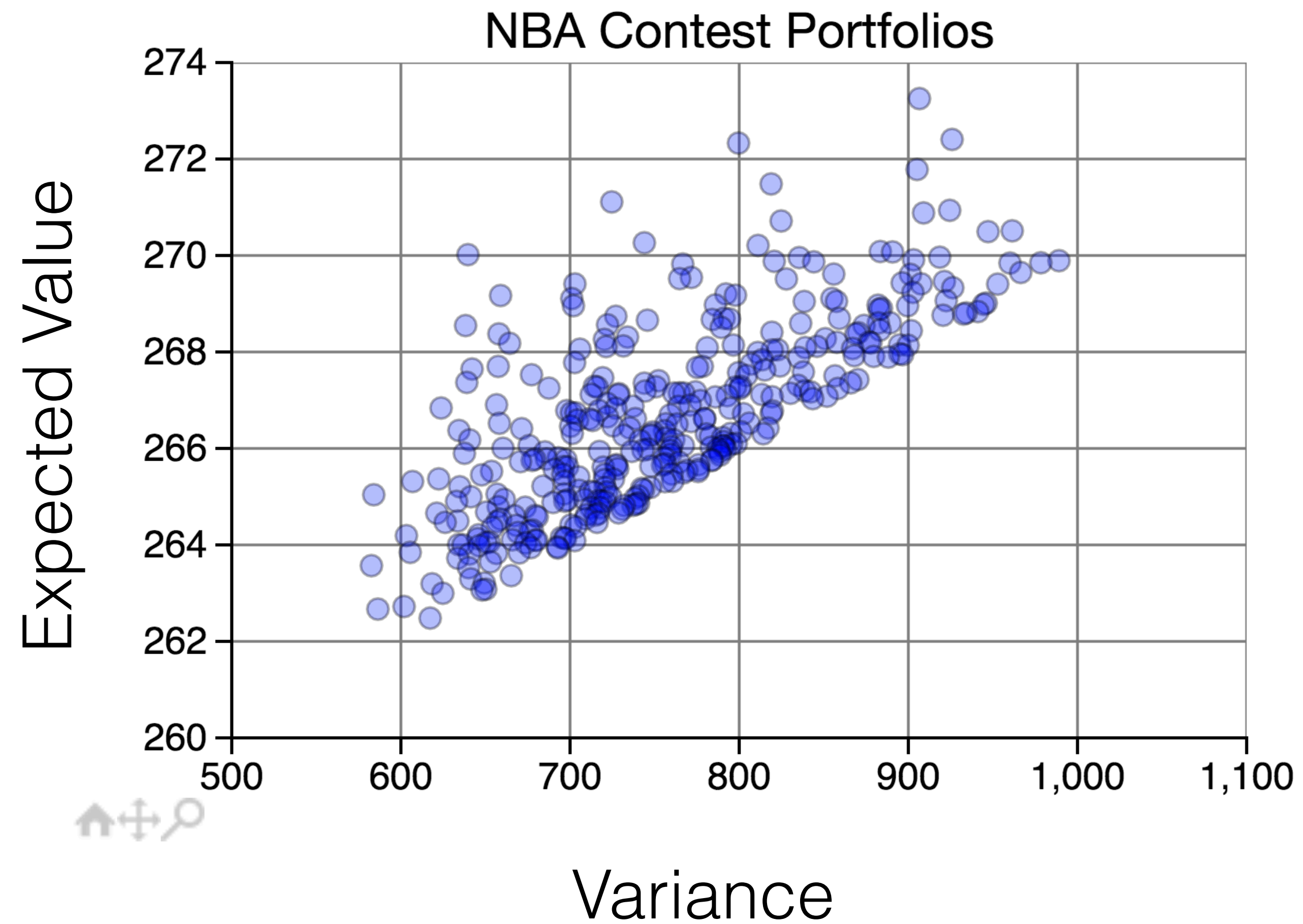
Portfolio Details

In [34]: `portfolios_df.ix[[24934, 28931, 28924, 27834]]`

Out[34]:

	C	Cost	Expected	PF1	PF2	PG1	PG2	SF1	SF2	SG1	SG2	Variance
24934	Jahlil Okafor	59900	273.253	Thaddeus Young	Dirk Nowitzki	Brandon Knight	Ishmael Smith	LeBron James	T.J. Warren	Evan Fournier	Eric Gordon	906.561
28931	Jahlil Okafor	60000	272.33	Kevin Love	Dirk Nowitzki	Ishmael Smith	Jarrett Jack	LeBron James	T.J. Warren	Evan Fournier	Eric Gordon	799.604
28924	Jahlil Okafor	59700	271.111	Thaddeus Young	Dirk Nowitzki	Ishmael Smith	Jarrett Jack	LeBron James	Al-Farouq Aminu	Evan Fournier	Eric Gordon	724.65
27834	Jahlil Okafor	60000	270.017	Thaddeus Young	Dirk Nowitzki	Ishmael Smith	Mike Conley	LeBron James	T.J. Warren	C.J. McCollum	Eric Gordon	639.651

Selecting A Portfolio



Featured Contest Payouts

Place	Prize	Place	Prize
1st	\$100,000	36th-60th	\$300
2nd	\$40,000	61st-90th	\$200
3rd	\$20,000	91st-120th	\$150
4th	\$10,000	121st-160th	\$100
5th	\$4,000	161st-210th	\$70
6th	\$3,000	211th-280th	\$60
7th-8th	\$2,000	281st-380th	\$50
9th-10th	\$1,500	381st-530th	\$40
11th-12th	\$1,000	531st-780th	\$35
13th-15th	\$700	781st-1280thh	\$30
16th-20th	\$600	1281st-2440th	\$25
21st-25th	\$500	2441st-5100th	\$20
26th-35th	\$400	5101st-12150th	\$15

Entry Fee: \$10

Max number of entries 52.K

Double Up Contest Payouts

Place	Prize
1st-750th	\$4

Entry Fee: \$2

Max number of entries 1724

Further Development

- Vegas Odds
- Risk Model
- Hedging and featured contests
- Player style classification
- Classify team play styles

Available Tables

players
name
team
birth_date
height
weight

team_game_log
name
abbr
game_date
opponent
home
win
points

player_game_log
name
position
opponent
game_date
salary
score
points
...

github.com/ahgnaw/talks/princeton_quant_trading

Special Thanks

- Adrienne Bolger
- Dr. David Jenicek
- Maxwell Margenot
- Dr. Alison Greenlee
- Jamie McCorriston
- Delaney Mackenzie

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