Predicting Winning Lineups for Daily Fantasy Football Leagues

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Motivation

Popularity of fantasy football => betting sites

Good lineup predictions => good bets => money

Problem definition

- Create a lineup generator for FanDuel(FD) to earn profit
- Profit = earn more points than 50% of other people
- Lineup has 1 QB, 2 RBs, 3 WRs, 1 TE, 1 PK, 1 Def
- Pay “salary” to each position on your lineup, total 60000
- At most 4 players per team; at least 3 teams

Challenges/constraints

- Salary cap
- Large amount of data
- Many legal bad lineups
- Don’t need best lineup; just good enough to double-up: on average 110 points.
- Competing against others

MDP

Approach

State Defintion = ([Final State], [Current Salary], [Current Line Up By Position Group], [Current Counts of Players in Each Team], [Final Production]).
Reward = -Infinity if Bust (Go over salary cap or take too many from one team) or the total lineup production at final state.

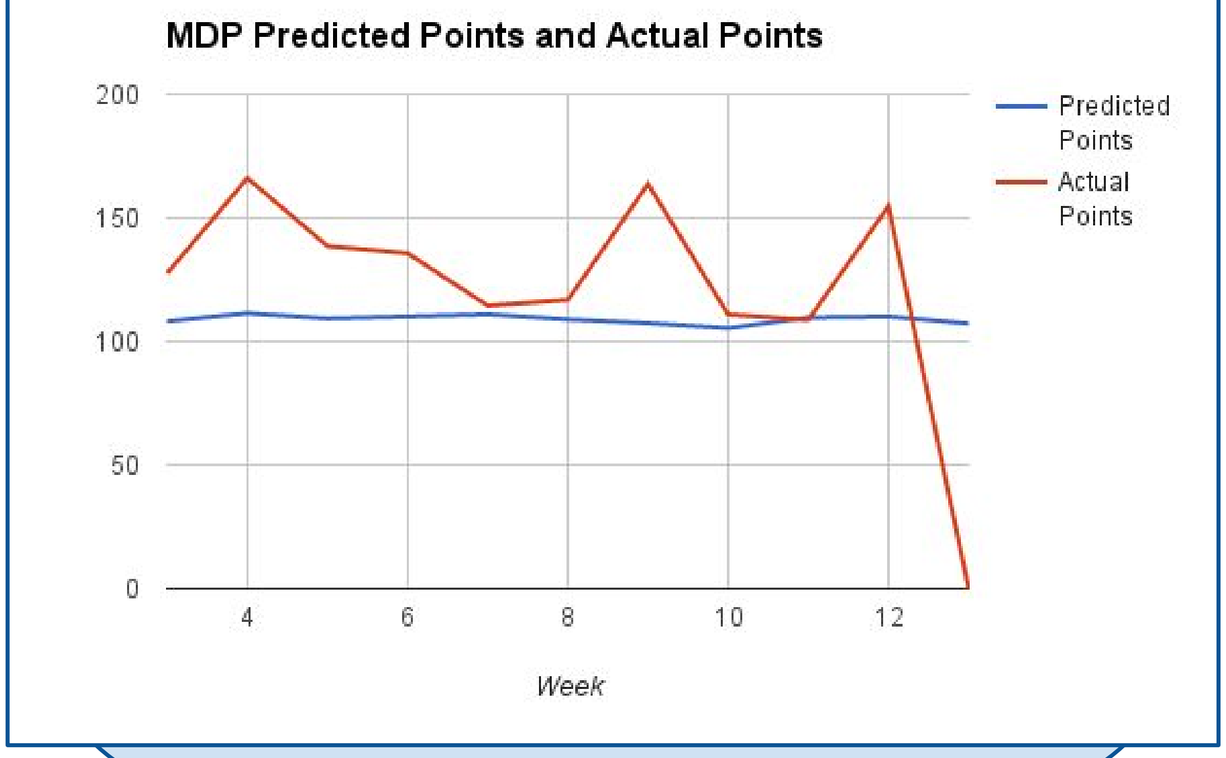
Line-up production based on probabilities to score 0-5, 5-10...20-25, 25+ points.

Use Value Iteration to determine optimal policy (since number of states is fixed for each week)

Limit search space to top 8 QBs, 9 WRs, 6 RB, 5 TE, 5 PK, 5 Def to prevent state bloating.

Results

Player	Position	Salary	Predicted Points	Actual Points
Tom Brady	QB	9100	19.26799799	19.04
Willie Snead	WR	6400	11.74594676	12.3
Rishard Matthews	WR	6200	11.80141512	13.9
Julian Edelman	WR	6400	12.47889995	12.3
Tim Hightower	RB	6500	11.21900807	17.5
Mark Ingram	RB	6000	11.11001535	29.2
Stephen Gostkowski	PK	4800	10.12084263	11
Jordan Reed	TE	7400	9.839165354	26.5
SD	Def	4600	12.51246846	13
Total		**57400**	**110.0957597**	**154.74**



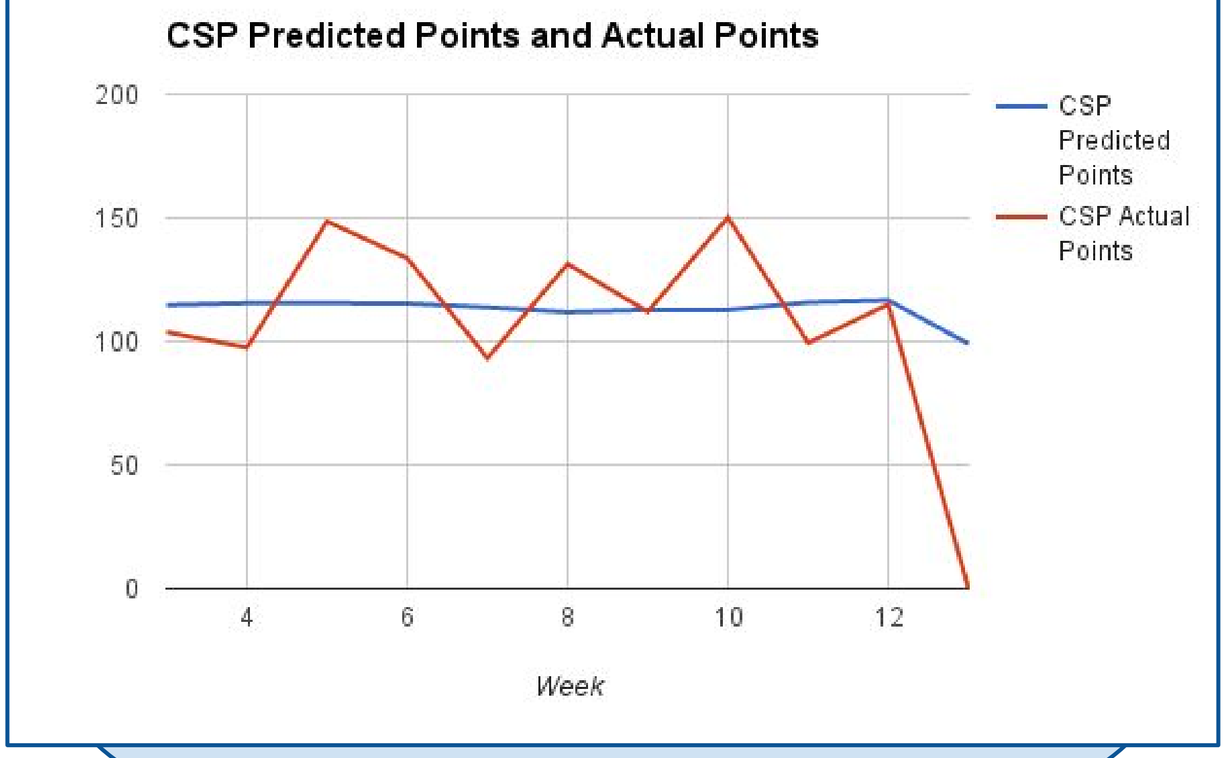
CSP

Approach

Variables: (pos, index) ex (QB, 0), (RB, 1)
Factors: weights = exp(expected points)
no-repeating, ordering constraints
Salary constraint implemented separately
Lineup with highest predicted points is used
Use top 5 players in each category to reduce runtime
And backtracking to solve

Results

Player	Position	Salary	Predicted Points	Actual Points
Dak Prescott	QB	8000	20.50	21.7
Julian Edelman	WR	6400	12.48	12.3
Dez Bryant	WR	8000	12.91	9.7
Brandin Cooks	WR	7300	12.41	0
Ezekiel Elliott	RB	8600	14.11	25
Tim Hightower	RB	6500	11.22	17.5
Stephen Gostkowski	PK	4800	10.12	11
Jason Witten	TE	5600	10.38	4.8
SD	Def	4600	12.51	13
Total		**59800**	**116.65**	**115**



Analysis

- Need 110 points on average to earn a profit.
  - Both models give a net profit, but the MDP profits more consistently
- MDP usually underperforms the actual output
  - better at earning money than expected.
  - But likely from a bias in our prediction models (worked on for 229) and something we’ll try to improve.
- Mean absolute error for the CSP = 4.53, for MDP = 11.609
  - From modelling standpoint, CSP currently better. MDP will likely improve once we get rid of bias