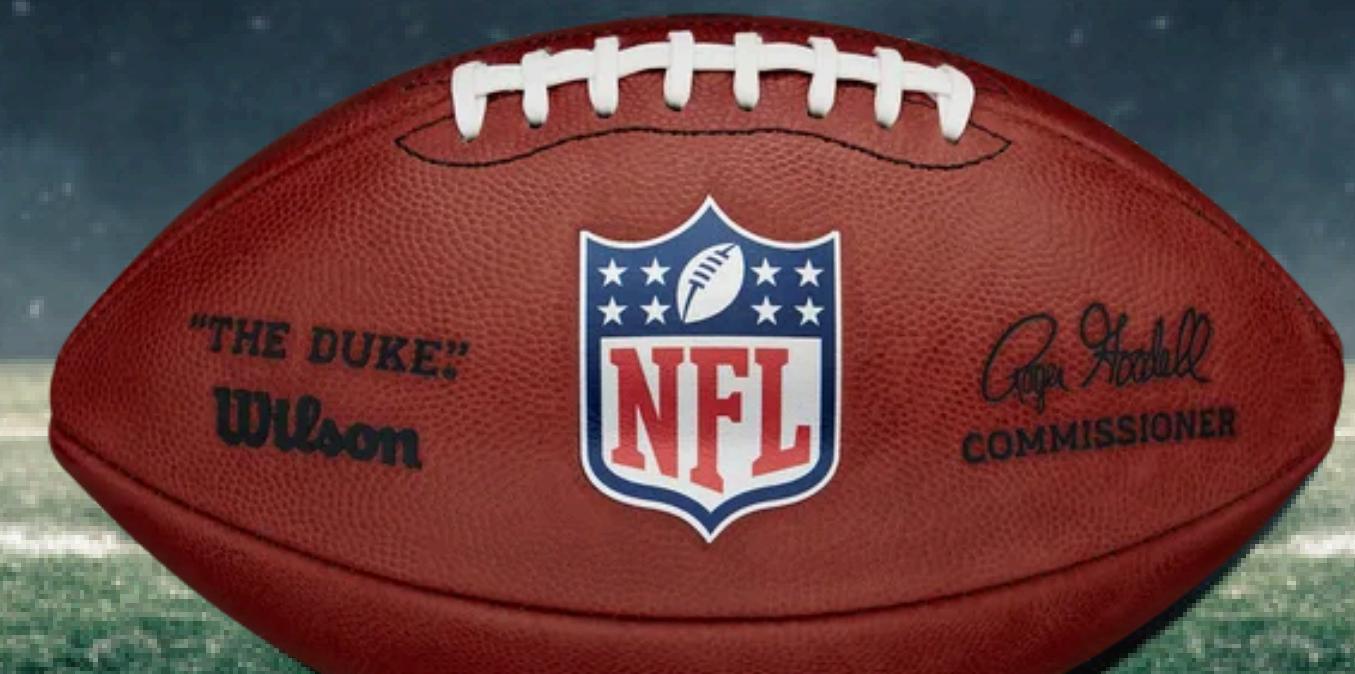


FANTASY FOOTBALL ROSTER OPTIMIZATION WITH INTEGER LINEAR PROGRAMMING

by: Kendall Andrews

CMSE 831: Computational Optimization



BACKGROUND AND MOTIVATION

Background

Daily fantasy sports (DFS) lineup construction is a constrained combinatorial problem: choose a small roster from a large player pool in order to outscore your opponent

Motivation

Optimize fantasy NFL lineups under salary & position constraints to maximize the team's total projected points

Question

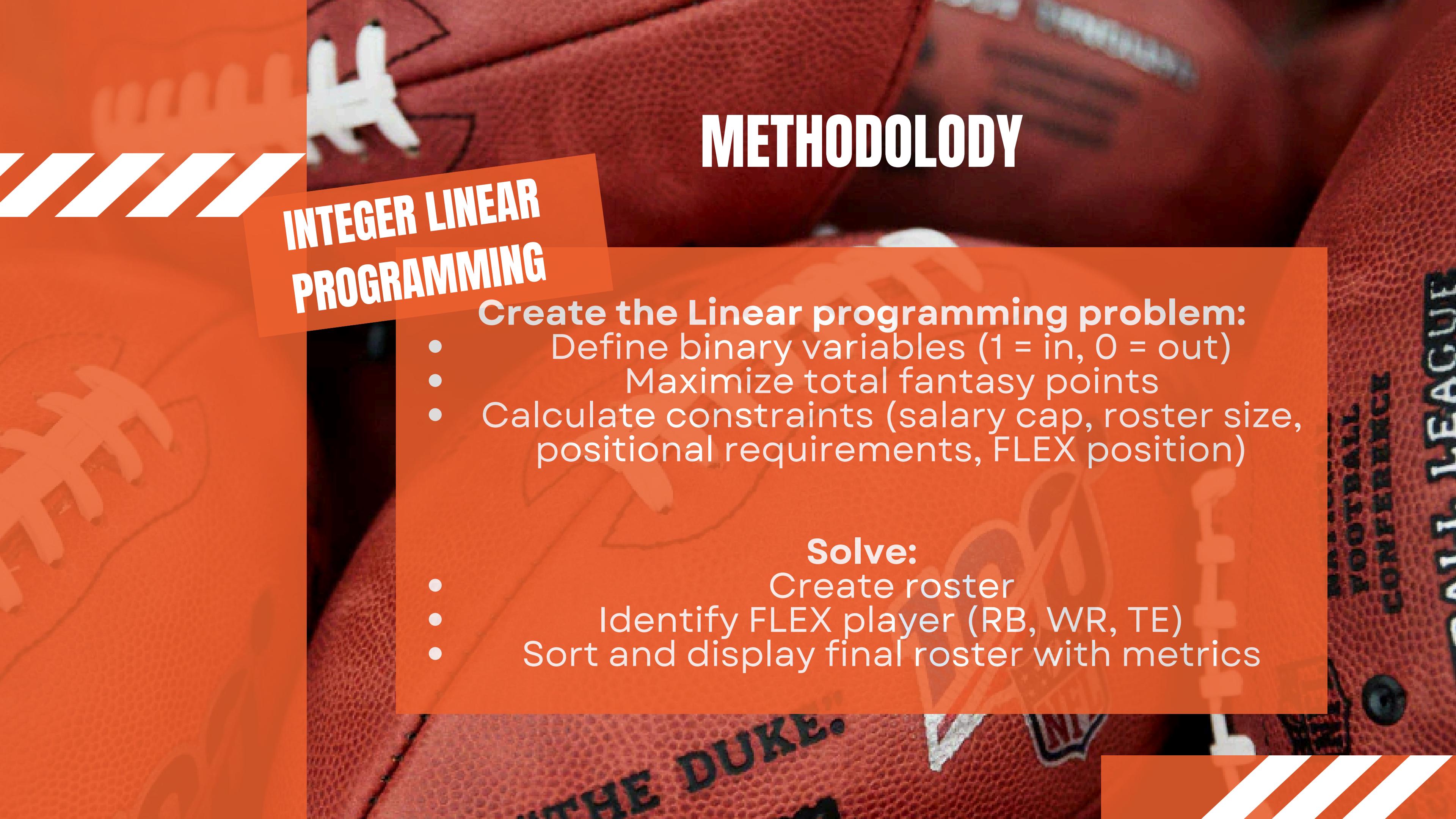
Can optimization and injury filtering improve lineup consistency?

METHODOLOGY

DATA PREPROCESSING

Data: Daily Fantasy Fuel, specifically Draft Kings, from Week 10 (11/6/2025)

- Removed unnecessary columns and players that are injured (Q, O, D, IR)
- Calculated risk (volatility)
- Defined constraints (salary and positional equality constraints)
- Formulate Linear Programming with PuLP



INTEGER LINEAR PROGRAMMING

METHODOLOGY

Create the Linear programming problem:

- Define binary variables (1 = in, 0 = out)
- Maximize total fantasy points
- Calculate constraints (salary cap, roster size, positional requirements, FLEX position)

Solve:

- Create roster
- Identify FLEX player (RB, WR, TE)
- Sort and display final roster with metrics

RESULTS

ROSTER

Metrics:

Total Projected Points: 142.30

Total Salary Used: \$50,000 out of \$50,000

Metrics:

Total Projected Points: 142.30

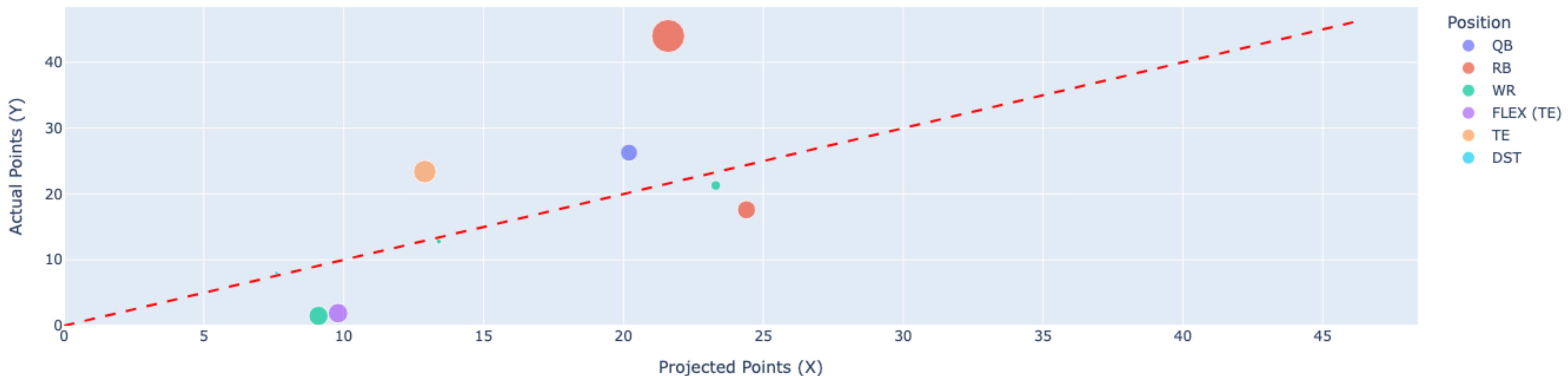
Total Actual Points 156.78

	Player	Position	Salary	Points
8	Jaxson Dart	QB	5700	20.2
1	Christian McCaffrey	RB	9000	24.4
2	De'Von Achane	RB	7400	21.6
5	Jaxon Smith-Njigba	WR	8600	23.3
6	Khalil Shakir	WR	5100	13.4
7	Olamide Zaccheaus	WR	3600	9.1
4	Hunter Henry	FLEX (TE)	3500	9.8
3	George Kittle	TE	4500	12.9
0	Jaguars	DST	2600	7.6

	Player	Position	Projected Points	Actual Points
0	Jaxson Dart	QB	20.2	26.28
1	Christian McCaffrey	RB	24.4	17.60
2	De'Von Achane	RB	21.6	44.00
3	Jaxon Smith-Njigba	WR	23.3	21.30
4	Khalil Shakir	WR	13.4	12.80
5	Olamide Zaccheaus	WR	9.1	1.50
6	Hunter Henry	FLEX (TE)	9.8	1.90
7	George Kittle	TE	12.9	23.40
8	Jaguars	DST	7.6	8.00

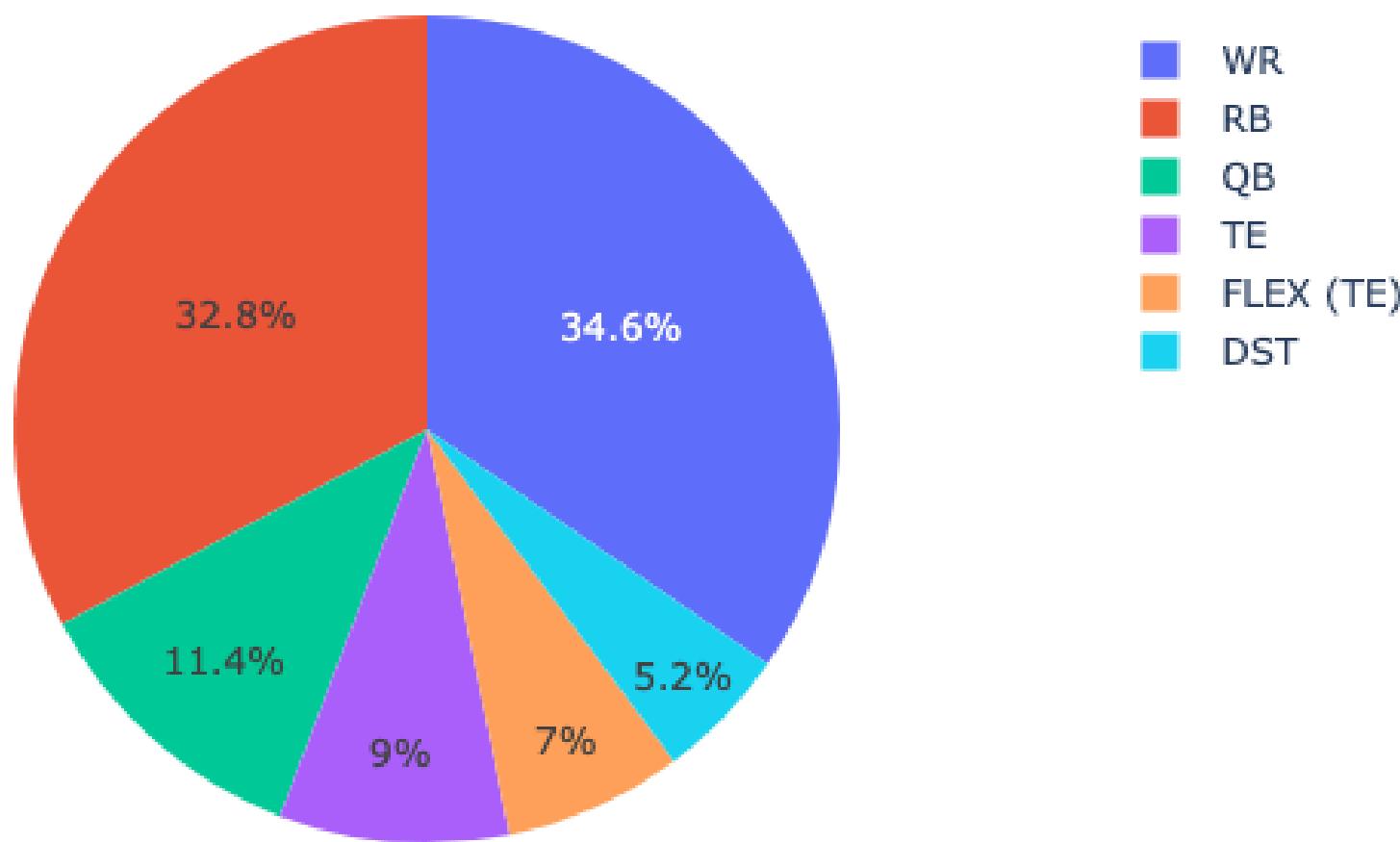
RESULTS

Actual vs. Projected Points (Week 10 Roster)

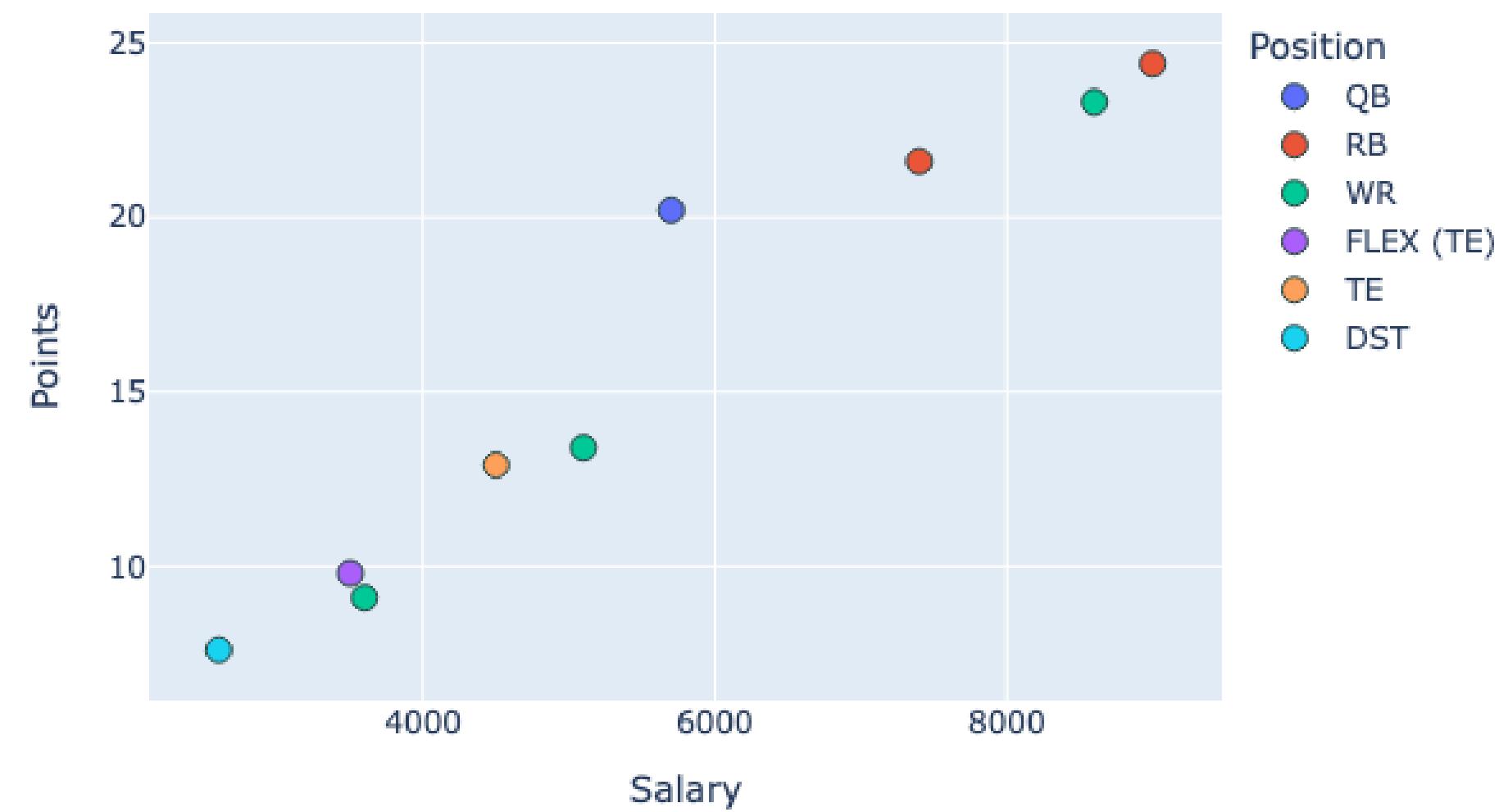


RESULTS

Roster Balance: Salary vs. Position

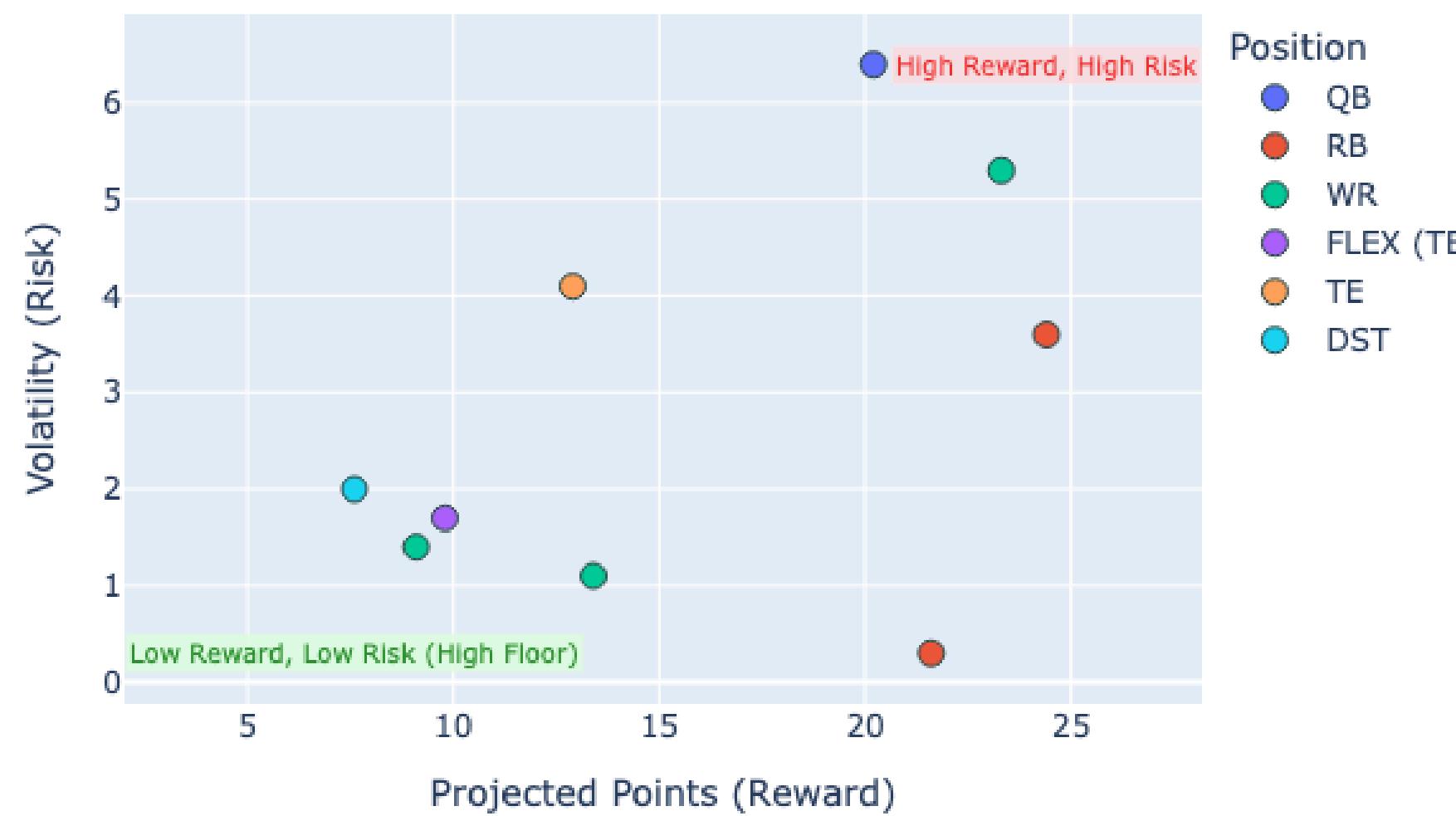


Salary vs. Projected Points

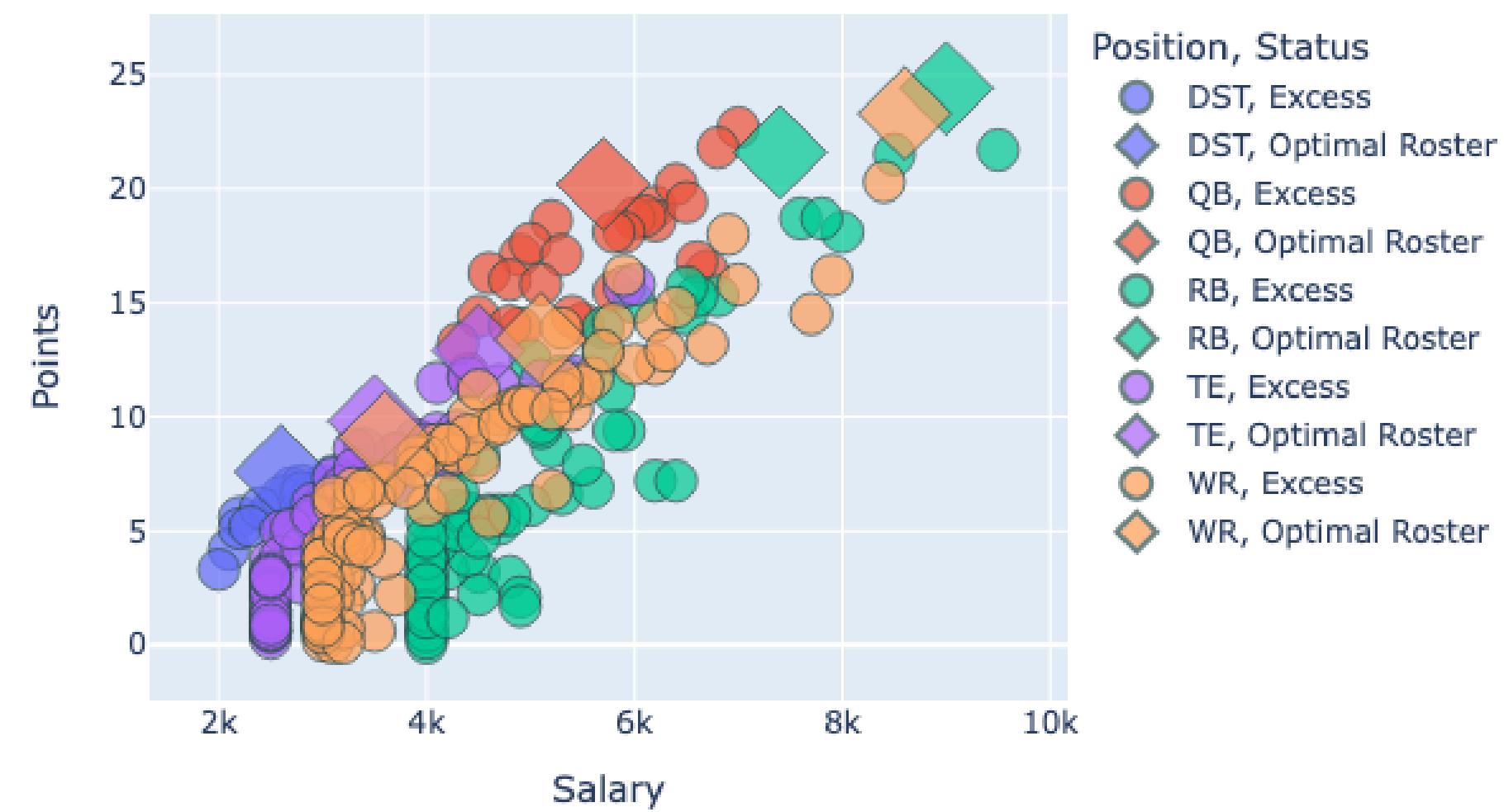


RESULTS

Volatility (Risk) vs. Projected Points (Reward)



Optimal Roster vs. Full Player Pool



CONCLUSION

- The Integer Linear Programming (ILP) framework is a validated and effective method for generating optimal, value-driven rosters.
- My project successfully demonstrated that optimization and injury filtering improved lineup consistency by using binary decision variables to achieve maximum points(142 points).

FUTURE WORK

- **Enhanced Data Integration and Risk Modeling:** Integrate a longitudinal dataset to calculate true Standard Deviation for robust risk assessment.
- **Comparative Algorithm Analysis:** Benchmark the implemented ILP against Greedy Algorithms and Simulated Annealing to evaluate trade-offs in efficiency and solution optimality.
- **Stochastic Optimization:** Advance to a Stochastic Framework using Variance Constrained Optimization and Monte Carlo Simulation for risk-adjusted lineup generation.

THANK YOU!

I hope you enjoyed my presentation



REFERENCES

- * Data: <https://www.dailyfantasyfuel.com/nfl/projections/>, specifically Draft Kings
- * PuLP: <https://coin-or.github.io/pulp/main/includeme.html>
- * Medium: <https://medium.com/ml-everything/using-python-and-linear-programming-to-optimize-fantasy-football-picks-dc9d1229db81>
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- * Visualizations: <https://plotly.com/python/>
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- * Mobile Application: ESPN Fantasy