

Self-Scouting the Scout

Using Text Analytics to Improve Scout Grades in
American Football

Jacques Kvam and Karl Pazdernik

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Deep Football
CASSIS 2018

Motivation

Motivation

1. Many scouts have years of experience and can detect minor differences between players.
2. Analytical methods have been focused on predicting player success from statistics.
3. Significant advancements happen when different disciplines collaborate.



We combine statistics and scouting reports:

1. Improve predictions on players
2. Uncover over/under-valued features in prospects.

Our goal is NOT to replace scouts!

That would waste information.



Outline

1. Data collection
2. Modeling choices
3. Results
4. Conclusions



Data Collection

Data Collection

Drafted players from 2010 to 2015.

1. Scouting Reports: nfl.com/draft
2. Historical Contracts: spotrac.com & overthecap.com
3. Approximate Values: profootballreference.com

Model

Input: Scouting Report: grades and text analysis

Output: Second Contract Salary



Scouting Reports

OT

ERIC FISHER
CENTRAL MICHIGAN MID-AMERICAN



DRAFTED BY: CHIEFS

ROUND | PICK | OVERALL | [View Prospect](#)



GRADE
94.0

COMBINE RESULTS

 5.05 SEC

 27 REPS

 28.5 INCH

 116.0 INCH

 7.59 SEC

 4.44 SEC











MORE DRAFT VIDEO

DRAFT ANALYSIS:
"When I put my Top 100 out there, he was the first name on the list, which tells you how strongly I feel about him. He's a Pro Bowl left tackle." — Mike Mayock



6'7"
HEIGHT

34 1/2"
ARM
LENGTH

306LBS.
WEIGHT

10 1/2"
HANDS

OVERVIEW
Any offensive tackle coming out of Central Michigan will naturally be compared to 2007 first-round pick Joe Staley, who now has become one of the top linemen in the NFL. But if there's one player with the potential to meet those high expectations, it's the tall, athletic, and rapidly growing Fisher. He was only a third-team All-MAC pick in 2011 as the full-time starter on the blind side, partially because he missed the final two games of the year with a knee injury. But in 2012 Fisher received first-team All-MAC honors after starting all 12 games at left tackle. NFL scouts will have no choice but to give him grades similar to those they gave Staley when he came out of Mount Pleasant.

He fell through the recruiting cracks a bit as a 250-pound tackle coming out of Stoney Creek High School in Michigan, where he only played on the offensive line there in this senior season (he captained both the football and basketball teams that year). But still proved himself strong enough as a true freshman to play in eight games, with two starts at left tackle. In 2010, he didn't start the first three games but proved an invaluable member of the line in the last nine, starting four games at right tackle, moving over to right guard for two weeks, and then lining up at left tackle for the final three contests. During his senior year, Fisher anchored an offensive line that averaged 6.2 yards-per-play, second best in the MAC and the same unit only allowed 14 sacks, which was good for fourth best in the MAC.

ANALYSIS
STRENGTHS Tall, long left tackle frame with good thickness but still room to add weight throughout. Natural athlete with bend and

1. Scout Grade → [0, 1]
2. Combine Stats
3. Height, Weight, Arm Length, Hand Size
4. Overview → n-grams
5. Strengths → n-grams
6. Weaknesses → n-grams



Second Contract



Eric Fisher

[EMBED THIS](#)**LEFT TACKLE****Age: 27****Exp: 5 Years****Drafted: Round 1 (#1 overall), 2013****College: Central Michigan****Agent(s): Joel Segal (Lagardere Unlimited)**[- More Chiefs -](#)

Contract Details

Cash Earnings

Stats & Valuation

Current Contract

Eric Fisher signed a 4 year, \$48,000,000 contract with the Kansas City Chiefs, including a \$12,750,000 signing bonus, \$22,000,000 guaranteed, and an average annual salary of \$12,000,000. In 2018, Fisher will earn a base salary of \$11,150,000 and a workout bonus of \$250,000, while carrying a cap hit of \$13,950,000 and a dead cap value of \$21,934,046.

CONTRACT TERMS:

4 yr(s) / \$48,000,000

SIGNING BONUS

\$12,750,000

AVERAGE SALARY

\$12,000,000

GTD AT SIGN:

\$22,000,000

TOTAL GTD:

\$22,000,000

FREE AGENT:

2022 / UFA

BONUS BREAKDOWN**CAP DETAILS****CASH DETAILS**

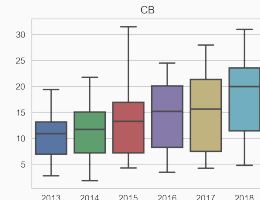
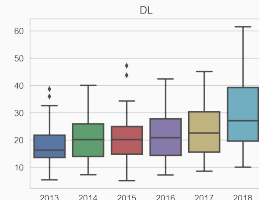
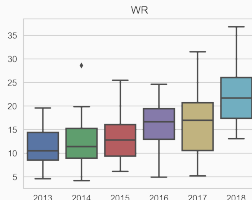
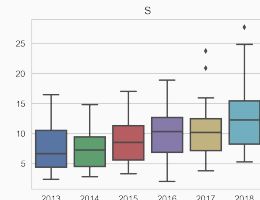
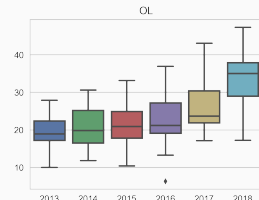
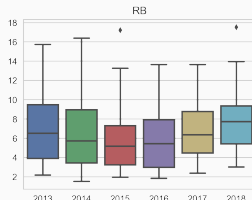
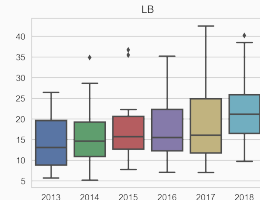
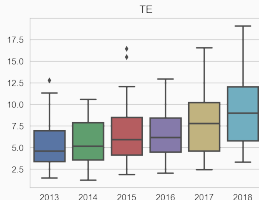
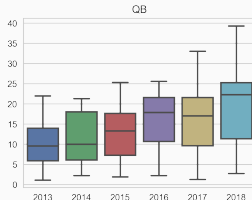
YEAR	AGE	BASE SALARY	SIGNING	ROSTER	WORKOUT	CAP HIT	DEAD CAP	YEARLY CASH	%
2016	25	\$675,000	\$6,179,636	-	-	\$6,854,636	<u>\$25,629,636</u>	\$13,425,000 (\$13,425,000)	
2017	26	\$6,857,977	\$2,550,000	-	\$50,000	\$9,457,977	<u>\$18,825,000</u>	\$6,907,977 (\$20,332,977)	
2018	27	\$11,150,000	\$2,550,000	-	\$250,000	\$13,950,000	<u>\$21,934,046</u>	\$11,400,000 (\$31,732,977)	✗

POTENTIAL OUT: 2019, 3 YR, \$33,450,000; \$8,384,046 DEAD CAP

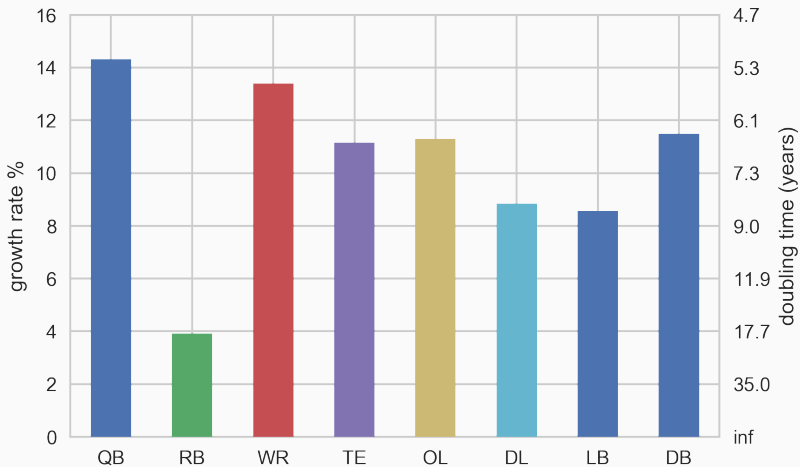
2019	28	\$9,850,000	\$2,550,000	\$500,000	\$250,000	\$13,150,000	<u>\$6,667,023</u>	\$10,600,000 (\$42,332,977)	✗
2020	29	\$8,750,000	\$2,550,000	\$500,000	\$250,000	\$12,050,000	<u>\$2,550,000</u>	\$9,500,000 (\$51,832,977)	✗
2021	30	\$10,750,000	-	\$500,000	\$250,000	\$11,500,000	-	\$11,500,000 (\$63,332,977)	✗
2022	31	UFA							

Contract Notes:

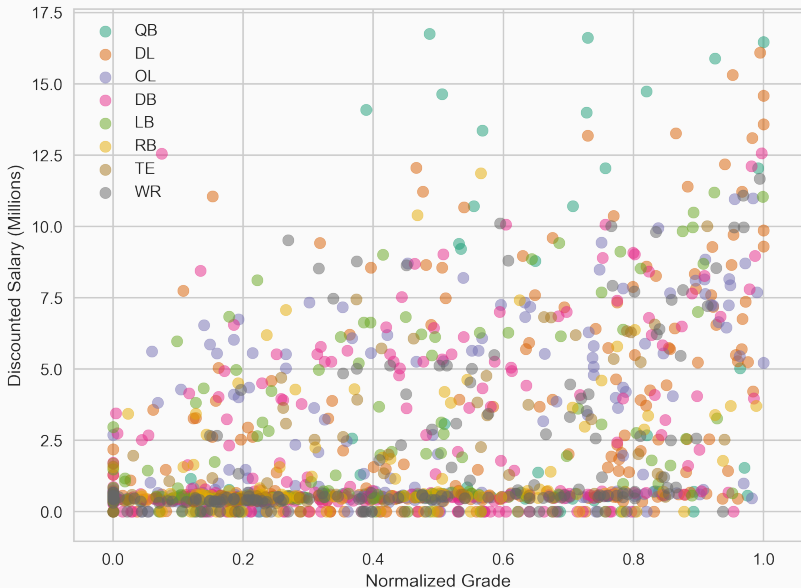
Positional Spending by Year



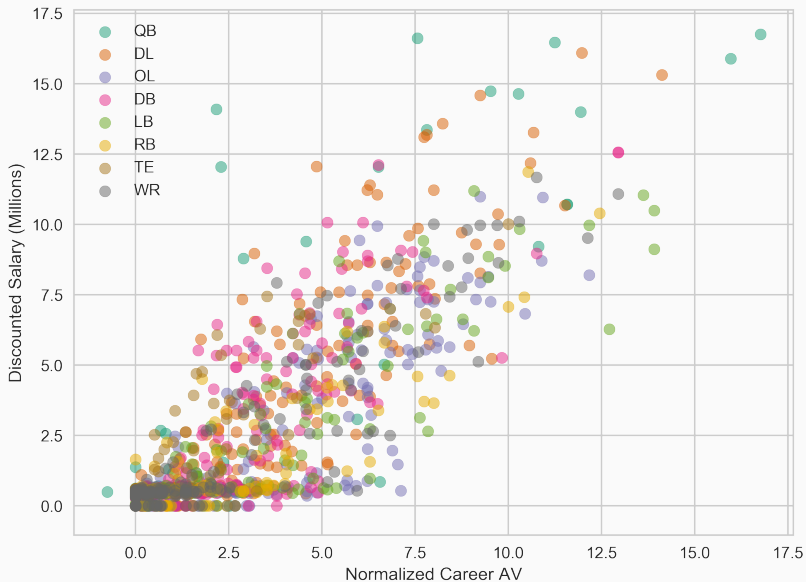
Growth Rate by Position



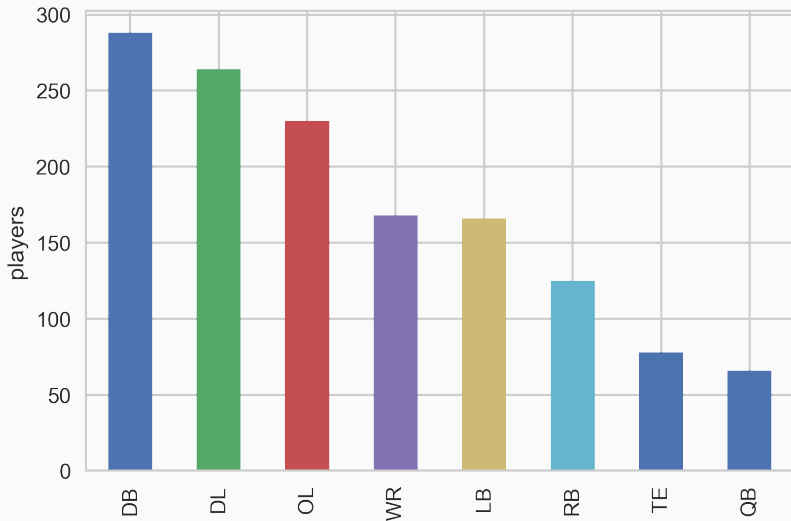
Normalized Grade versus Contract Value



Career Approximate Value versus Contract Value



Sample Sizes



Modeling

Models We Tried

Problem Type

1. Regression
2. Classification: stars, starters, backups, practice squad

Model Selection

1. Linear Regression
2. Support Vector Machines
3. Random Forests
4. Gradient Boosting Decision Trees
5. Neural Networks: Fully Connected and Recurrent

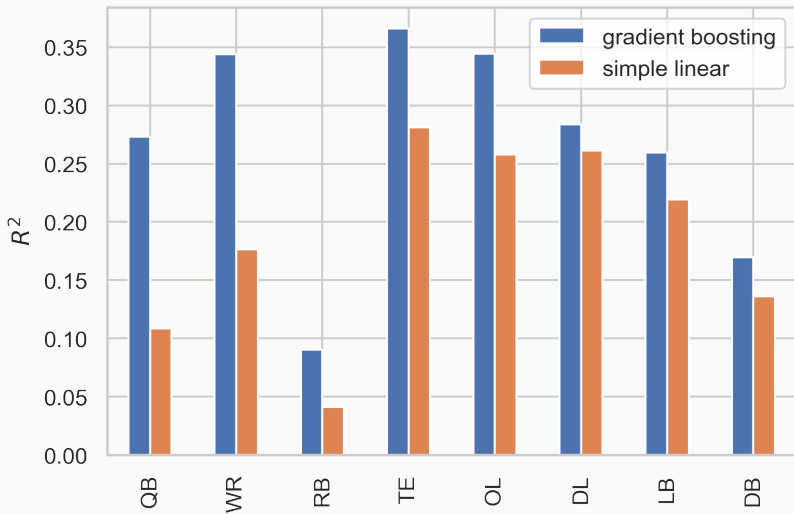


1. Regression on discounted salary
2. Train simple linear model with normalized grades
3. Train gradient boosting model with n-grams on residuals
4. Leave One Out cross validation due to small sample size
5. Models are trained and tuned per position



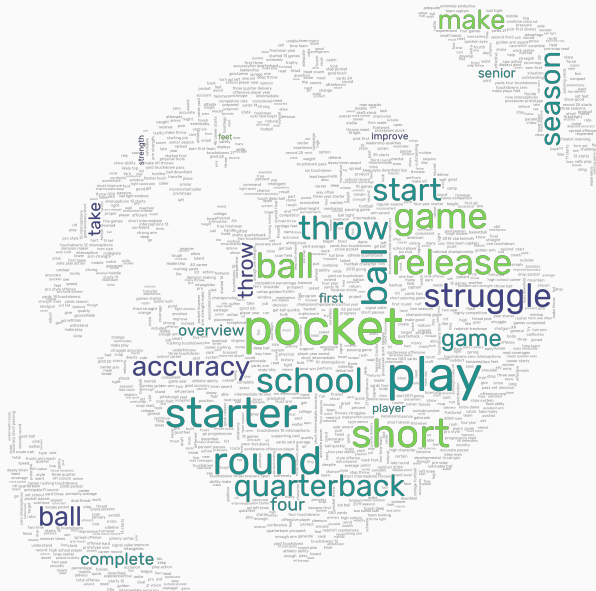
Results

R^2 Comparison



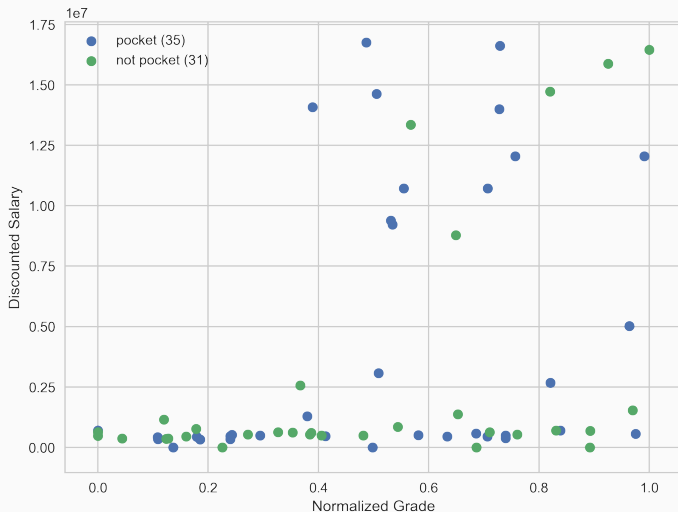
Quarterbacks

Strength
Weakness
Overview
Unused



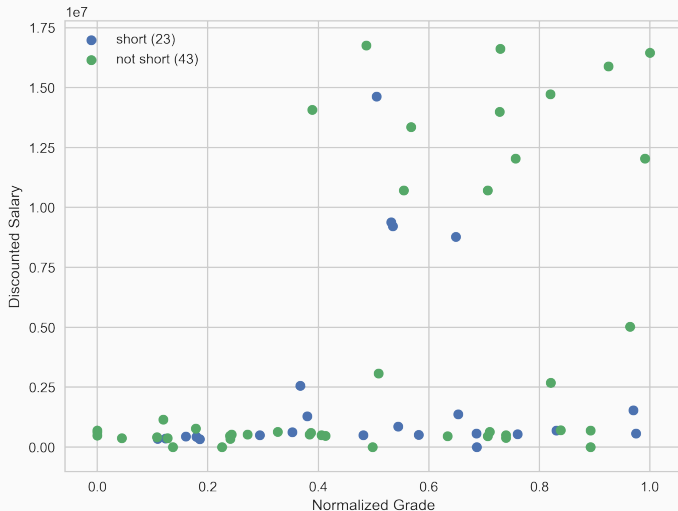
Quarterback Analysis: Strength "Pocket"

[Bradford] to stand in the pocket and take a hit.



Quarterback Analysis: Strength "Short"

[Ponder] Does a good job in the short passing game ...

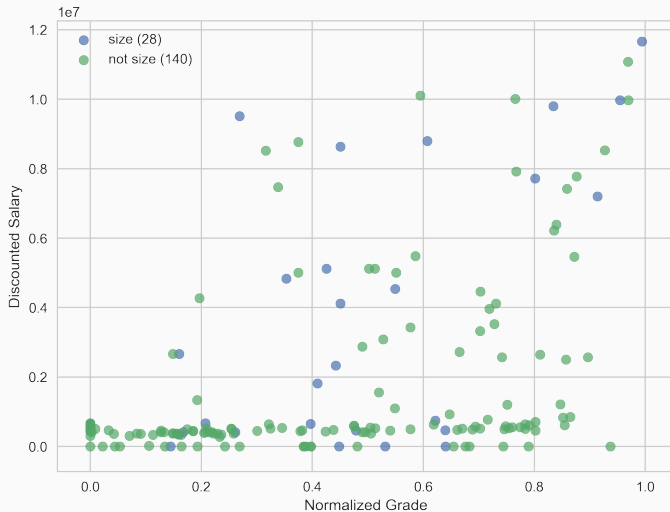


Strength
Weakness
Overview
Unused



Wide Receiver Analysis: Weakness "Size"

[Hopkins] Only average size for a starting outside receiver



Strength
Weakness
Overview
Unused



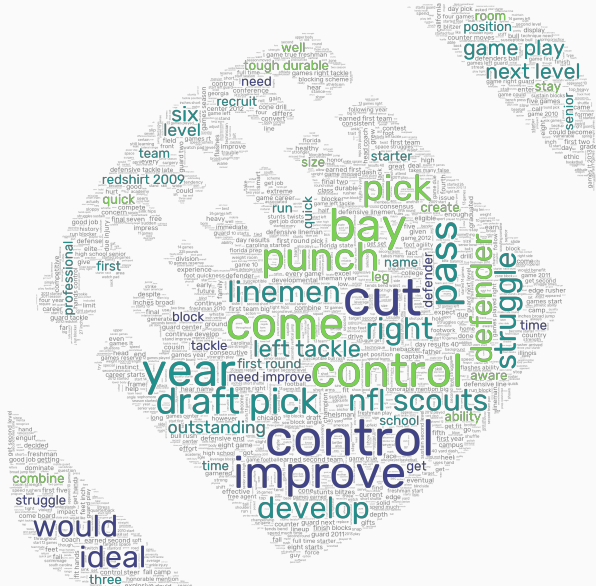
Offensive Linemen

Strength

Weakness

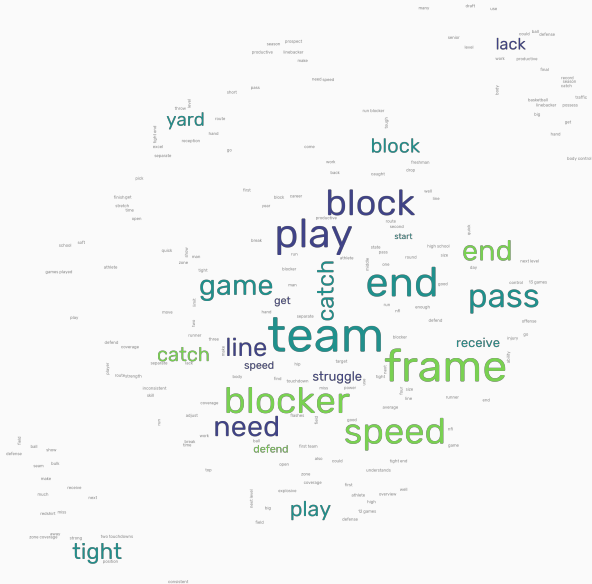
Overview

Unused



Tight Ends

Strength
Weakness
Overview
Unused

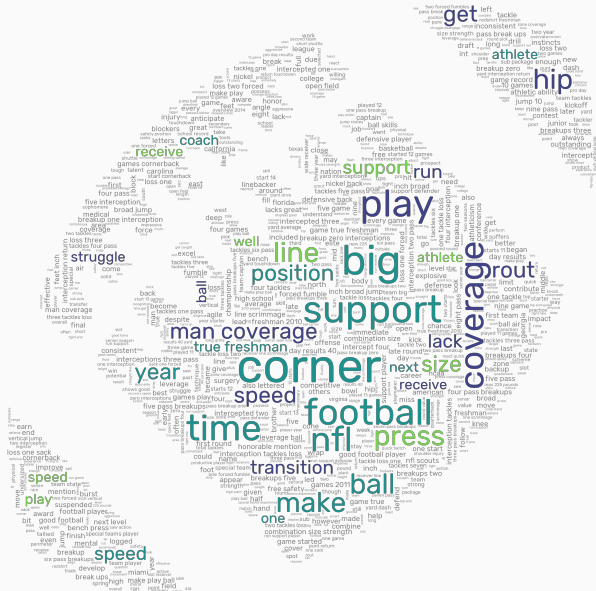


Strength
Weakness
Overview
Unused



Defensive Backs

Strength
Weakness
Overview
Unused



Future Work

1. Increase dataset by including undrafted players.
2. Collect data from more scouts.
3. Improve performance on lagging positions.
4. Evaluate metrics that teams care about, for example recall of predicting star players.



Takeaways

1. Everyone has biases including scouts!
2. We are not replacing scouts!
3. Scouting supplies data fundamental for this approach.
4. We address debiasing scouting reports.
5. We can give feedback to scouts to help them improve.
6. We show that we can improve prediction of player success through market value.



Thanks!



contact@deepfootball.com



deepfootball.com



@deepfootball

