Modeling Shot Efficiency In the NBA

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Introduction/Motivation

- “Good” shots versus “Bad” shots
- Situational variables have constant effect throughout all levels of play
- What are these situation variables? How much does each matter?

Data

- 122,502 shots from the 2014-2015 NBA season
- Response: binary
- Predictors: mix of categorical and continuous

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Variables:
Shot number --> The shot number for that player in that specific game (8 would mean it was the player's 8th shot in that game)
Shot_clock --> How many seconds were left on the shot clock when the player shot the basketball
Shot_distance --> How far away the player was from the basketball when shooting
Dribbles --> The number of dribbles the player took before shooting
Touch_time --> How long the player touched the ball for before shooting (after being passed to)
PTS_TYPE --> whether the shot was 2 or 3-pointer
Closest_Defender --> Who the closest defender was to the shooting player
Close_Def_Distance --> How far away said player was when the ball was shot
Player_name --> Who shot the ball
FGM --> Whether the shot went in or not (response variable)
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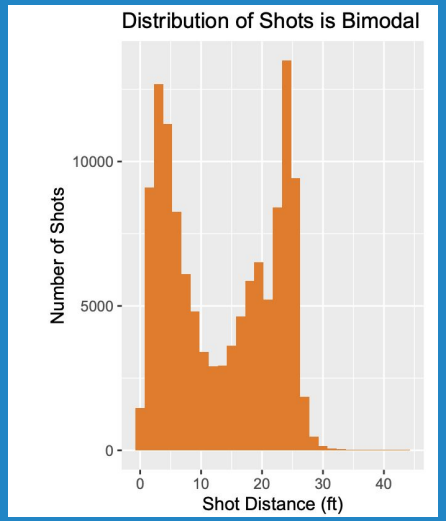
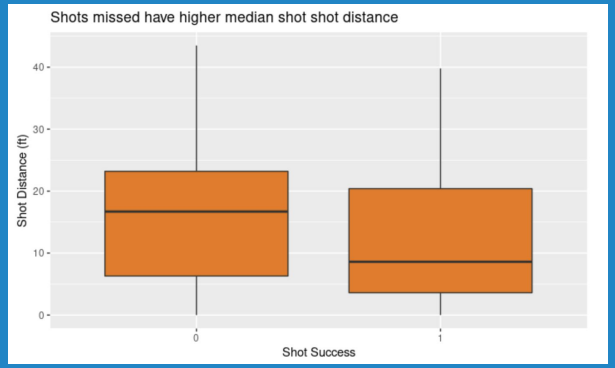
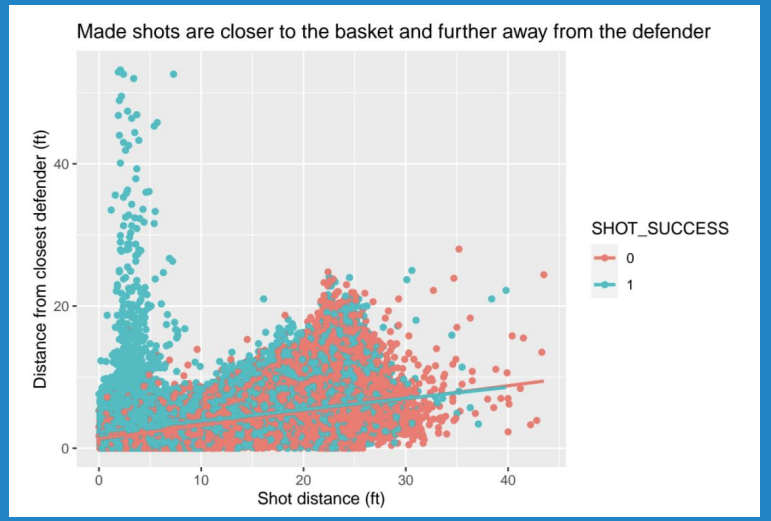
Exploratory Data Analysis







SHOT_SUCCESS	min	max	mean	sd	median	IQR
0	0	43.5	14.920	8.520	16.7	16.9
1	0	39.8	11.683	8.754	8.6	16.8

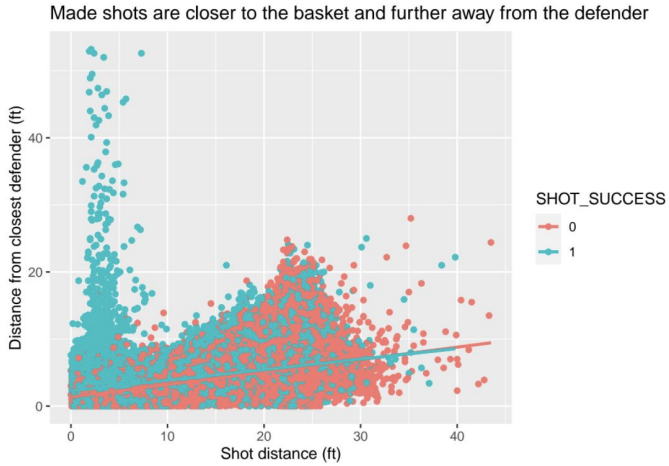
Modeling Process

- Logistic Regression
- Backwards selection with AIC as criteria
- Variables selected:

term	estimate	std.error	statistic	p.value
(Intercept)	-0.058	0.018	-3.171	0.002
SHOT_CLOCK	0.019	0.001	17.652	0.000
SHOT_DIST	-0.060	0.001	-69.588	0.000
CLOSE_DEF_DIST	0.108	0.003	38.807	0.000

Further Modeling: Interaction term

- EDA showed correlation betwe shot distance and defender distance
- Drop-in deviance test showed term was a good predictor



term	estimate	std.error	statistic	p.value	conf.low	conf.high
(Intercept)	-0.519	0.025	-20.346	0	-0.569	-0.469
SHOT_CLOCK	0.020	0.001	19.133	0	0.018	0.022
SHOT_DIST	-0.030	0.001	-21.579	0	-0.033	-0.028
CLOSE_DEF_DIST	0.264	0.007	39.128	0	0.251	0.277
SHOT_DIST:CLOSE_DEF_DIST	-0.009	0.000	-25.951	0	-0.009	-0.008

Conclusion/Future Work

- Certain situational variables ultimately have an influence on an NBA player's shot efficiency
- Incorporate categorical variables into our model
- Investigate shot success during "clutch" scenarios
- Using defensive metrics to evaluate role of defender