“NFL Combine” Player Analysis

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Introduction

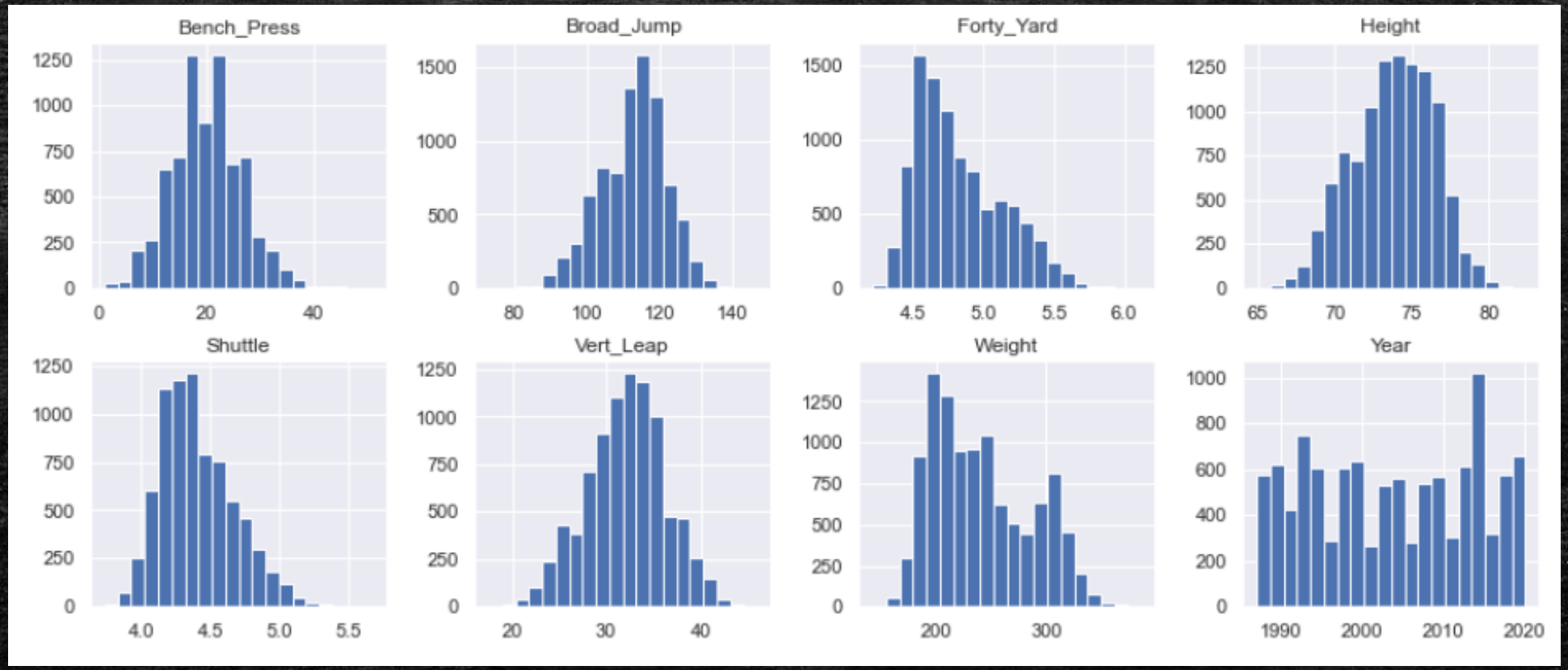
- Every year since 1985, the NFL invites eligible college football players to attend the NFL Scouting Combine. The invitation-only event evaluates players based on size, strength, speed, power, and agility through a series of physical tests.
- A player's performance at the combine can affect their draft status, which affects their earning potential. For some players, the combine represents their last chance at fulfilling their dream of becoming an NFL player.
- As the NFL has evolved, player positions have become more specialized, which has led to bigger, stronger, and faster players.
- This project will compare NFL combine results between two time periods: (1987-1999) and (2000-2020) and quantify how player performance has evolved between them.

Hypothesis: Have NFL players gotten bigger, faster, and stronger in the past 33 years?

Variables used in the analysis

Variable name	Description
Height	Measure of player height in inches
Weight	Measure of player weight in pounds.
Forty_Yard	Measure of the time elapsed for the player to run the 40-yard dash.
Bench_Press	Measure of the number of barbell bench press repetitions the player performed using 225 lb.
Vert_Leap	Measure of how high the player jumped
Broad_Jump	Measure of how far the player jumped horizontally from a standstill.
Shuttle	Measure of time elapsed to run a 20-yard lateral shuttle.
Year	The year the measurements were taken at the NFL Combine.
POS	Position that the player plays.

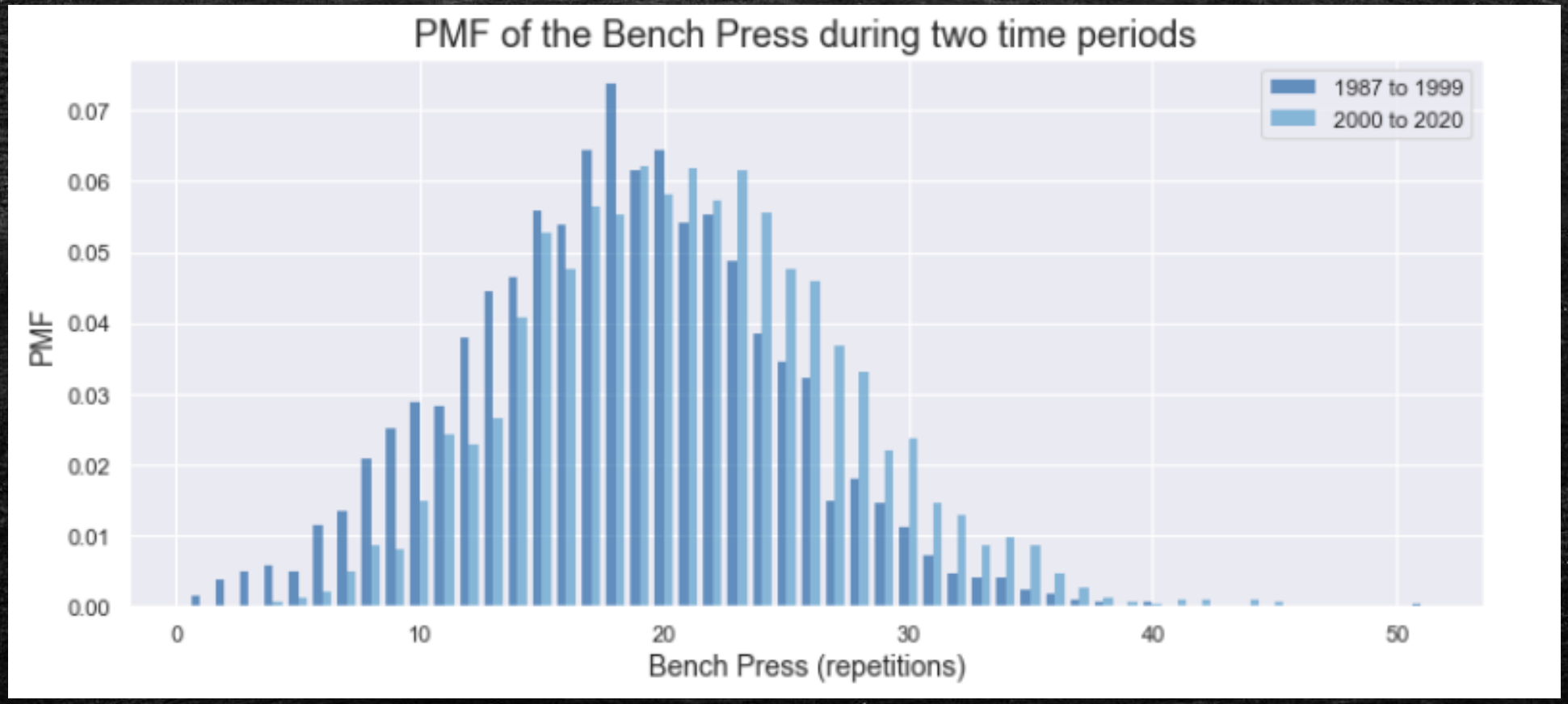
Histograms of the variables



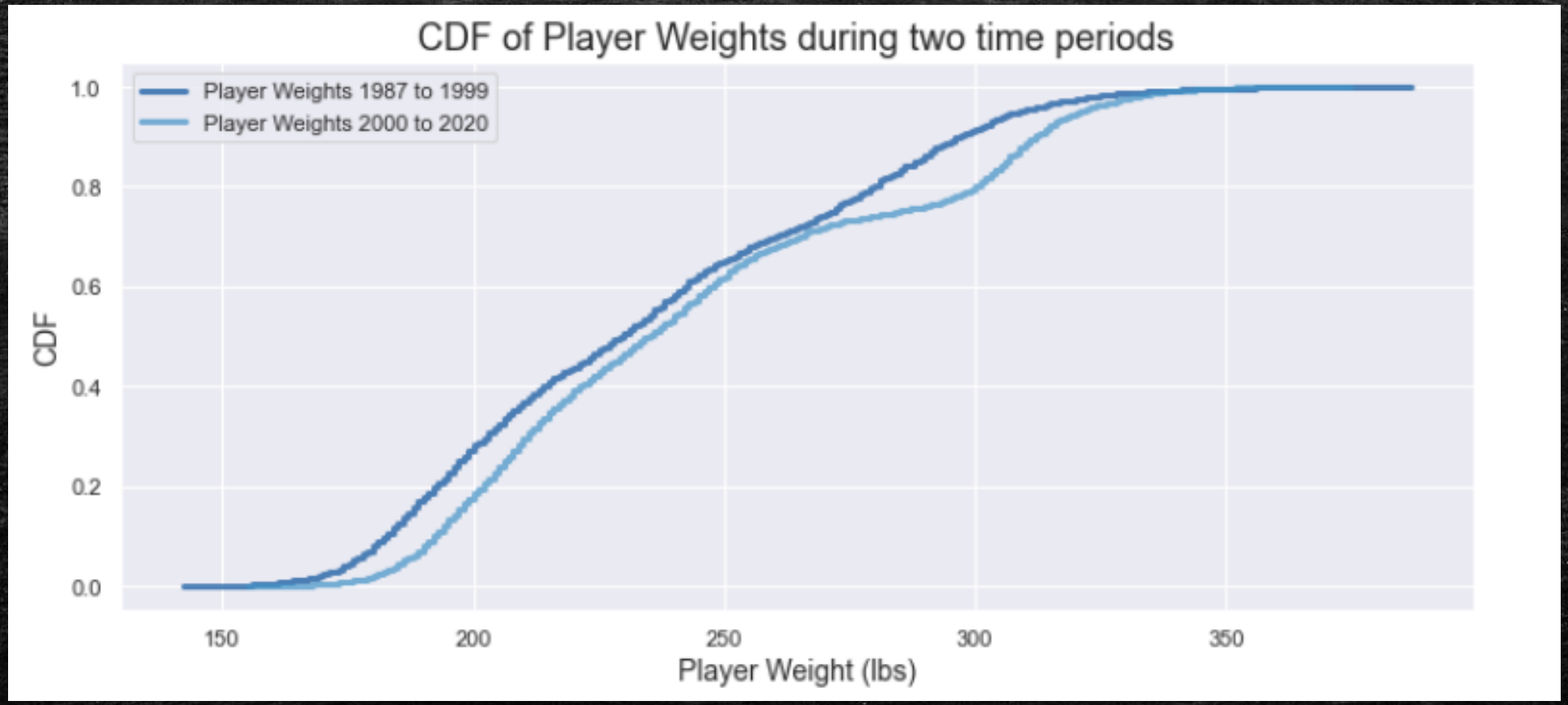
Descriptive Statistics

	Year	Height	Weight	Forty_Yard	Bench_Press	Vert_Leap	Broad_Jump	Shuttle
count	10906.000	10906.000	10906.000	9828.000	7457.000	8780.000	8617.000	7711.000
mean	2003.682	73.764	240.212	4.823	19.827	32.113	112.735	4.404
std	10.086	2.635	44.934	0.308	6.497	4.211	9.365	0.267
min	1987.000	64.900	142.000	4.210	1.000	17.500	7.000	3.730
25%	1994.000	71.900	203.000	4.580	15.000	29.000	107.000	4.200
50%	2004.000	74.000	232.000	4.750	20.000	32.500	114.000	4.370
75%	2013.000	75.800	275.000	5.030	24.000	35.000	119.000	4.570
max	2020.000	82.400	387.000	6.120	51.000	46.000	147.000	5.680
mode	2015.000	73.000	195.000	4.620	18.000	33.000	115.000	4.200

PMF of the Bench Press variable

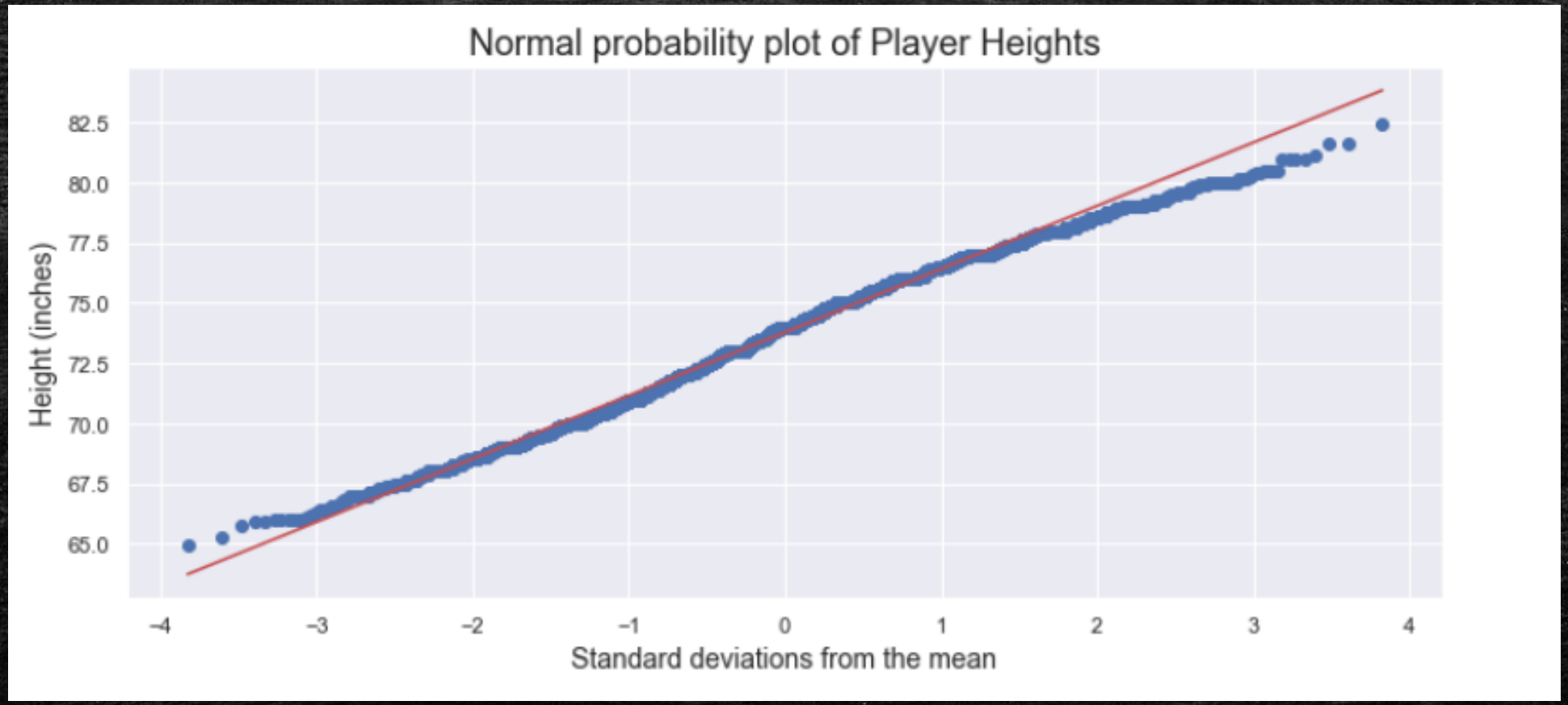


CDFs of Player Weights

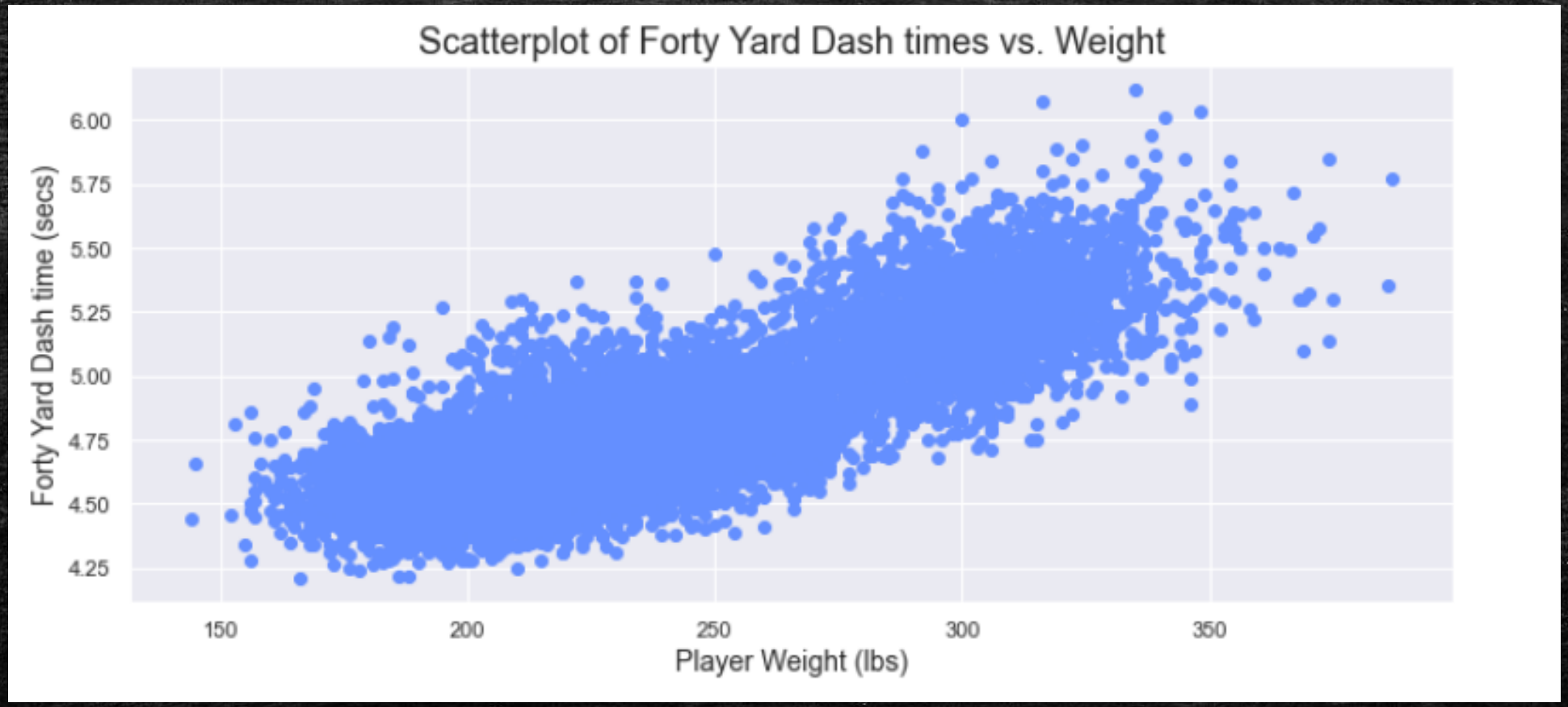


CDFs of Forty Yard dash times

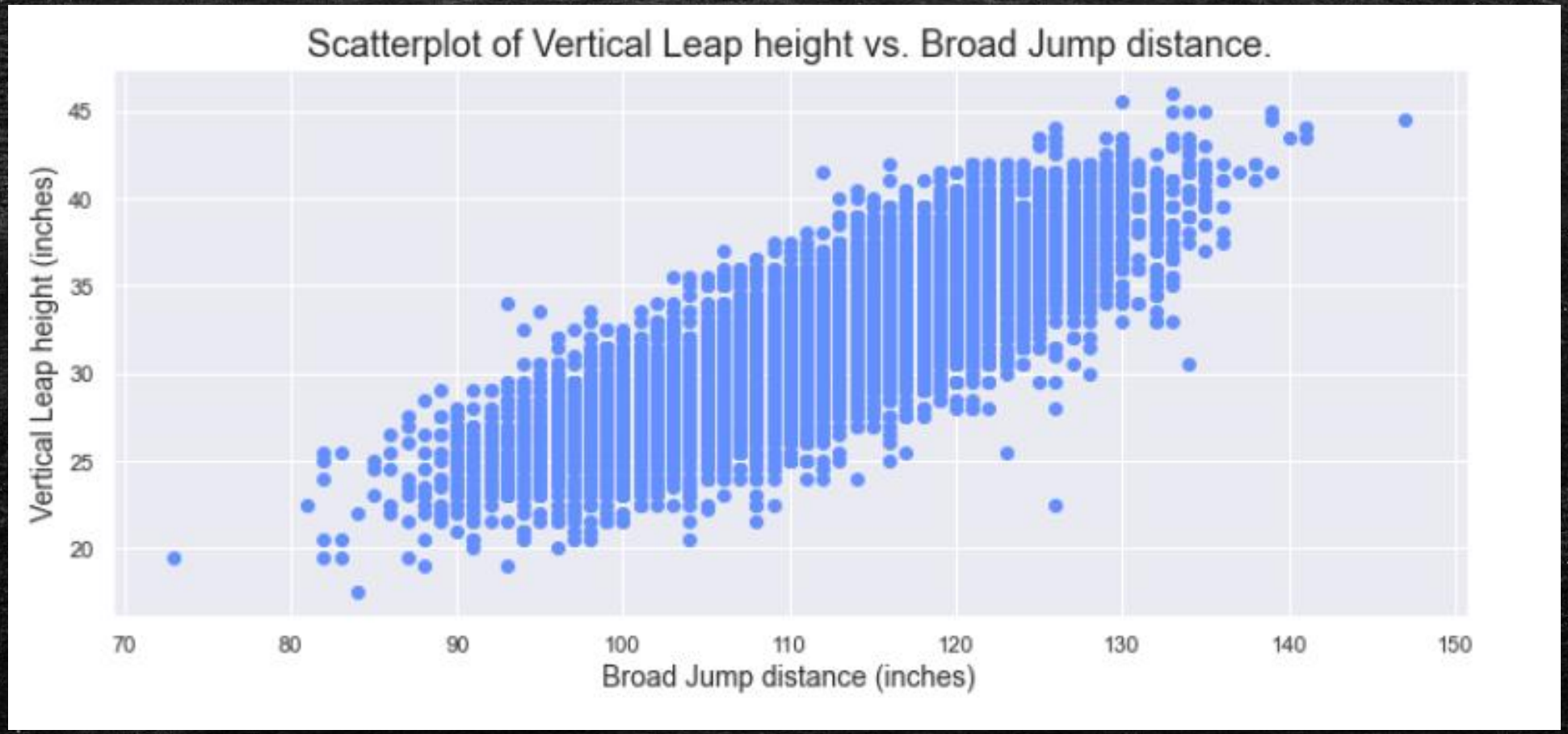
Normal probability plot of Player Heights



Scatterplot of Forty Yard Dash vs. Weight



Scatterplot of Vertical Leap vs. Broad Jump



Correlation matrix

	Year	Height	Weight	Forty_Yard	Bench_Press	Vert_Leap	Broad_Jump	Shuttle
Year	1.00	0.06	0.09	-0.14	0.18	0.20	0.23	-0.03
Height	0.06	1.00	0.73	0.62	0.37	-0.41	-0.41	0.53
Weight	0.09	0.73	1.00	0.83	0.63	-0.58	-0.64	0.73
Forty_Yard	-0.14	0.62	0.83	1.00	0.41	-0.75	-0.80	0.77
Bench_Press	0.18	0.37	0.63	0.41	1.00	-0.24	-0.30	0.34
Vert_Leap	0.20	-0.41	-0.58	-0.75	-0.24	1.00	0.82	-0.67
Broad_Jump	0.23	-0.41	-0.64	-0.80	-0.30	0.82	1.00	-0.68
Shuttle	-0.03	0.53	0.73	0.77	0.34	-0.67	-0.68	1.00

Hypothesis test: Have NFL players gotten bigger, faster, and stronger in the past 33 years?

Null Hypothesis

Any observed increases in player size, speed, and strength are due to chance.

Alternative Hypothesis

Observed Increases in player size, speed, and strength are statistically significant, and not due to chance.

Hypothesis testing confirmed that the observed changes were statistically significant. We therefore reject the null hypothesis that the observed changes were due to chance.

Linear Regression of Forty_Yard vs. Bench_Press + Shuttle

OLS Regression Results

Dep. Variable:	Forty_Yard	**R-squared:**	0.629
Model:	OLS	**Adj. R-squared:**	0.629
Method:	Least Squares	**F-statistic:**	4786.
Date:	Fri, 29 May 2020	**Prob (F-statistic):**	0.00
Time:	12:43:35	**Log-Likelihood:**	1244.0
No. Observations:	5644	**AIC:**	-2482.
Df Residuals:	5641	**BIC:**	-2462.
Df Model:	2		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.9165	0.043	21.331	0.000	0.832	1.001
Bench_Press	0.0076	0.000	18.157	0.000	0.007	0.008
Shuttle	0.8563	0.010	84.249	0.000	0.836	0.876

Omnibus:	11.596	**Durbin-Watson:**	1.125
Prob(Omnibus):	0.003	**Jarque-Bera (JB):**	12.094
Skew:	0.084	**Prob(JB):**	0.00236
Kurtosis:	3.152	**Cond. No.**	364.

Conclusions

NFL players have gotten bigger, faster and stronger in the past 33 years, and the results are statistically significant. Specifically, the observed changes below were all determined to be statistically significant, and not due to chance.

~ 20% increase in the Bench_Press repetitions across almost all positions.
~ 5% increase in the Vert_Leap height across most positions.
~ 3% increase in the Broad_Jump distance across most positions.
~ 3% increase in Weight across almost all positions.
~ 1.5% decrease in the Forty_Yard times across most positions.
~ 1% decrease in the Shuttle times across most positions.