

NFL Predictions Using Machine Learning

Description:

- Entire code:
<https://colab.research.google.com/drive/1LIMOTqhc291KjkUX0V1dfm2UCc1fh7-6?usp=sharing>
- Each game has 1021 feature engineered data values which are inputted into a neural network and used to output a score prediction, which has two values: away score and home score.
- Used an MLP Neural network to make predictions
 - Input layer: 1021 neurons
 - First hidden layer: 200 neurons
 - Second hidden layer: 100 neurons
 - Third hidden layer: 50 neurons
 - Output layer: 2 neurons

Week 1 Predictions

*all spreads according to CBS Sports

Game(away vs home):	Prediction(away team score, home team score):
Lions vs Chiefs(-4.5)*	[[16.54583023 , 24.1705384]])
Panthers vs Falcons(-3.5)	[18.59949374 , 22.07265043] ,
Texans vs Ravens(-9.5)	[18.58635952 , 24.07533031] ,
Bengals(-2) vs Browns	[22.21158879 , 20.43136462] ,
Jaguars(-5) vs Colts	[23.31908552 , 20.14302386] ,
Buccaneers vs Vikings(-5.5)	[18.4145496 , 22.83066224] ,
Titans vs Saints(-3)	[18.89484141 , 24.1626703] ,
49ers(-2.5) vs Steelers	[21.52448504 , 17.96687796] ,
Cardinals vs Commanders(-7)	[17.61056805 , 22.95213718] ,
Packers(-1) vs Bears	[28.15871659 , 20.47274104] ,

Week 1 Predictions(continued)

Game(away vs home):	Prediction(away team score, home team score):
Raiders vs Broncos(-3)	[23.89978501, 24.28440191],
Dolphins vs Chargers(-3)	[19.64340199, 23.02153485],
Eagles(-4) vs Patriots	[27.93915954, 20.11984066],
Rams vs Seahawks(-5)	[17.36264911, 22.58098882],
Cowboys(-3.5) vs Giants	[23.91604814, 20.74743245],
Bills(-2.5) vs Jets	[27.06638084, 21.79833111]])

Week 1 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Lions(21) vs Chiefs(20)	Chiefs	Chiefs	L	L
Panthers(10) vs Falcons(24)	Falcons	Panthers	W	L
Texans(9) vs Ravens(25)	Ravens	Texans	W	L
Bengals(3) vs Browns(24)	Bengals	Browns	L	W
Jaguars(31) vs Colts(21)	Jaguars	Colts	W	L
Buccaneers(20) vs Vikings(17)	Vikings	Buccaneers	L	W
Titans(15) vs Saints(16)	Saints	Saints	W	L
49ers(30) vs Steelers(7)	49ers	49ers	W	W

Week 1 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Cardinals (16) vs Commanders(20)	Commanders	Cardinals	W	W
Packers(38) vs Bears(20)	Packers	Packers	W	W
Raiders(17) vs Broncos(16)	Broncos	Raiders	L	W
Dolphins(36) vs Chargers(34)	Chargers	Chargers	L	L
Eagles(25) vs Patriots(20)	Eagles	Eagles	W	W
Rams(30) vs Seahawks(13)	Seahawks	Seahawks	L	L
Cowboys(40) vs Giants(0)	Cowboys	Giants	W	L
Bills(16) vs Jets(22)	Bills	Bills	L	L

Week 1 Results

Straight up: 9-7

Against the spread: 7-9

Week 2 Predictions

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Game(away vs home):	Prediction(away team score, home team score):
Vikings vs Eagles(-6)	[22.682641 , 33.10274957],
Packers vs Falcons(-1.5)	[26.13737826 , 21.78566456],
Raiders vs Bills(-8.5)	[20.8114653 , 31.20509525],
Ravens vs Bengals(-3)	[20.64731212 , 28.60163516],
Seahawks vs Lions(-4.5)	[22.88412507 , 27.51174536],
Colts vs Texans(-1)	[19.30266886 , 24.85533341],
Chiefs(-3.5) vs Jaguars	[27.7855853 , 20.25687581],
Bears vs Buccaneers(-2.5)	[13.300829 , 28.34990849],
Chargers(-3) vs Titans	[27.70159977 , 20.43811179],
Giants(-4) vs Cardinals	[31.73090764 , 27.10789442],

Week 2 Predictions(continued)

Game(away vs home):	Prediction(away team score, home team score)
49ers(-7.5) vs Rams	[26.1385538 , 20.64809721],
Jets vs Cowboys(-9)	[22.29383288, 32.2761006],
Commanders vs Broncos(-3.5)	[27.39892265, 24.50971985],
Dolphins(-3) vs Patriots	[23.25769236, 23.09640169],
Saints(-3) vs Panthers	[26.55876932, 25.6764085],
Browns(-2.5) vs Steelers	[17.3115403 , 24.45359796]])

Week 2 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Vikings(28) vs Eagles(34)	Eagles	Eagles	W	T
Packers(24) vs Falcons(25)	Packers	Packers	L	L
Raiders(10) vs Bills(38)	Bills	Bills	W	W
Ravens(27) vs Bengals(24)	Bengals	Bengals	L	L
Seahawks(37) vs Lions(31)	Lions	Lions	L	L
Colts(31) vs Texans(20)	Texans	Texans	L	L
Chiefs(17) vs Jaguars(9)	Chiefs	Chiefs	W	W
Bears(17) vs Buccaneers(27)	Bucs	Bucs	W	W

Week 2 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Chargers(24) vs Titans(27)	Chargers	Chargers	L	L
Giant(31)s vs Cardinals(28)	Giants	Giants	W	L
49ers(30) vs Rams(23)	49ers	Rams	W	W
Jets(10) vs Cowboys(30)	Cowboys	Cowboys	W	W
Commanders(35) vs Broncos(33)	Commanders	Commanders	W	W
Dolphins(24) vs Patriots(17)	Dolphins	Patriots	W	L
Saints(20) vs Panthers(17)	Saints	Panthers	W	T
Browns(22) vs Steelers(26)	Steelers	Steelers	W	W

Week 2 Results

Straight-up: 11-5

Against the spread: 7-7-2

Season Results:

Straight-up: 20-12

Against the spread: 14-16-2

Week 3 Predictions

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Game(away vs home):	Prediction(away team score, home team score):
Giants vs 49ers(-10.5)	[18.00830355, 30.94037788],
Colts vs Ravens(-7.5)	[16.45190604, 29.32929811],
Titans vs Browns(-3.5)	[18.72385488, 29.44506154],
Falcons vs Lions(-3)	[16.66306652, 26.09234018],
Saints vs Packers(-2)	[18.88365082, 23.57966616],
Texans vs Jaguars(-9)	[14.1357413 , 25.082596],
Broncos vs Dolphins(-6.5)	[20.41992678, 28.02968601],
Chargers vs Vikings(-1)	[20.6648018 , 27.53747353],
Patriots(-2.5) vs Jets	[18.84018933, 21.75237932],
Bills(-6.5) vs Commanders	[22.74570309, 22.48216296],

Week 3 Predictions(continued)

Game(away vs home):	Prediction(away team score, home team score)
Panthers vs Seahawks(-6)	[21.64906219 , 24.85429182],
Cowboys(-12) vs Cardinals	[27.0139492 , 21.56645565],
Bears vs Chiefs(-12.5)	[15.77446719 , 34.48097439],
Steelers vs Raiders(-2.5)	[26.23348184 , 25.79927817],
Eagles(-5) vs Buccaneers	[32.45676805 , 18.30230053],
Rams vs Bengals(-2.5)	[15.11338539 , 29.34502679]]

Week 3 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Giants(12) vs 49ers(30)	49ers	49ers	W	W
Colts(22) vs Ravens(19)	Ravens	Ravens	L	L
Titans(3) vs Browns(27)	Browns	Browns	W	W
Falcons(6) vs Lions(20)	Lions	Lions	W	W
Saints(17) vs Packers(18)	Packers	Packers	W	L
Texans(37) vs Jaguars(17)	Jaguars	Jaguars	L	L
Broncos(20) vs Dolphins(70)	Dolphins	Dolphins	W	W
Chargers(28) vs Vikings(24)	Vikings	Vikings	L	L

Week 3 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Patriots(15) vs Jets(10)	Jets	Jets	L	L
Bills(37) vs Commanders(3)	Bills	Commanders	W	L
Panthers(27) vs Seahawks(37)	Seahawks	Panthers	W	L
Cowboys(16) vs Cardinals(28)	Cowboys	Cardinals	L	W
Bears(10) vs Chiefs(41)	Chiefs	Chiefs	W	W
Steelers(23) vs Raiders(18)	Steelers	Steelers	W	W
Eagles(25) vs Buccaneers(11)	Eagles	Eagles	W	W
Rams(16) vs Bengals(19)	Bengals	Bengals	W	W

Week 3 Results

Straight-up: 11-5

Against the spread: 9-7

Season Results:

Straight-up: 31-17

Against the spread: 23-23-2

Week 4 Predictions

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Game(away vs home):	Prediction(away team score, home team score):
Lions(-2) vs Packers	[19.34120494 , 19.92266766],
Falcons vs Jaguars(-3)	[21.12680505 , 20.79726454],
Dolphins vs Bills(-2.5)	[14.42783472 , 25.09145055],
Vikings(-4) vs Panthers	[27.75167124 , 25.02793234],
Broncos(-3.5) vs Bears	[28.2145577 , 12.95995296],
Ravens vs Browns(-3)	[16.85179107 , 22.18288068],
Steelers(-3) vs Texans	[26.68563738 , 14.47873593],
Rams vs Colts (PICK)	[19.7983657 , 20.05665405],

Week 4 Predictions(continued)

Game(away vs home):	Prediction(away team score, home team score)
Buccaneers vs Saints(-3)	[24.01781175, 23.78968435],
Commanders vs Eagles(-8)	[14.37785431, 26.62808061],
Bengals(-2) vs Titans	[19.19562758, 16.09053577],
Raiders vs Chargers(-5.5)	[12.43470727, 23.25954327],
Patriots vs Cowboys(-6.5)	[21.96137685, 26.57180441],
Cardinals vs 49ers(-14)	[12.21231969, 28.15884216],
Chiefs(-9.5) vs Jets	[27.64784873, 15.34599383],
Seahawks vs Giants(PICK)	[18.74766177, 21.80128746]]

Week 4 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Lions(34) vs Packers(20)	Packers	Packers	L	L
Falcons(7) vs Jaguars(23)	Falcons	Falcons	L	L
Dolphins(20) vs Bills(48)	Bills	Bills	W	W
Vikings(21) vs Panthers(13)	Vikings	Panthers	W	L
Broncos(31) vs Bears(28)	Broncos	Broncos	W	L
Ravens(28) vs Browns(3)	Browns	Browns	L	L
Steelers(6) vs Texans(30)	Steelers	Steelers	L	L
Rams(29) vs Colts(23)	Rams	Rams	L	L

Week 4 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Buccaneers(26) vs Saints(9)	Buccaneers	Buccaneers	W	W
Commanders(31) vs Eagles(34)	Eagles	Eagles	W	L
Bengals(3) vs Titans(27)	Bengals	Bengals	L	L
Raiders(17) vs Chargers(24)	Chargers	Chargers	W	W
Patriots(3) vs Cowboys(38)	Cowboys	Patriots	W	L
Cardinals(16) vs 49ers(35)	49ers	49ers	W	W
Chiefs(23) vs Jets(20)	Chiefs	Chiefs	W	L
Seahawks(24) vs Giants(3)	Giants	Giants	L	L

Week 4 Results

Straight-up: 9-7

Against the spread: 4-12

Season Results:

Straight-up: 40-24

Against the spread: 27-35-2

Week 5 Predictions

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Game(away vs home):	Prediction(away team score, home team score):
Bears vs Commanders(-5.5)	[14.79622214 , 23.10478723]
Jaguars vs Bills(-5.5)	[14.7356117 , 28.03364486]
Texans vs Falcons(-2)	[15.11034551 , 10.8294454]
Panthers vs Lions(-10)	[14.52233986 , 21.03983604]
Titans(-2) vs Colts	[19.76945121 , 24.3049831]
Giants vs Dolphins(-11)	[24.43106187 , 37.13112198]
Saints vs Patriots(-1)	[22.44884484 , 21.824546]

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Week 5 Predictions(continued)

Game(away vs home):	Prediction(away team score, home team score)
Ravens(-4) vs Steelers	[18.84890652 , 15.59772151] ,
Bengals(-3) vs Cardinals	[23.61362434 , 20.42800713] ,
Eagles(-4.5) vs Rams	[26.80433211 , 20.19448026] ,
Jets vs Broncos(-1.5)	[23.77269078 , 29.92648727] ,
Chiefs(-4) vs Vikings	[27.33180231 , 21.20556095] ,
Cowboys vs 49ers(-3.5)	[23.61404923 , 30.00371466] ,
Packers(-1) vs Raiders	[21.2584258 , 21.83698598]]

Week 5 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Bears(40) vs Commanders(20)	Commanders	Commanders	L	L
Jaguars(25) vs Bills(20)	Bills	Bills	L	L
Texans(19) vs Falcons(21)	Texans	Texans	L	T
Panthers(24) vs Lions(42)	Lions	Panthers	W	L
Titans(16) vs Colts(23)	Colts	Colts	W	W
Giants(16) vs Dolphins(31)	Dolphins	Dolphins	W	W
Saints(34) vs Patriots(0)	Saints	Saints	W	W

Week 5 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Ravens(10) vs Steelers(17)	Ravens	Steelers	L	W
Bengals(34) vs Cardinals(20)	Bengals	Bengals	W	W
Eagles(23) vs Rams(14)	Eagles	Eagles	W	W
Jets(31) vs Broncos(21)	Broncos	Broncos	L	L
Chiefs(27) vs Vikings(20)	Chiefs	Chiefs	W	W
Cowboys(10) vs 49ers(42)	49ers	49ers	W	W
Packers(13) vs Raiders(17)	Raiders	Raiders	W	W

Week 5 Results

Straight-up: 9-5

Against the spread: 9-4-1

Season Results:

Straight-up: 49-29

Against the spread: 36-39-3

Week 6 Predictions

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Game(away vs home):	Prediction(away team score, home team score):
Broncos vs Chiefs(-10.5)	[16.36297852, 34.52043882],
Ravens(-4) vs Titans	[15.64148368, 14.19049613],
Commanders vs Falcons(-2.5)	[23.94936478, 18.92388066],
Vikings(-2.5) vs Bears	[34.72198505, 21.04542249],
Seahawks vs Bengals(-2.5)	[20.88913934, 27.28088417],
49ers(-7) vs Browns	[30.99449731, 18.95703289],
Saints(-1.5) vs Texans	[22.39473672, 22.31514289],
Colts vs Jaguars(-4)	[18.54727639, 22.52395413],
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Week 6 Predictions(continued)

Game(away vs home):	Prediction(away team score, home team score)
Panthers vs Dolphins(-13.5)	[14.19198885, 38.19554132],
Patriots vs Raiders(-3)	[19.57684148, 19.04444623],
Cardinals vs Rams(-7)	[13.13622941, 24.38692282],
Eagles(-7) vs Jets	[30.86352132, 18.82282969],
Lions(-3) vs Buccaneers	[19.25888096, 18.99729144],
Giants vs Bills(-14)	[20.72140049, 27.73936353],
Cowboys(-2.5) vs Chargers	[26.2596937, 22.05345331]]]

Week 6 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Broncos(8) vs Chiefs(19)	Chiefs	Chiefs	W	W
Ravens(24) vs Titans(16)	Ravens	Titans	W	L
Commanders(24) vs Falcons(16)	Commanders	Commanders	W	W
Vikings(19) vs Bears(13)	Vikings	Vikings	W	W
Seahawks(13) vs Bengals(17)	Bengals	Bengals	W	W
49ers(17) vs Browns(19)	49ers	49ers	L	L
Saints(13) vs Texans(20)	Saints	Texans	L	W
Colts(20) vs Jaguars(37)	Jaguars	Colts	W	L

Week 6 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Panthers(24) vs Dolphins(42)	Dolphins	Dolphins	W	W
Patriots(17) vs Raiders(21)	Patriots	Patriots	L	L
Cardinals(9) vs Rams(26)	Rams	Rams	W	W
Eagles(14) vs Jets(20)	Eagles	Eagles	L	L
Lions(20) vs Buccaneers(6)	Lions	Buccaneers	W	L
Giants(9) vs Bills(14)	Bills	Giants	W	W
Cowboys(20) vs Chargers(17)	Cowboys	Cowboys	W	W

Week 6 Results

Straight-up: 11-4

Against the spread: 9-6

Season Results:

Straight-up: 60-33

Against the spread: 45-45-3

Week 7 Predictions

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Game(away vs home):	Prediction(away team score, home team score):
Jaguars vs Saints(-1)	[23.83596272, 22.79190626],
Lions vs Ravens(-3)	[26.7305566 , 25.06952023],
Raiders(-3) vs Bears	[26.87798553, 24.7891254],
Browns(-2.5) vs Colts	[26.27972174, 19.78003455],
Bills(-8.5) vs Patriots	[34.30950167, 16.58576407],
Commanders(-2.5) vs Giants	[23.76980297, 18.78423194],
Falcons vs Buccaneers(-2.5)	[23.67283631, 27.09430708],

Week 7 Predictions(continued)

Game(away vs home):	Prediction(away team score, home team score)
Steelers vs Rams(-3)	[20.03591752, 29.60101951],
Cardinals vs Seahawks(-7.5)	[21.18497408, 31.53174258],
Packers(-1) vs Broncos	[26.41019542, 25.30178051],
Chargers vs Chiefs(-5.5)	[21.54311833, 21.73050396],
Dolphins vs Eagles(-2.5)	[22.65283492, 24.01931165],
49ers(-7) vs Vikings	[21.64963455, 13.84295575]]

Week 7 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Jaguars(31) vs Saints(24)	Jaguars	Jaguars	W	W
Lions(6) vs Ravens(38)	Lions	Lions	L	L
Raiders(12) vs Bears(30)	Raiders	Bears	L	W
Browns(39) vs Colts(38)	Browns	Browns	W	L
Bills(25) vs Patriots(29)	Bills	Bills	L	L
Commanders(7) vs Giants(14)	Commanders	Commanders	L	L
Falcons(16) vs Buccaneers(13)	Buccaneers	Buccaneers	L	L

Week 7 Results

Game Results	Prediction: win/loss	Prediction: against the spread	Prediction result: straight-up	Prediction result: against the spread
Steelers(24) vs Rams(17)	Rams	Rams	L	L
Cardinals(10) vs Seahawks(20)	Seahawks	Seahawks	W	W
Packers(17) vs Broncos(19)	Packers	Packers	L	L
Chargers(17) vs Chiefs(31)	Chiefs	Chargers	W	L
Dolphins(17) vs Eagles(31)	Eagles	Dolphins	W	L
49ers(17) vs Vikings(22)	49ers	49ers	L	L

Week 7 Results

Straight-up: 5-8

Against the spread: 3-10

Season Results:

Straight-up: 65-41

Against the spread: 48-55-3