FiFA World Cup Prediction

Group Members

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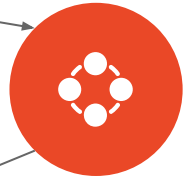
Project Road Map

Data Collection

DataSet of International matches of last two decades

Data Pre-Processing

Prepare the raw data for further informative analysis

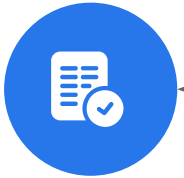


Train and Test

Dividing the data into train and test set for model training

Evaluate models

Implementing models on train and test set



Analysis

After evaluating each model we can assess the performance of different models

Feature

- date
- home_team
- away_team
- home_team_continent
- away_team_continent
- home_team_fifa_rank
- away_team_fifa_rank
- home_team_total_fifa_points
- away_team_total_fifa_points
- home_team_score
- away_team_score
- tournament

- city
- country
- neutral_location
- shoot_out
- home_team_result
- home_team_goalkeeper_score
- away_team_goalkeeper_score
- home_team_mean_defense_score
- home_team_mean_offense_score
- home_team_mean_midfield_score
- away_team_mean_defense_score
- away_team_mean_offense_score
- away_team_mean_midflield_

Data Pre-Processing

01

Handling NULL Values

Imputing Mean Values

02

Feature engineering

Analyzing Features to Improve the performance of machine learning models

03

Feature Selection

Selecting features based on our defined problem to reduce overfitting and increase model performance

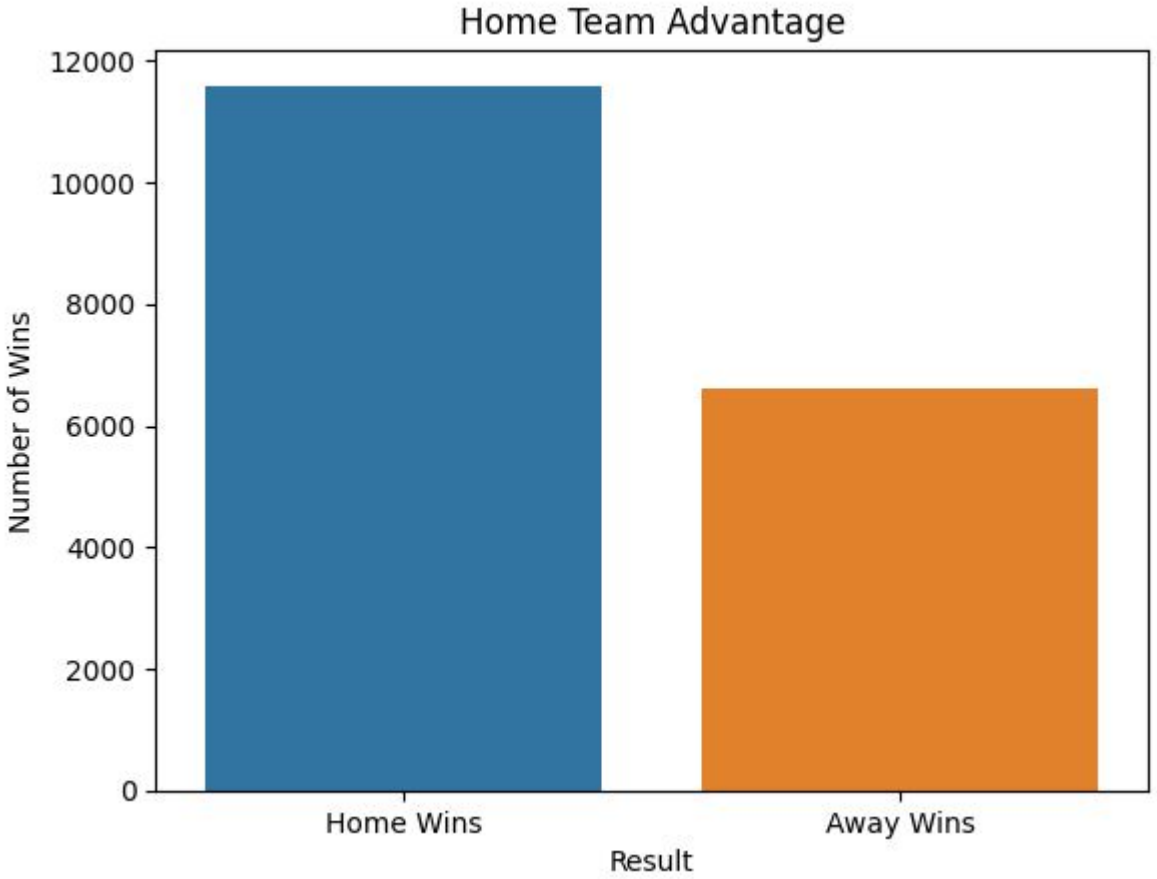
Feature Engineering

Home Team Advantage

-Analyzing if a team has an advantage when they play on their home ground or not

Ecuador, which has won 5 matches and encountered no losses while playing at their home ground.

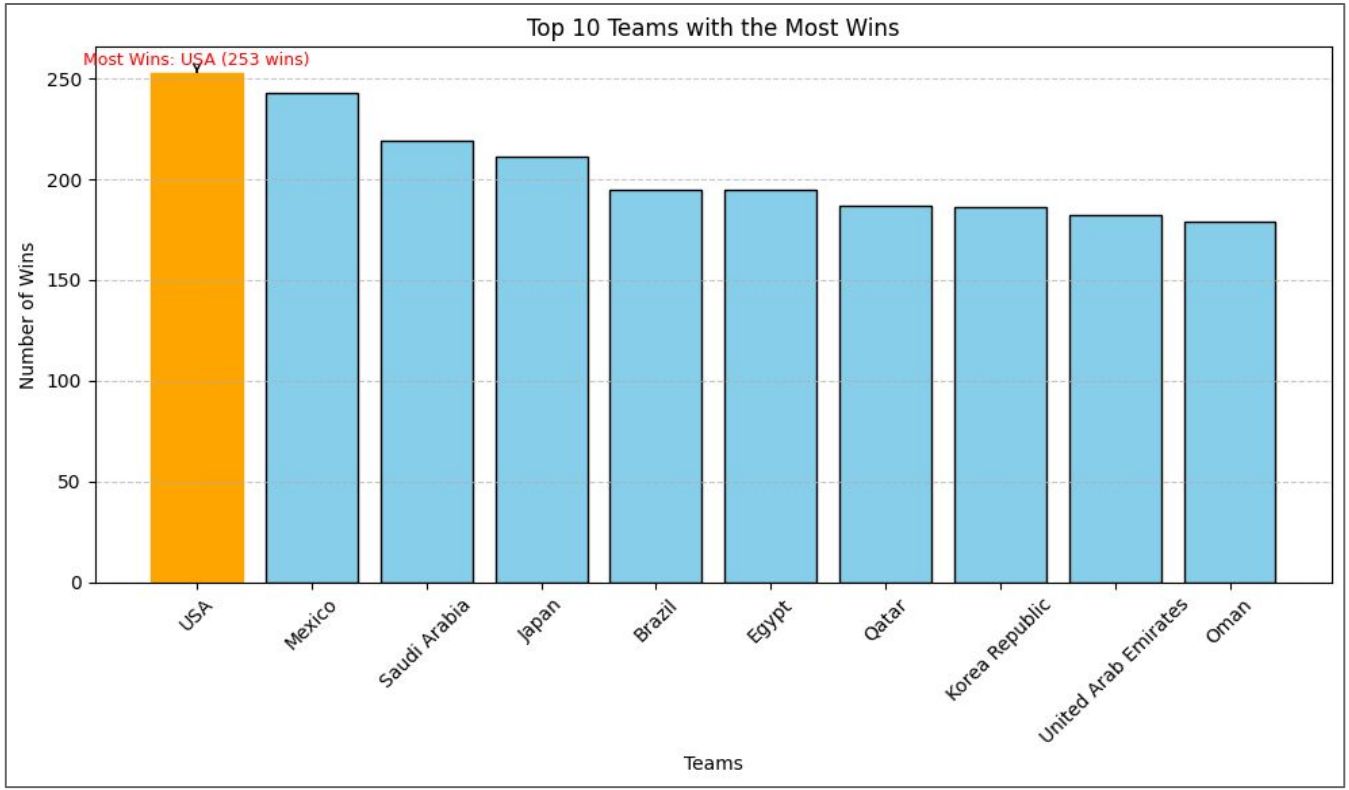
	country	Home_team_win	Home_team_loss
0	Bolivia	3	1
2	Ecuador	5	0
3	Guinea	1	0
6	Zimbabwe	2	0
7	Guinea	4	0



Home Team Advantage is clearly evident from the following bar chart.

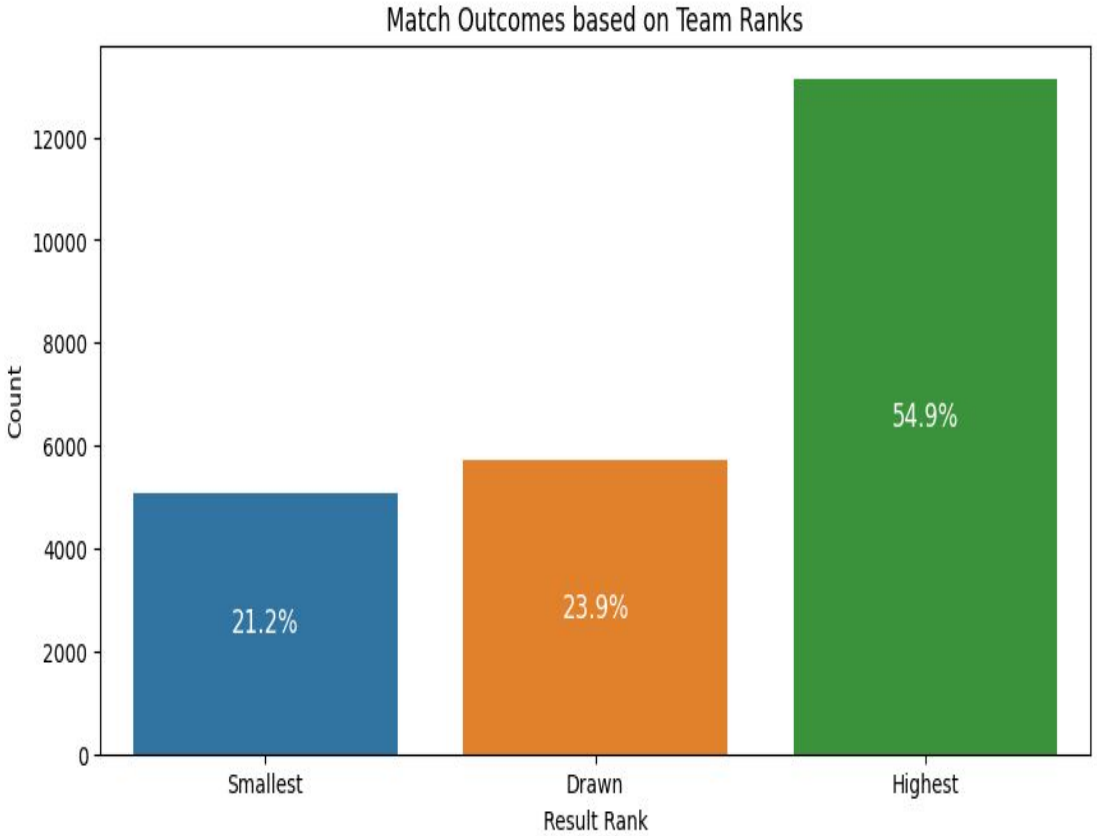
-Home wins indicating wins on their home ground which is significantly higher

Country with most Wins



-Based on previous records, USA has most wins

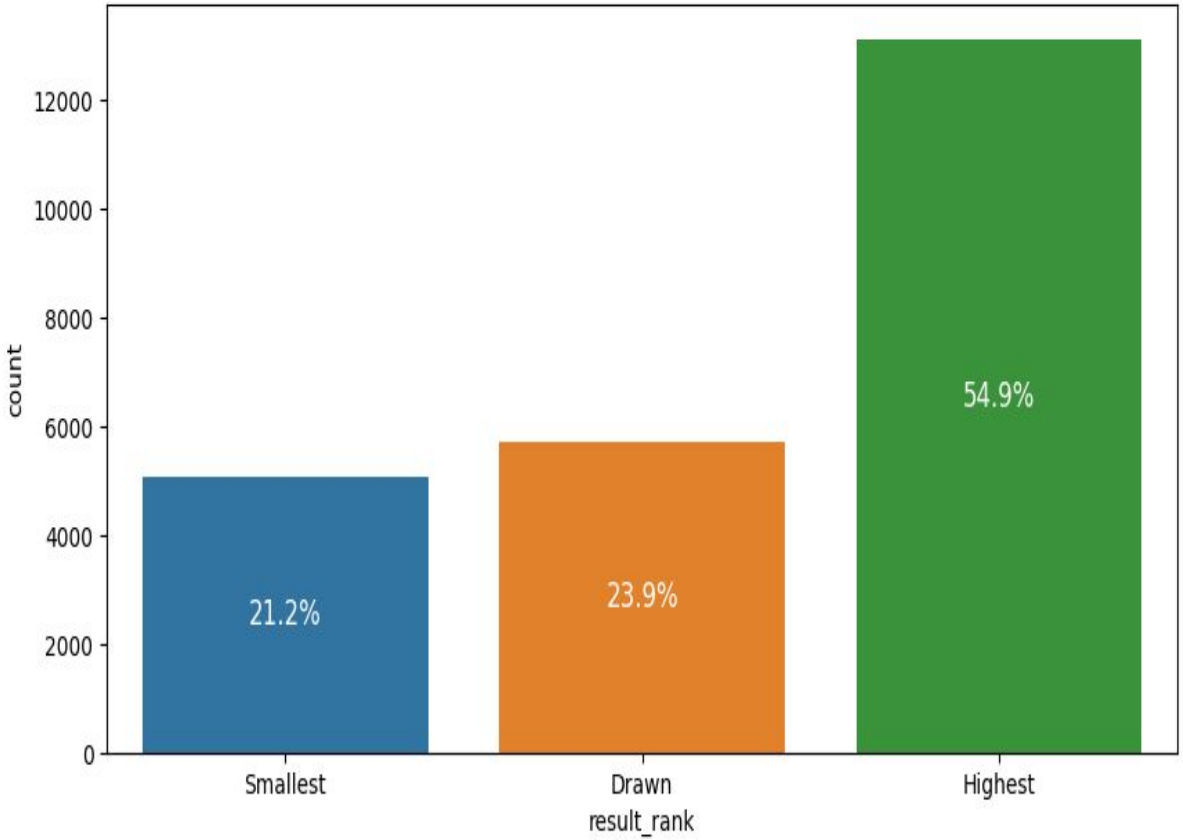
Evaluating Winning Percentage Based on Rankings



-Based on the Fifa ranking , what are the odds of a team winning the final match

Comparing Winning Percentages Based on Attacking Rate

-comparing winning percentages based on attacking rates is crucial as it sheds light on the significance of offense in determining match outcomes.



Machine Learning Infographics

01

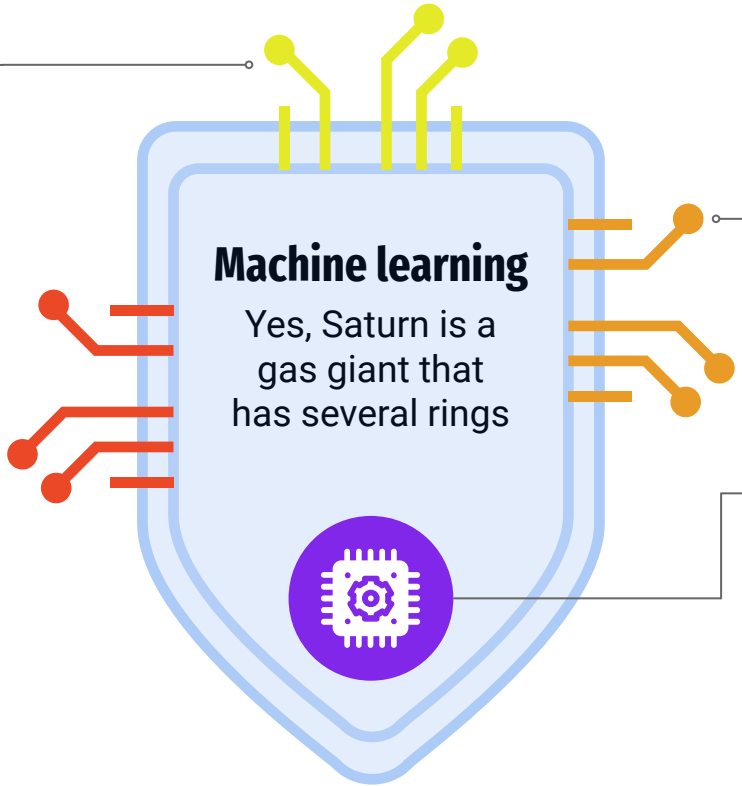
Mercury

Mercury is the closest planet to the Sun

02

Venus

Venus has a beautiful name, but it's hot



03

Earth

The Earth is the third planet from the Sun

04

Mars

Despite being red, Mars is a cold place

Machine Learning Infographics

Machine learning
Saturn is the gas giant that has rings

Earth
The Earth is the third planet from the Sun

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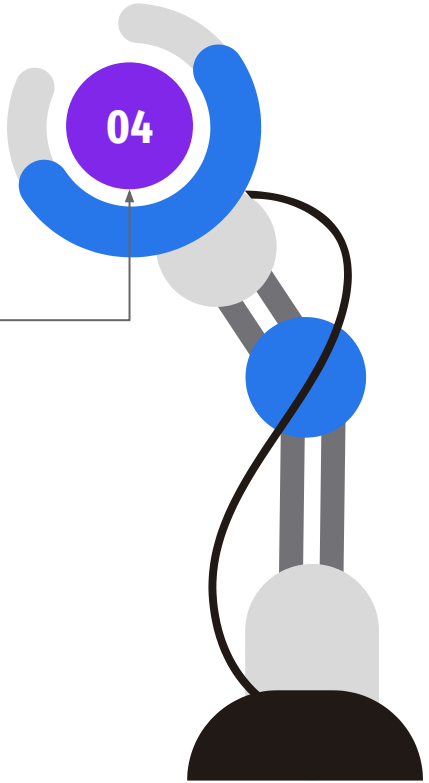
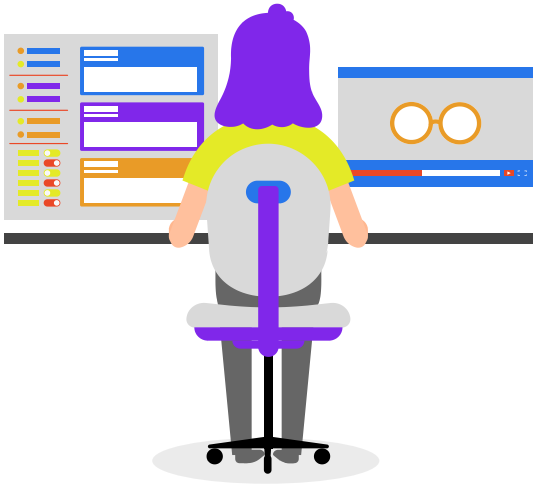


Do teams with stronger offensive scores have more goals?

First we founded the offscore of participated teams



	Team	of score
0	Argentina	88.25
1	Brazil	86.55
2	Spain	85.87
3	France	85.70
4	Netherlands	85.47
5	England	85.09
6	Portugal	84.93
7	Uruguay	83.60
8	Germany	83.59
9	Belgium	81.71
10	Croatia	80.08
11	Senegal	79.83
12	Poland	79.26
13	Mexico	79.21
14	Cameroon	78.72
15	Serbia	78.26
16	Denmark	77.49
17	Morocco	77.01
18	Switzerland	76.51
19	USA	76.03
20	Ecuador	75.37
21	Korea Republic	75.07
22	Ghana	74.54
23	Australia	74.43
24	Wales	74.35
25	Japan	72.80
26	Tunisia	71.40
27	Costa Rica	71.22
28	Canada	71.19
29	IR Iran	70.98
30	Saudi Arabia	70.52

Columns for Team,Conceded goals home and away,

	Team	Conceded goals home	Conceded goals away
1	Brazil	141	159
2	Spain	107	141
3	Germany	220	171
4	IR Iran	115	165
5	Netherlands	145	142
6	France	154	112
7	Portugal	124	144
8	England	132	119
9	Japan	273	153
10	Mexico	272	247
11	Australia	127	164
12	Argentina	140	192
13	USA	261	191
14	Saudi Arabia	239	246
15	Korea Republic	202	211
16	Morocco	113	127
17	Belgium	162	167
18	Croatia	133	182
19	Tunisia	137	192
20	Denmark	135	163
21	Senegal	91	198
22	Qatar	234	214
23	Poland	169	223
24	Switzerland	152	166
25	Uruguay	124	259
26	Cameroon	111	209
27	Ghana	113	236
28	Costa Rica	157	316
29	Serbia	78	115
30	Canada	85	191
31	Ecuador	130	284
32	Wales	134	160

Columns for Scored goals home ,away and total scored goals

	Scored goals home	Scored goals away	Total scored goals
1	558	396	954
2	469	312	781
3	544	331	875
4	425	288	713
5	426	274	700
6	447	223	670
7	424	244	668
8	384	246	630
9	533	243	776
10	572	286	858
11	435	194	629
12	379	278	657
13	589	172	761
14	514	248	762
15	444	241	685
16	347	149	496
17	350	213	563
18	294	251	545
19	355	195	550
20	278	226	504
21	258	194	452
22	422	176	598
23	306	234	540
24	273	191	464
25	257	247	504
26	235	201	436
27	267	197	464
28	319	233	552
29	142	125	267
30	157	154	311
31	257	180	437
32	160	113	273

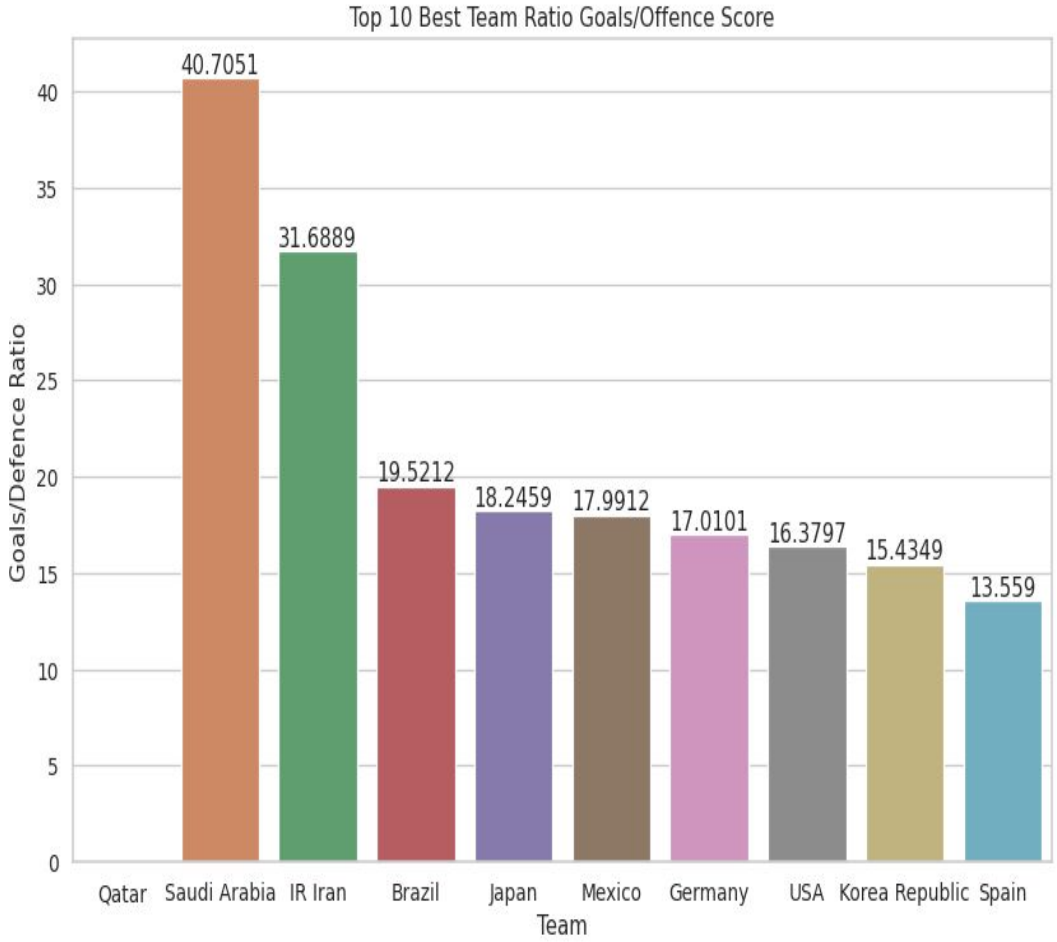
Columns for Total conceded goals ,Goal difference and Goal ratio

	Total conceded goals	Goal difference	Goal ratio
1	300	654	3.180000
2	248	533	3.149194
3	391	484	2.237852
4	280	433	2.546429
5	287	413	2.439024
6	266	404	2.518797
7	268	400	2.492537
8	251	379	2.509960
9	426	350	1.821596
10	519	339	1.653179
11	291	338	2.161512
12	332	325	1.978916
13	452	309	1.683628
14	485	277	1.571134
15	413	272	1.658596
16	240	256	2.066667
17	329	234	1.711246
18	315	230	1.730159
19	329	221	1.671733
20	298	206	1.691275
21	289	163	1.564014
22	448	150	1.334821
23	392	148	1.377551
24	318	146	1.459119
25	383	121	1.315927
26	320	116	1.362500
27	349	115	1.329513
28	473	79	1.167019
29	193	74	1.383420
30	276	35	1.126812
31	414	23	1.055556
32	294	-21	0.928571

Calculated the Total scored goals/Gk score

	Team	Of score	Total scored goals	Total scored goals/Gk score
1	Qatar	0.00	598	inf
2	Saudi Arabia	18.72	762	40.705128
3	IR Iran	22.50	713	31.688889
4	Brazil	48.87	954	19.521179
5	Japan	42.53	776	18.245944
6	Mexico	47.69	858	17.991193
7	Germany	51.44	875	17.010109
8	USA	46.46	761	16.379681
9	Korea Republic	44.38	685	15.434881
10	Spain	57.60	781	13.559028
11	Tunisia	43.13	550	12.752145
12	Netherlands	55.10	700	12.704174
13	Australia	49.68	629	12.661031
14	France	54.28	670	12.343405
15	Costa Rica	46.61	552	11.842952
16	Argentina	55.76	657	11.782640
17	Portugal	57.21	668	11.676280
18	England	55.32	630	11.388286
19	Ecuador	39.13	437	11.167902
20	Poland	50.02	540	10.795682
21	Morocco	46.17	496	10.742907
22	Belgium	53.00	563	10.622642
23	Croatia	51.77	545	10.527332
24	Denmark	48.46	504	10.400330
25	Ghana	46.89	464	9.895500
26	Senegal	45.96	452	9.834639
27	Uruguay	52.71	504	9.561753
28	Switzerland	49.79	464	9.319140
29	Cameroon	49.21	436	8.859988
30	Canada	41.48	311	7.497589
31	Wales	52.49	273	5.200991
32	Serbia	78.26	267	3.411705

Finally Plot the graph in terms of goals/offence ratio



Do teams with stronger goalkeepers receive fewer goals?

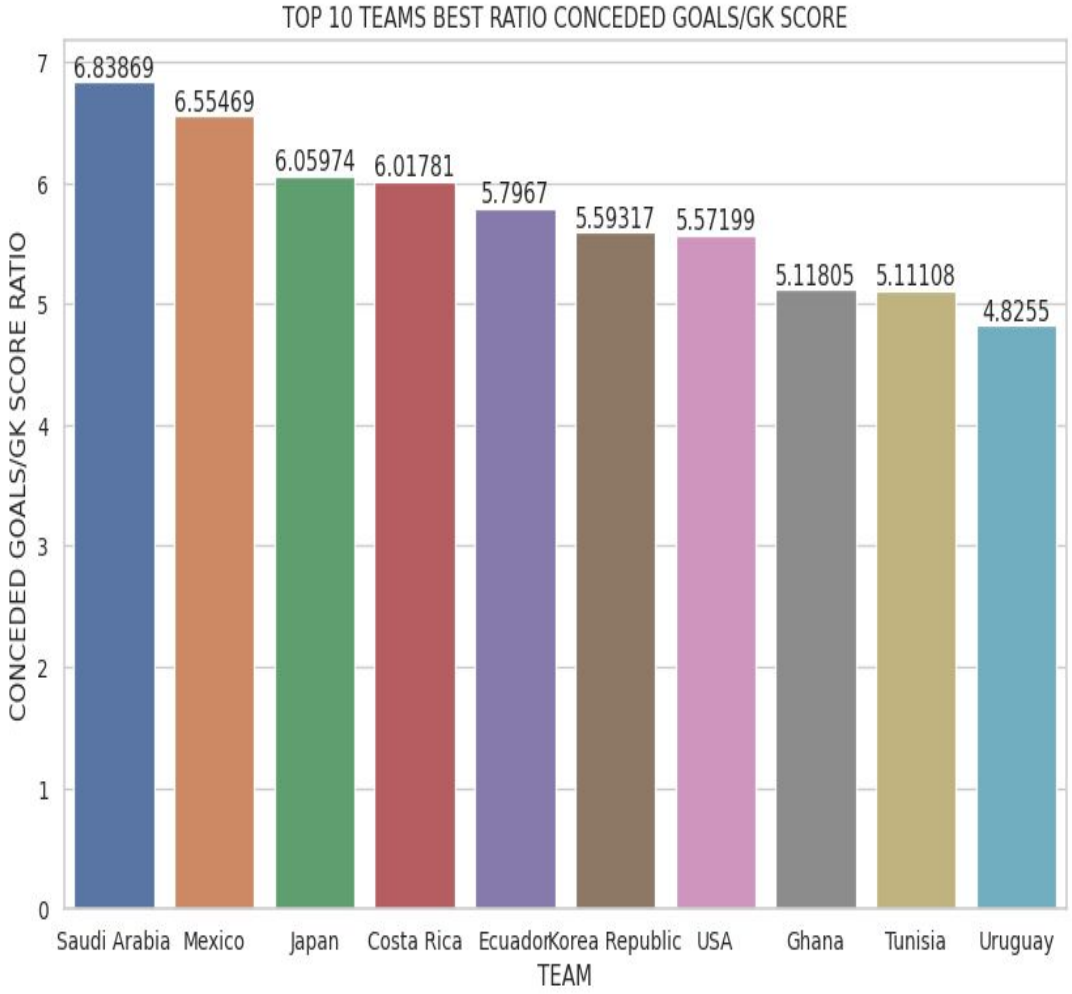
Calculating The Gk scores of participated teams

	Team	Gk_Score
1	Germany	89.02
2	Spain	88.78
3	France	86.86
4	Brazil	86.28
5	England	83.25
6	Netherlands	83.23
7	Belgium	82.41
8	Poland	82.10
9	Portugal	81.81
10	USA	81.12
11	Argentina	80.70
12	Switzerland	80.22
13	Denmark	79.66
14	Uruguay	79.37
15	Mexico	79.18
16	Croatia	78.67
17	Costa Rica	78.60
18	Australia	78.36
19	Cameroon	77.66
20	Serbia	76.48
21	Korea Republic	73.84
22	Wales	73.80
23	Senegal	72.38
24	Canada	72.08
25	Morocco	71.98
26	Ecuador	71.42
27	Saudi Arabia	70.92
28	Japan	70.30
29	IR Iran	68.39
30	Ghana	68.19
31	Tunisia	64.37
32	Qatar	NaN

Calculated the Conceded goals/Gk score ratio

	Team	Gk_Score	Total conceded goals	Concided goals/Gk score Ratio
1	Saudi Arabia	70.92	485	6.838691
2	Mexico	79.18	519	6.554686
3	Japan	70.30	426	6.059744
4	Costa Rica	78.60	473	6.017812
5	Ecuador	71.42	414	5.796696
6	Korea Republic	73.84	413	5.593174
7	USA	81.12	452	5.571992
8	Ghana	68.19	349	5.118053
9	Tunisia	64.37	329	5.111077
10	Uruguay	79.37	383	4.825501
11	Poland	82.10	392	4.774665
12	Germany	89.02	391	4.392271
13	Cameroon	77.66	320	4.120525
14	Argentina	80.70	332	4.114002
15	IR Iran	68.39	280	4.094166
16	Croatia	78.67	315	4.004068
17	Senegal	72.38	289	3.992816
18	Belgium	82.41	329	3.992234
19	Wales	73.80	294	3.983740
20	Switzerland	80.22	318	3.964099
21	Canada	72.08	276	3.829079
22	Denmark	79.66	298	3.740899
23	Australia	78.36	291	3.713629
24	Brazil	86.28	300	3.477051
25	Netherlands	83.23	287	3.448276
26	Morocco	71.98	240	3.334260
27	Portugal	81.81	268	3.275883
28	France	86.86	266	3.062399
29	England	83.25	251	3.015015
30	Spain	88.78	248	2.793422
31	Serbia	76.48	193	2.523536

Finally Plot the graph in terms of Conceded Goals/Gk Score ratio

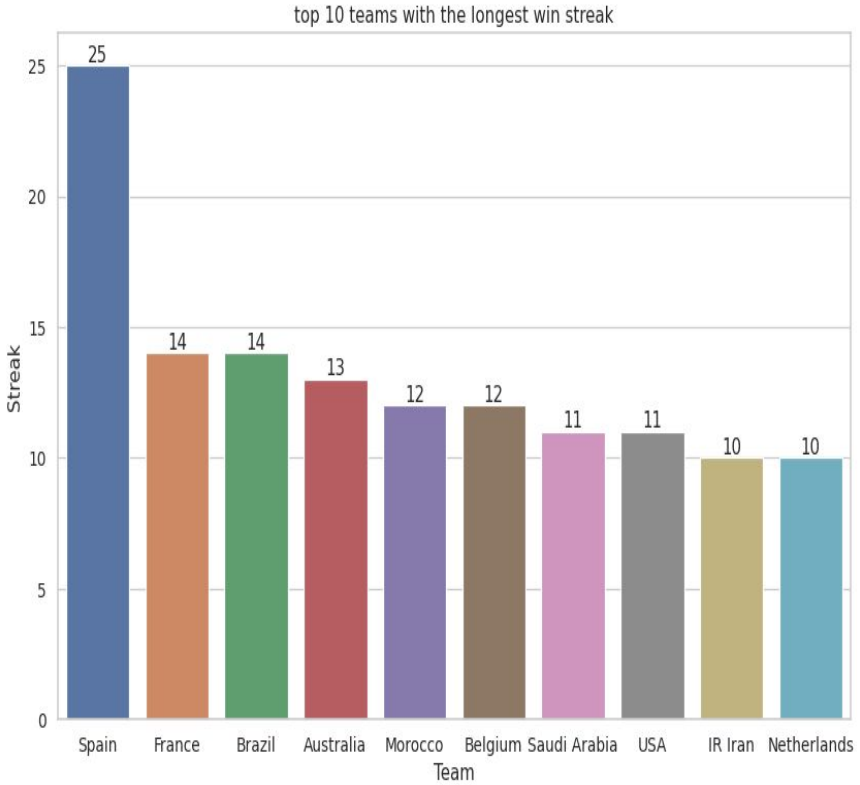


Which are the top 10 teams with the longest win streak?

We calculated the streak for the participated teams

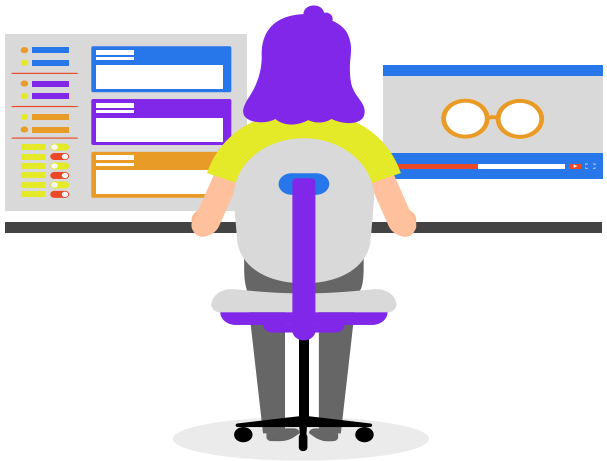
	Team	Streak
1	Spain	25
2	France	14
3	Brazil	14
4	Australia	13
5	Morocco	12
6	Belgium	12
7	Saudi Arabia	11
8	USA	11
9	IR Iran	10
10	Netherlands	10
11	Switzerland	10
12	Senegal	10
13	Mexico	10
14	Costa Rica	9
15	Argentina	9
16	Korea Republic	8
17	Tunisia	8
18	Germany	8
19	Cameroon	8
20	Portugal	8
21	England	8
22	Uruguay	7
23	Qatar	7
24	Poland	7
25	Croatia	7
26	Canada	7
27	Japan	7
28	Ghana	6
29	Denmark	6
30	Ecuador	6
31	Serbia	5

We calculated the streak for the participated teams



Better team win percentage as a home team or away team?

We calculated the result of home team and away team .Then we calculated the winning percentage.

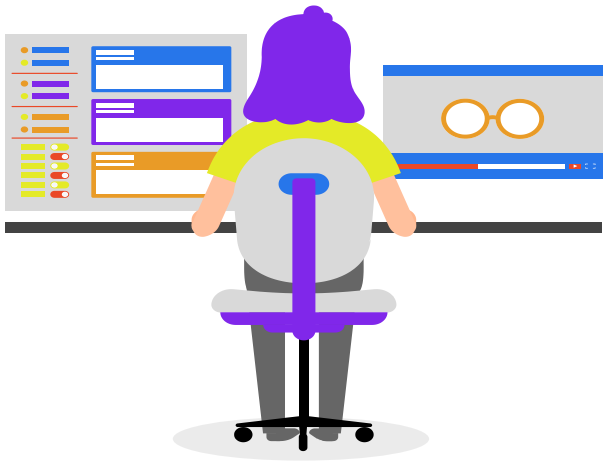


```
Lose    4984
Win     3429
Draw    2840
Name: home_team_result, dtype: int64
```

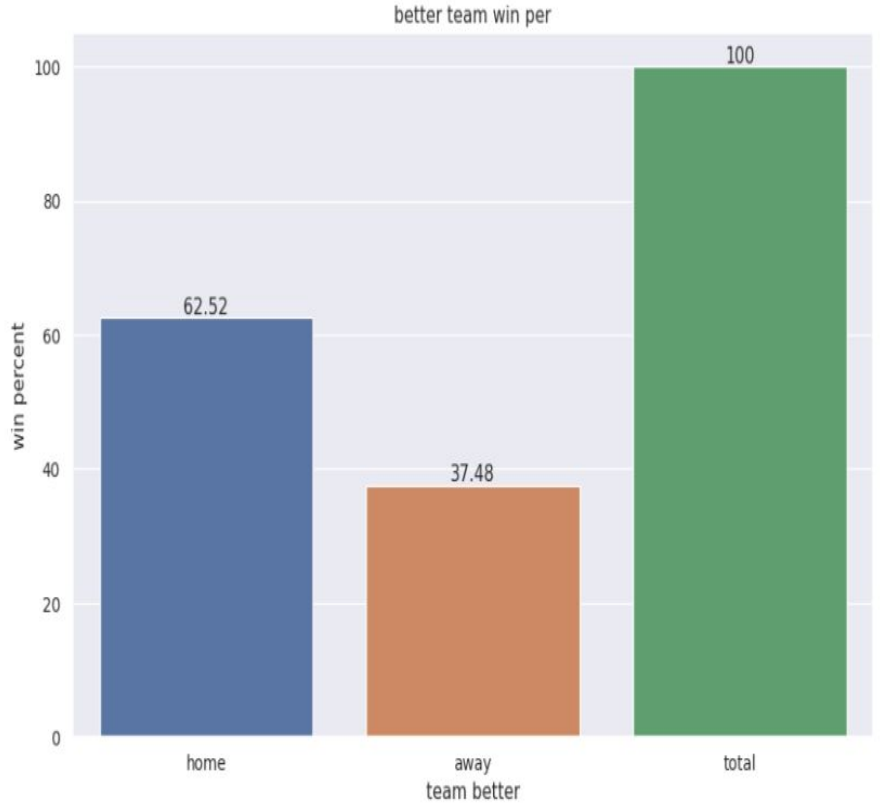
```
Win     8313
Draw    2542
Lose    1781
Name: home_team_result, dtype: int64
```

	win percent
home	62.52
away	37.48
total	100.00

Finally we plot the percentage

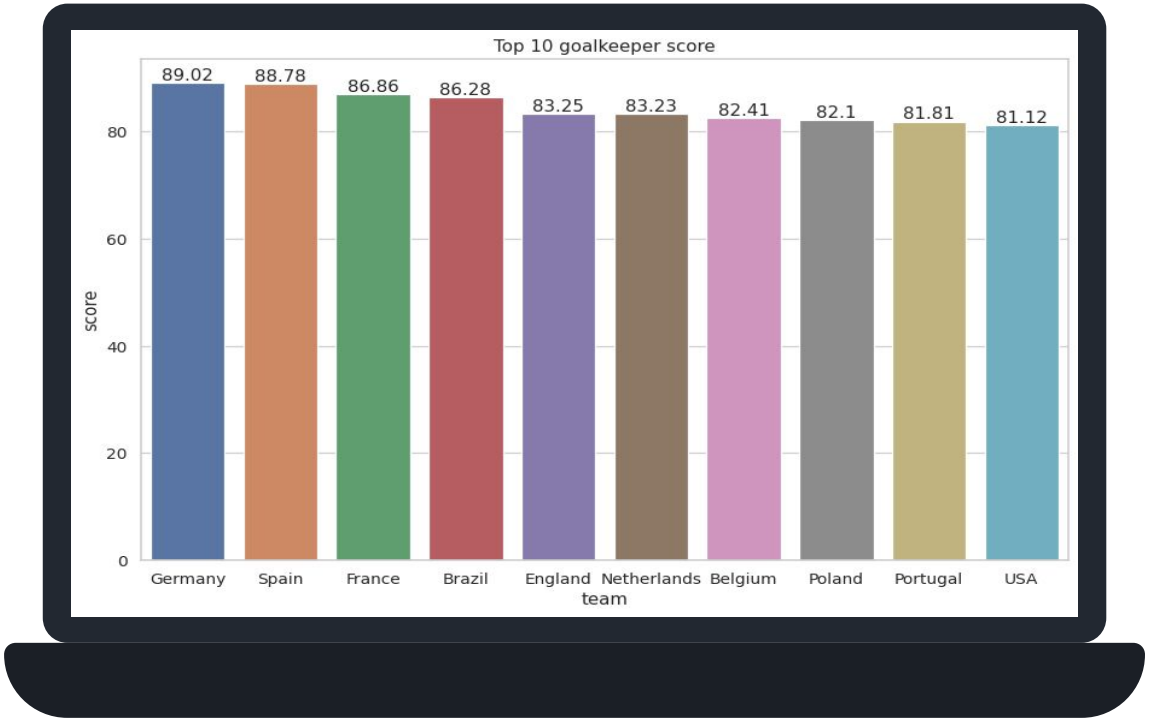


Text(0.5, 1.0, 'better team win per')



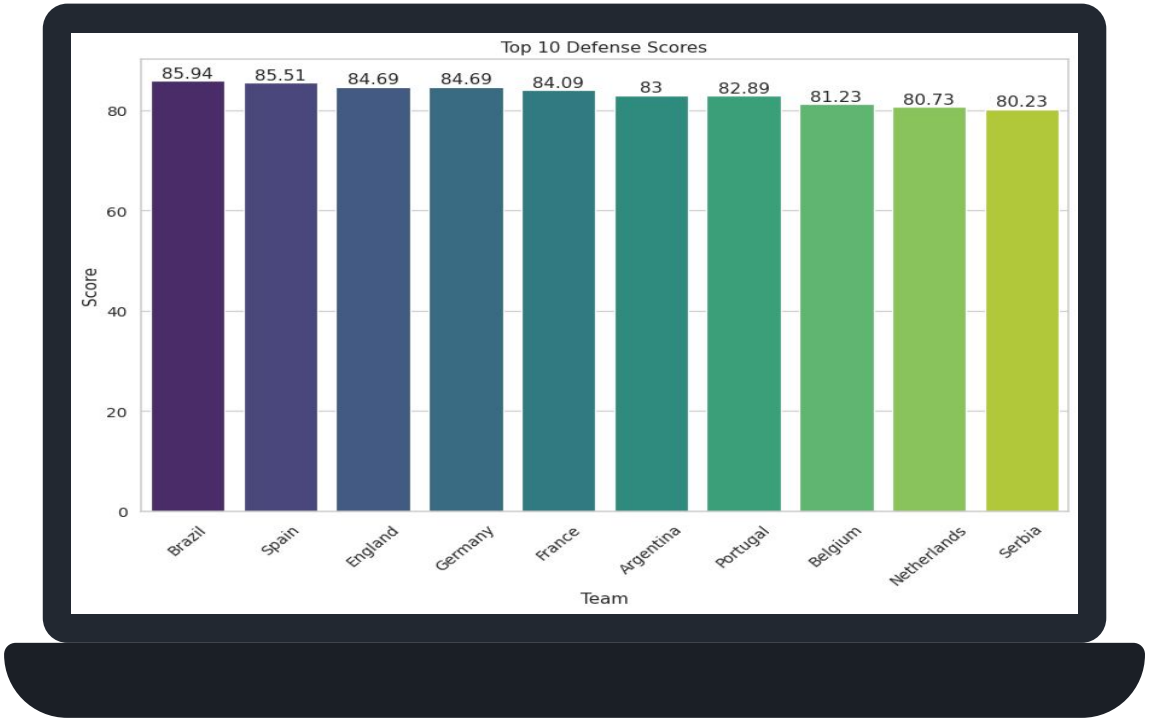
Top 10 Goalkeeper Scores

- Calculate the average goalkeeper score for the team, regardless of whether they were the home or away team



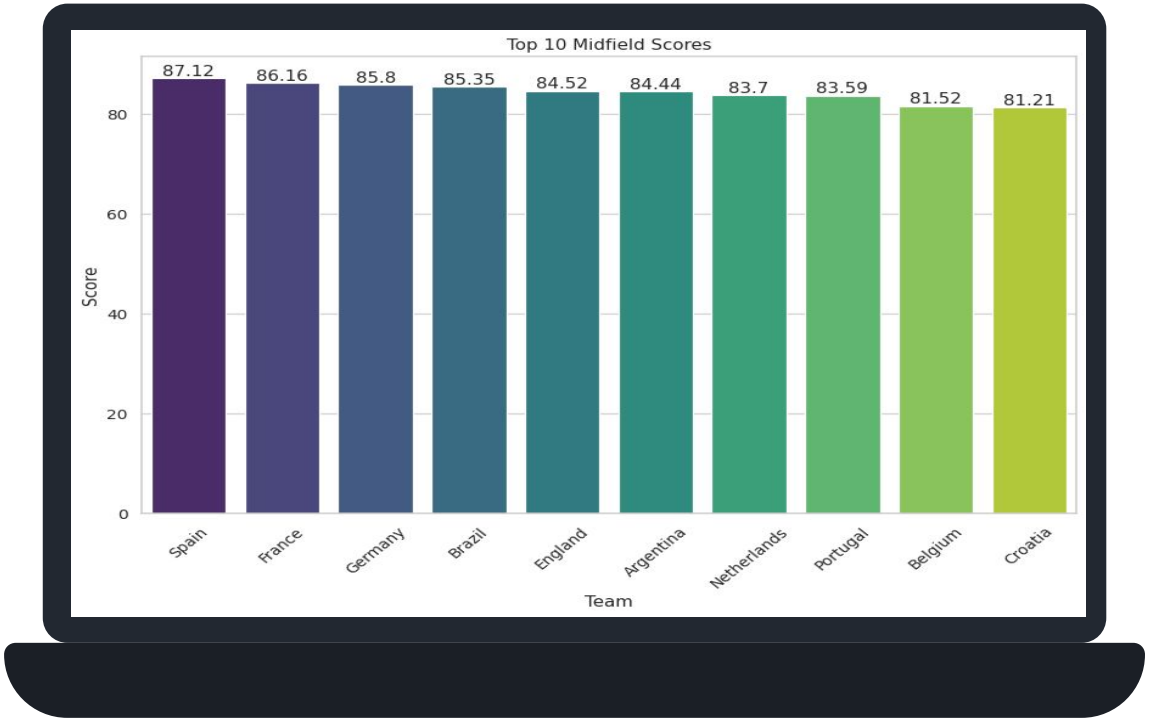
Top 10 Defence Scores

- Calculate the average Defense score for the team, regardless of whether they were the home or away team



Top 10 Midfielder Scores

- Calculate the average Midfielder score for the team, regardless of whether they were the home or away team

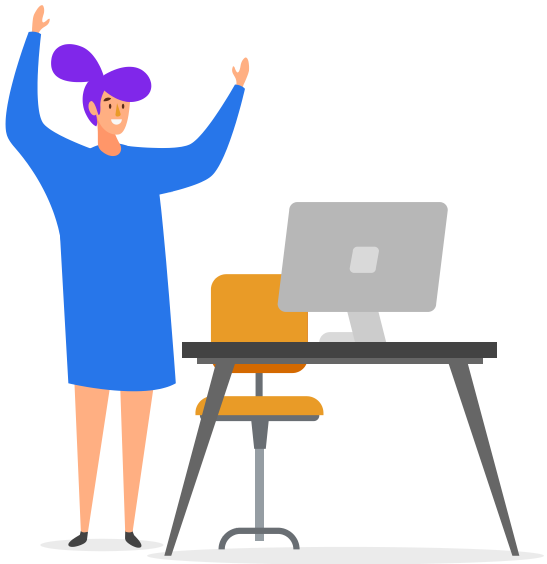


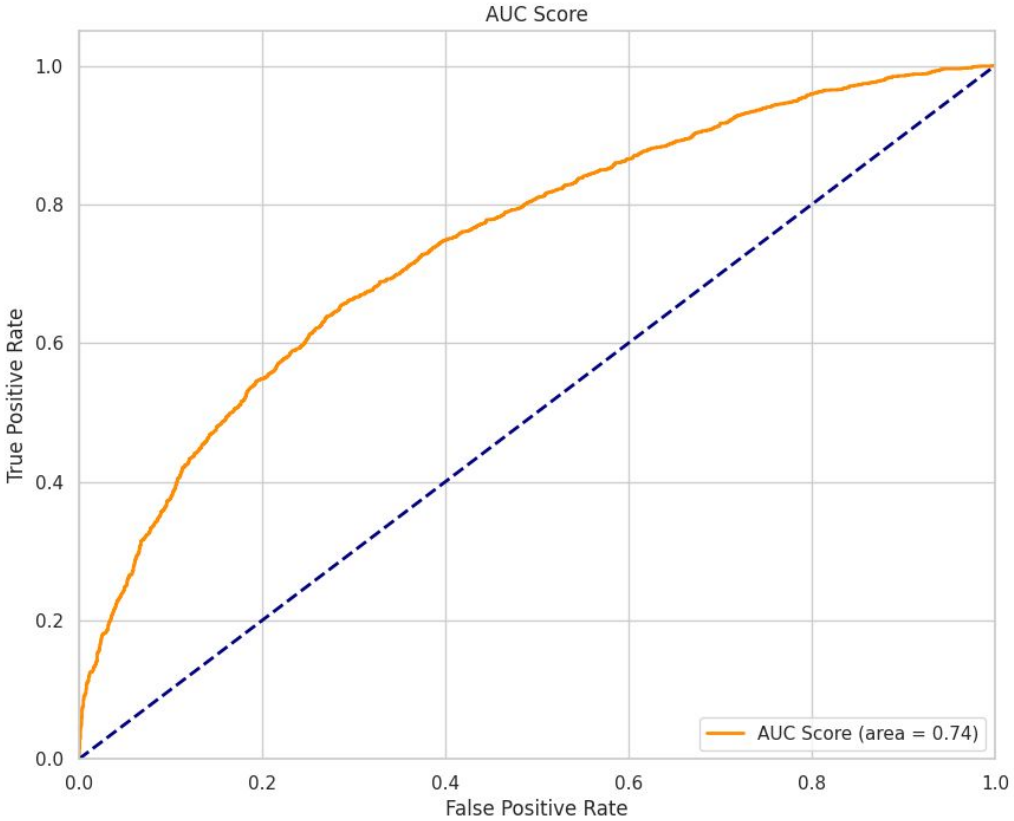
Which are the top 15 teams with a high win percentage?

	Team	Total	Win	Draw	Lose	Home win	Home draw	Home lose	Total Home	Away win	Away draw	Away lose	Total Away	Win %	Draw %	Lose %	Home Win %	Home Draw %	Home Lose %	Away Win %	Away Draw %	Away Lose %
1	Brazil	433	301	76	56	181	31	21	233	120	45	35	200	69.520000	17.550000	12.930000	77.680000	13.300000	9.010000	60.000000	22.500000	17.500000
2	Spain	354	246	64	44	145	27	17	189	101	37	27	165	69.490000	18.080000	12.430000	76.720000	14.290000	8.990000	61.210000	22.420000	16.360000
3	France	370	230	83	57	145	44	32	221	85	39	25	149	62.160000	22.430000	15.410000	65.610000	19.910000	14.480000	57.050000	26.170000	16.780000
4	Germany	390	240	82	68	139	44	36	219	101	38	32	171	61.540000	21.030000	17.440000	63.470000	20.090000	16.440000	59.060000	22.220000	18.710000
5	IR Iran	366	217	79	70	133	31	27	191	84	48	43	175	59.290000	21.580000	19.130000	69.630000	16.230000	14.140000	48.000000	27.430000	24.570000
6	Netherlands	340	201	74	65	119	40	33	192	82	34	32	148	59.120000	21.760000	19.120000	61.980000	20.830000	17.190000	55.410000	22.970000	21.620000
7	Portugal	336	198	79	59	123	37	24	184	75	42	35	152	58.930000	23.510000	17.560000	66.850000	20.110000	13.040000	49.340000	27.630000	23.030000
8	Argentina	367	216	79	72	130	36	24	190	86	43	48	177	58.860000	21.530000	19.620000	68.420000	18.950000	12.630000	48.590000	24.290000	27.120000
9	England	334	196	75	63	124	38	32	194	72	37	31	140	58.680000	22.460000	18.860000	63.920000	19.590000	16.490000	51.430000	26.430000	22.140000
10	Croatia	320	172	79	69	92	38	24	154	80	41	45	166	53.750000	24.690000	21.560000	59.740000	24.680000	15.580000	48.190000	24.700000	27.110000
11	Japan	425	227	89	109	154	63	63	280	73	26	46	145	53.410000	20.940000	25.650000	55.000000	22.500000	22.500000	50.340000	17.930000	31.720000

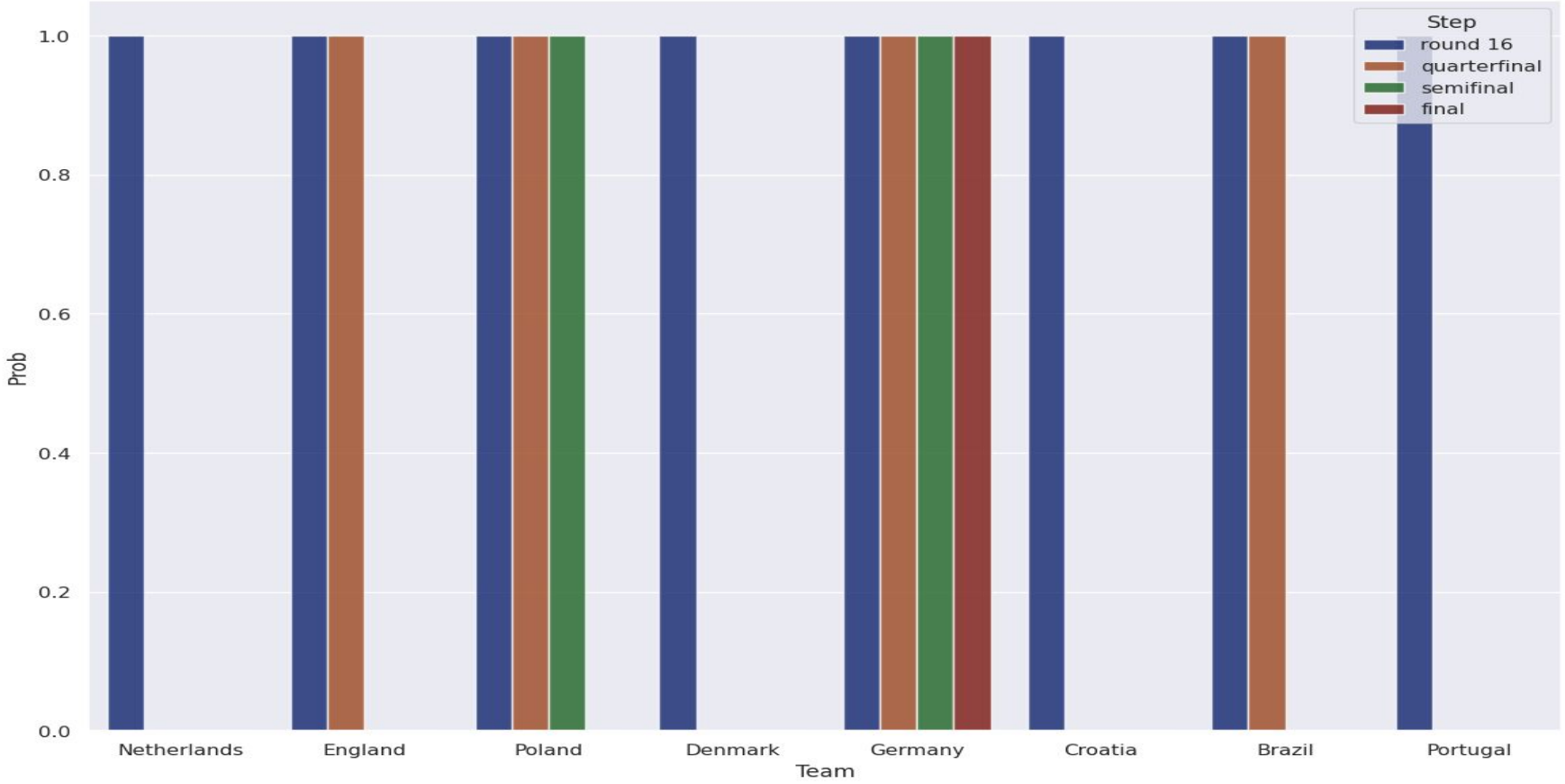
- Calculate the home and away win, draw, and lose counts for the team
- Calculate the total win, draw, and lose counts
- Create a DataFrame with the teams and their win, draw, and lose counts and Calculate the win, draw, and lose percentages for total, home, and away

AUC scores

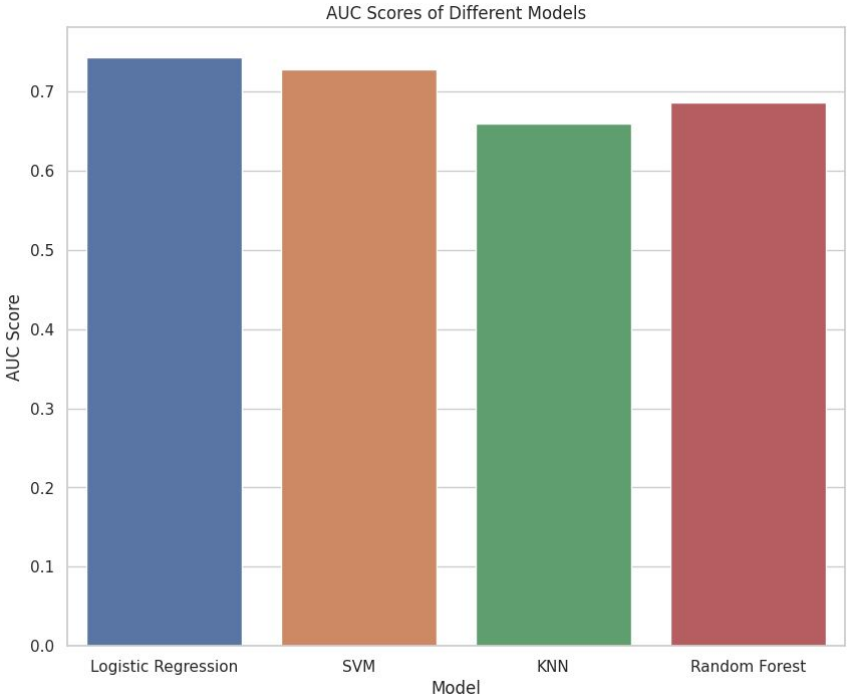


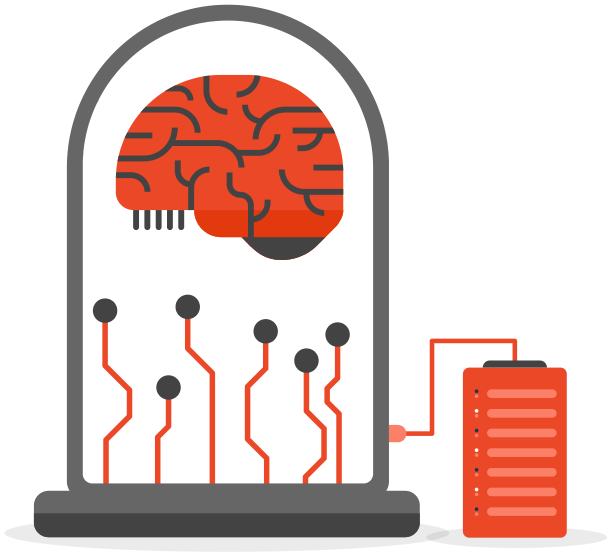

AUC Score
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
AUC Score (area = 0.74)

Winner prediction FIFA world cup 2022



AUC Scores of Different Models





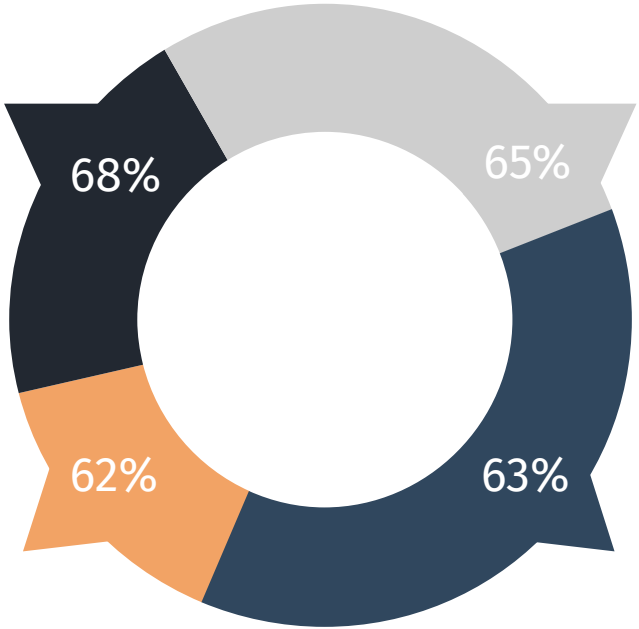
Accuracies of Different Models

Logistic Regression

A statistical model used for binary classification problems, predicting the probability of an event occurrence.

KNN

A non-parametric, supervised learning classifier that uses proximity to classify or predict data points.



SVM

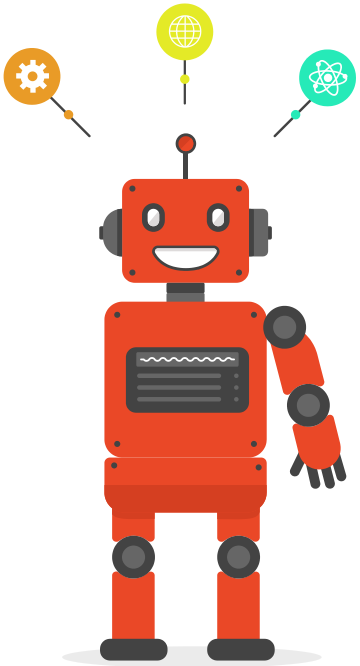
A supervised learning model that uses a separating hyperplane for classification and regression tasks.

Random Forest

A machine learning algorithm that combines multiple decision trees to make more accurate predictions and classifications.

Why Logistic Regression got highest Accuracy

- **Relevant Features:** In my dataset includes features that are likely to be predictive of the outcome. These include FIFA rankings, total FIFA points, and scores of the teams.
- **Binary Outcome:** Logistic Regression is designed for binary classification problems. In my case, the target variable 'is_won' is binary, which suits the algorithm.
- **Regularization:** The Logistic Regression model I used has a regularization parameter. Regularization can prevent overfitting by adding a penalty to the loss function, which can lead to better performance on the test set.
- **Feature Transformation:** I've used polynomial features in my pipeline, which can help capture interactions between features. This can sometimes improve the performance of linear models like Logistic Regression.



Machine Learning Infographics

Opportunities of machine learning

01

Relevant Features
These include FIFA rankings, total FIFA points, and scores of the teams.

02

Customization
Despite being red, Mars is a cold place

03

Voice recognition
Venus has a beautiful name, but it's hot

04

Data analysis
The Earth is the third planet from the Sun

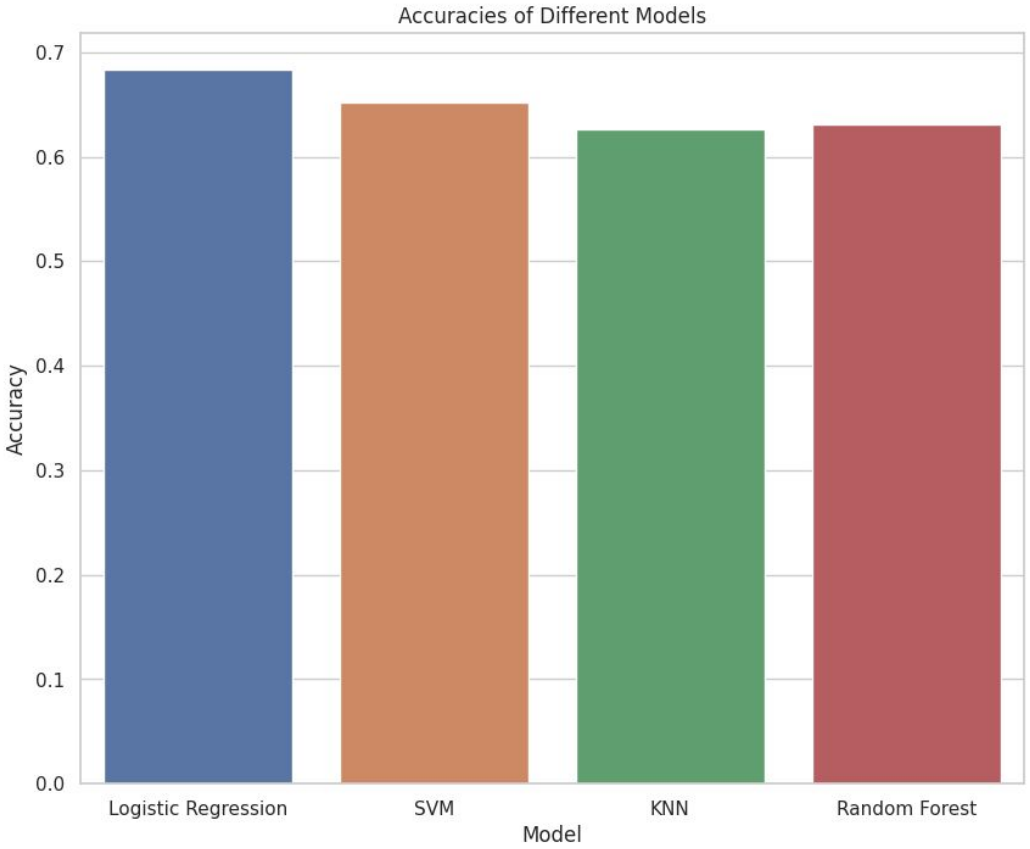
05

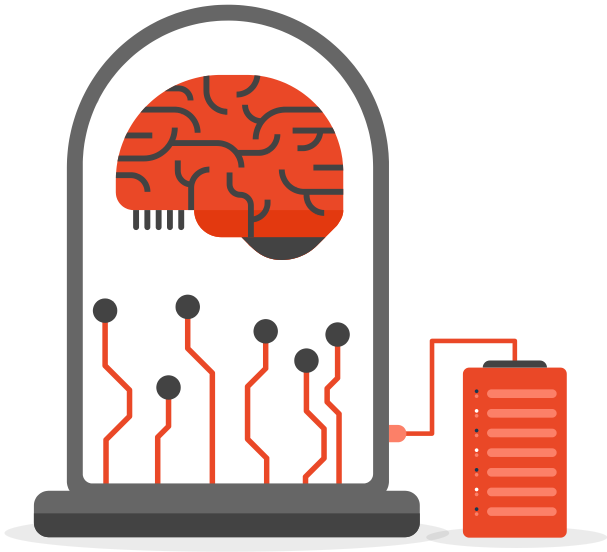
Optical recognition
Mercury is the closest planet to the Sun

06

Memory data
Pluto is considered a dwarf planet

Accuracies of Different Models





Machine Learning Infographics

Continuous improvement
Despite being red, Mars is a cold place

Data acquisition
Venus has a beautiful name, but it’s hot

Patterns identification
Mercury is the closest planet to the Sun

Time and resources
The Earth is the third planet from the Sun

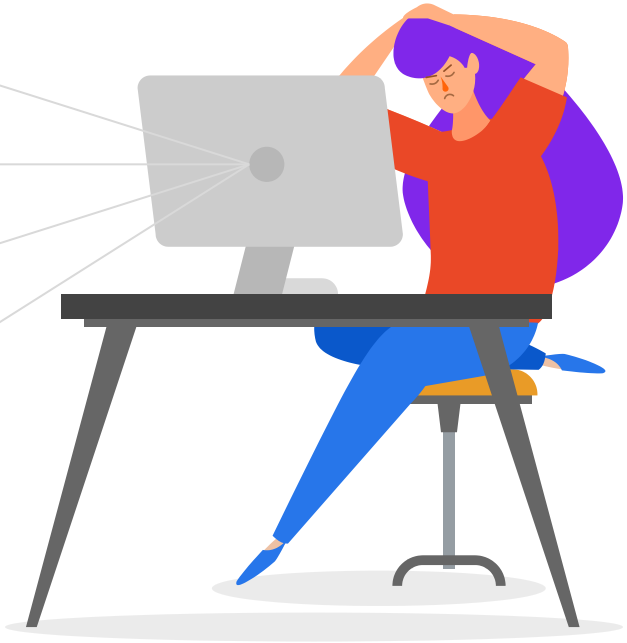
01

02

03

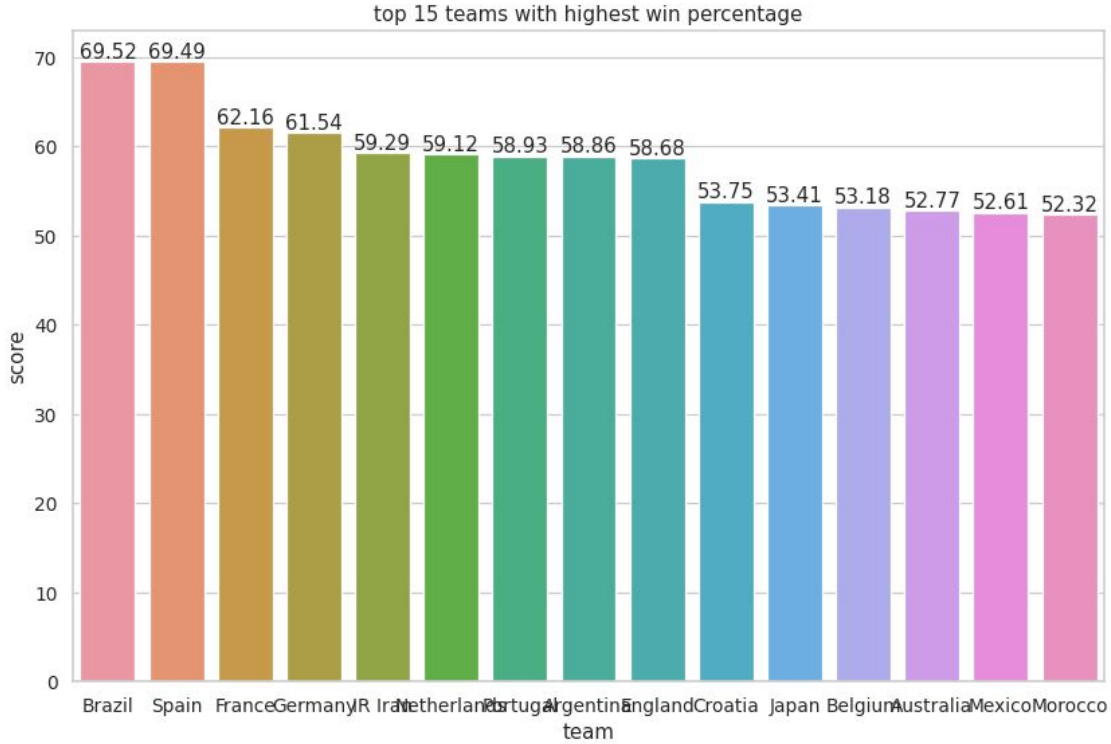
04

Machine learning disadvantages

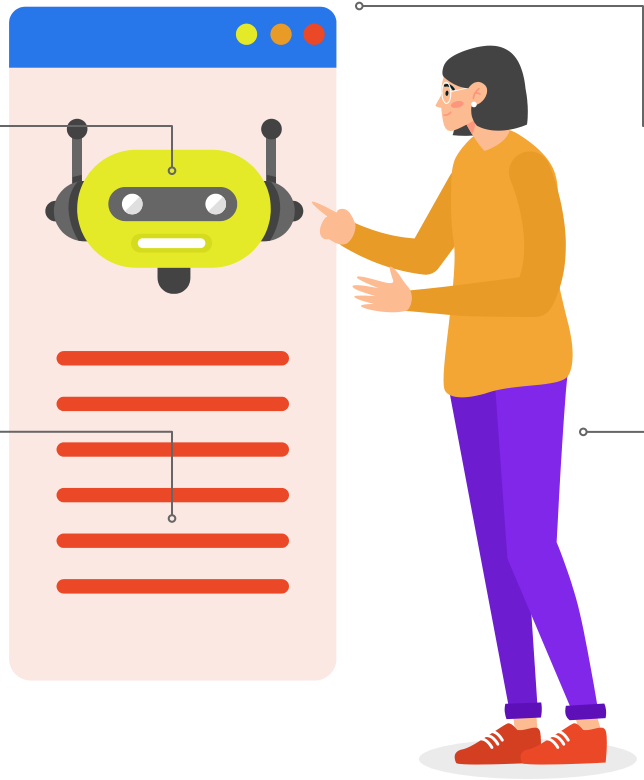


Machine Learning Infographics

- After plotting the data we got the graph.



Machine Learning Infographics



01 **Active learning**

Mercury is the closest planet to the Sun

02 **Maturation**

Jupiter is a gas giant and the biggest planet

03 **Motor synergies**

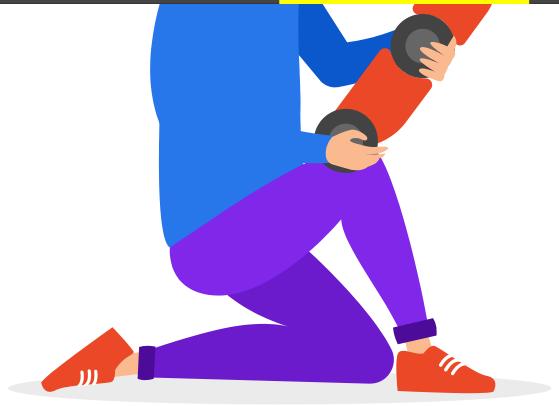
The Earth is the planet where we live

04 **Imitation**

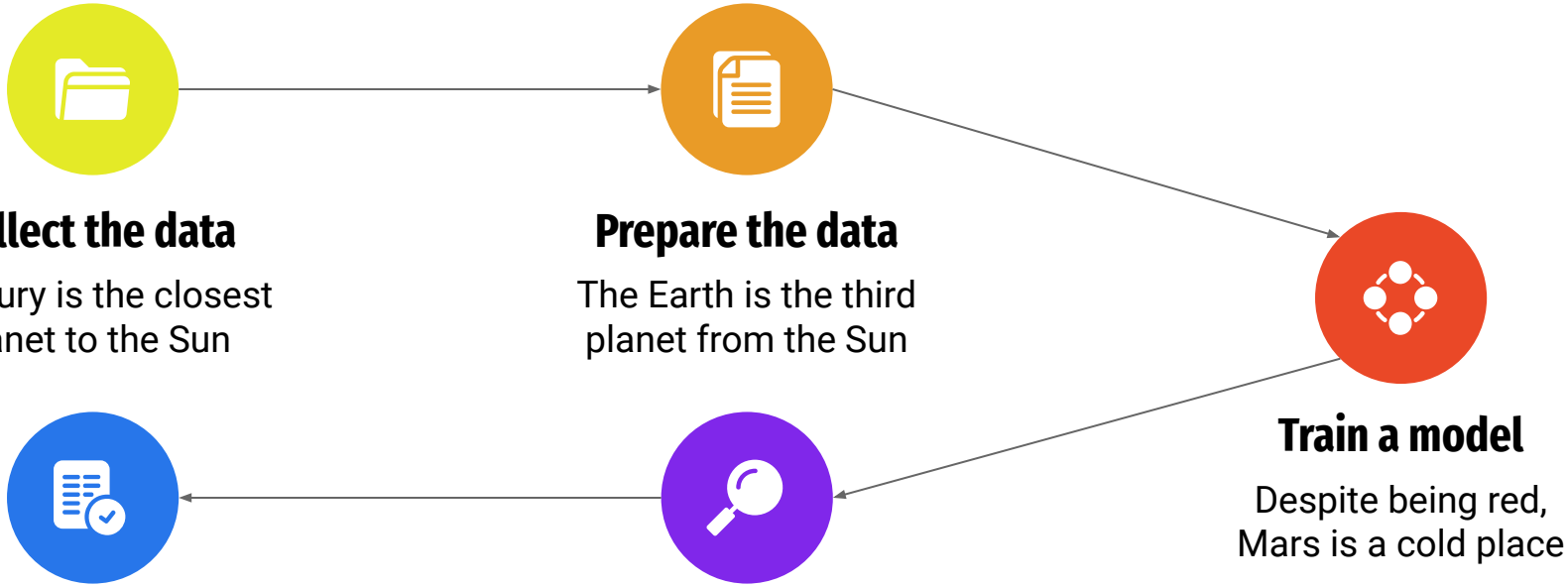
Despite being red, Mars is a cold place

Machine Learning Infographics

	Team	Total	Win	Draw	Lose	Home win	Home draw	Home lose	Total Home	Away win	Away draw	Away lose	Total Away	Win %	Draw %	Lose %	Home Win %	Home Draw %	Home Lose %	Away Win %	Away Draw %	Away Lose %
1	Brazil	433	301	76	56	181	31	21	233	120	45	35	200	69.520000	17.550000	12.930000	77.680000	13.300000	9.010000	60.000000	22.500000	17.500000
2	Spain	354	246	64	44	145	27	17	189	101	37	27	165	69.490000	18.080000	12.430000	76.720000	14.290000	8.990000	61.210000	22.420000	16.360000
3	France	370	230	83	57	145	44	32	221	85	39	25	149	62.160000	22.430000	15.410000	65.610000	19.910000	14.480000	57.050000	26.170000	16.780000
4	Germany	390	240	82	68	139	44	36	219	101	38	32	171	61.540000	21.030000	17.440000	63.470000	20.090000	16.440000	59.060000	22.220000	18.710000
5	IR Iran	366	217	79	70	133	31	27	191	84	48	43	175	59.290000	21.580000	19.130000	69.630000	16.230000	14.140000	48.000000	27.430000	24.570000
6	Netherlands	340	201	74	65	119	40	33	192	82	34	32	148	59.120000	21.760000	19.120000	61.980000	20.830000	17.190000	55.410000	22.970000	21.620000
7	Portugal	336	198	79	59	123	37	24	184	75	42	35	152	58.930000	23.510000	17.560000	66.850000	20.110000	13.040000	49.340000	27.630000	23.030000
8	Argentina	367	216	79	72	130	36	24	190	86	43	48	177	58.860000	21.530000	19.620000	68.420000	18.950000	12.630000	48.590000	24.290000	27.120000
9	England	334	196	75	63	124	38	32	194	72	37	31	140	58.680000	22.460000	18.860000	63.920000	19.590000	16.490000	51.430000	26.430000	22.140000
10	Croatia	320	172	79	69	92	38	24	154	80	41	45	166	53.750000	24.690000	21.560000	59.740000	24.680000	15.580000	48.190000	24.700000	27.110000
11	Japan	425	227	89	109	154	63	63	280	73	26	46	145	53.410000	20.940000	25.650000	55.000000	22.500000	22.500000	50.340000	17.930000	31.720000



Machine Learning Infographics



Collect the data

Mercury is the closest planet to the Sun

Prepare the data

The Earth is the third planet from the Sun

Train a model

Despite being red, Mars is a cold place

Evaluate the model

Jupiter is the biggest planet of them all

Improve

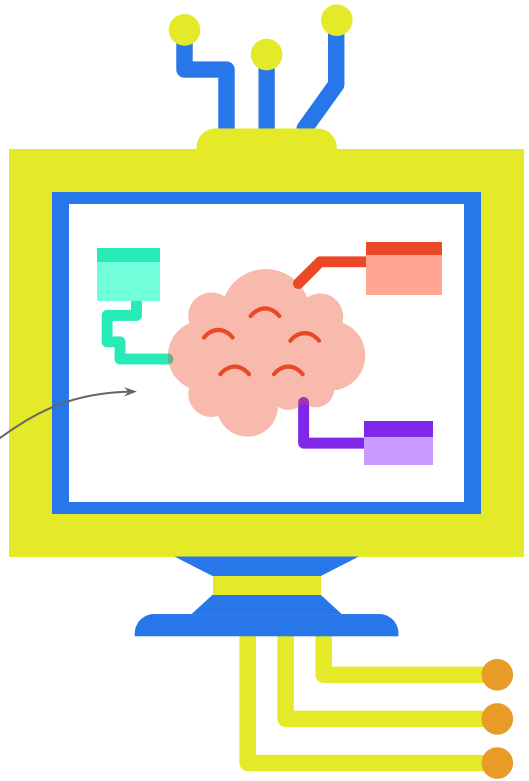
Pluto is considered a dwarf planet

Machine Learning Infographics

Inputs

Mercury is the closest planet to the Sun

- Input 1
- Input 2
- Input 3



Outputs

Jupiter is a gas giant and the biggest planet

- Output 1
- Output 2
- Output 3

Machine Learning Infographics

Supervised learning

Classification

- Fraud detection
- Email spam detection
- Diagnostics
- Image classification

Regression

- Risk assessment
- Score prediction

Unsupervised learning

Reduction

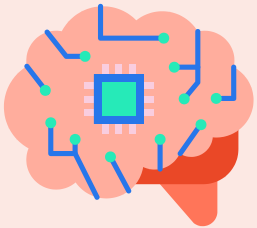
- Text mining
- Data visualization
- Face detection
- Voice detection

Regression

- City planning
- Targeted marketing

Reinforcement learning

- Finances
- Manufacturing
- Stock management
- Autonomous cars



Machine Learning Infographics

Predict trends
Venus has a beautiful name, but it's hot

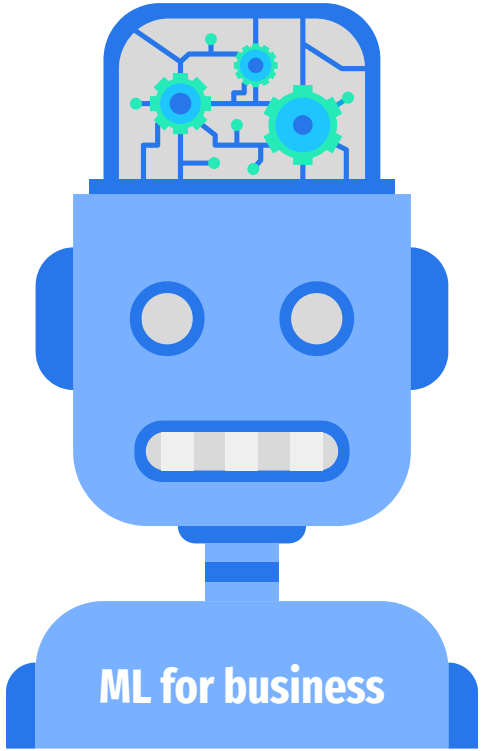
01

Target segmentation
Mercury is the closest planet to the Sun

03

Advert segmentation
The Earth is the third planet from the Sun

05



02

Innovation
Despite being red, Mars is a cold place

Cost reduction
Neptune is very far away from the Sun

04

06

Customer relations
Jupiter is the biggest planet of them all

Machine Learning Infographics

Machine learning application example

01

Tweet

Mercury is the closest planet to the Sun

02

Feature engineering

Venus has a beautiful name, but it's hot

03

Classification

The Earth is the third planet from the Sun

04

Output

Despite being red, Mars is a cold place

Machine Learning Infographics

10%

Mercury

Mercury is the closest planet to the Sun

20%

Neptune

It’s the farthest planet from the Sun

30%

Jupiter

Jupiter is a gas giant and the biggest planet

40%

Mars

Despite being red, Mars is a cold place

Follow the link in the graph to modify its data and then paste the new one here. **For more info, click here**

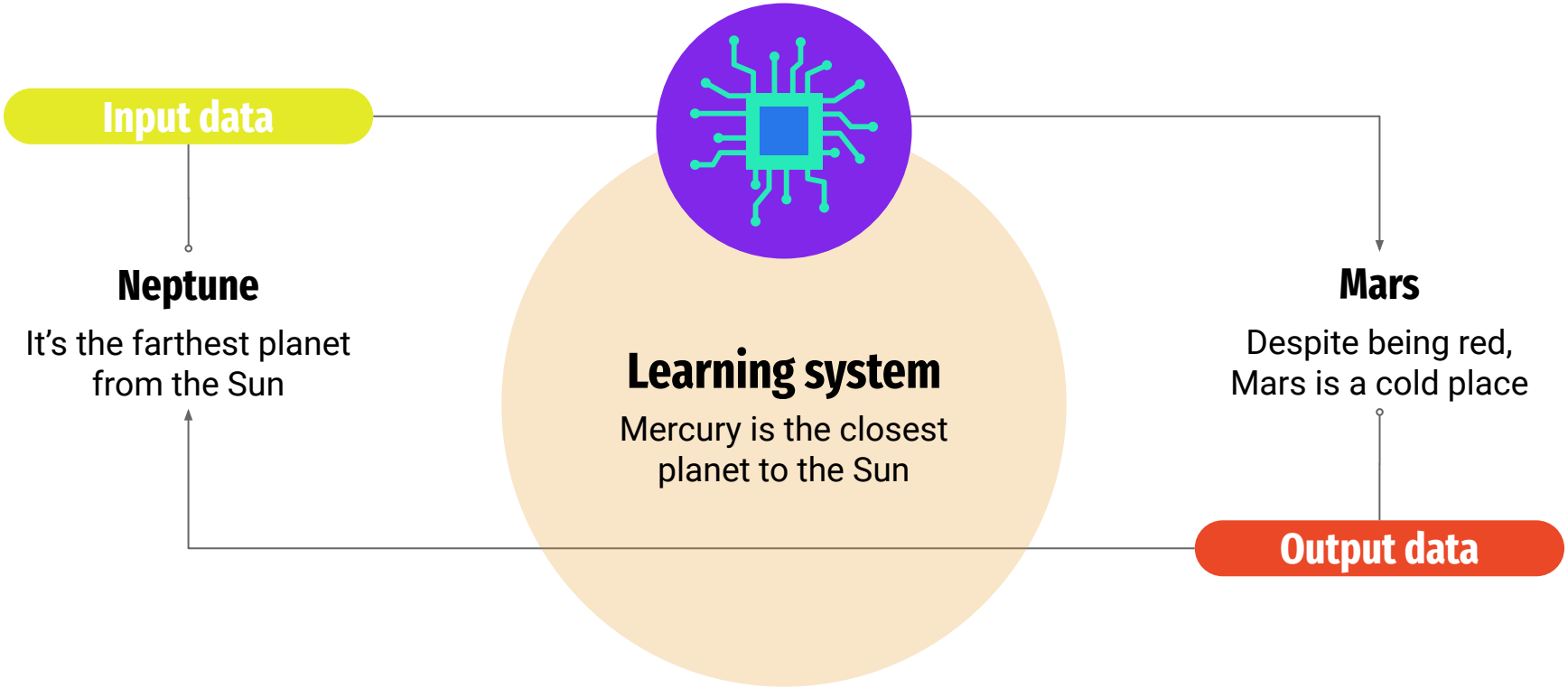
Machine Learning Infographics

Biochemical analysis
Mercury is the closest planet to the Sun

Disease diagnosis
Venus has a beautiful name, but it's hot

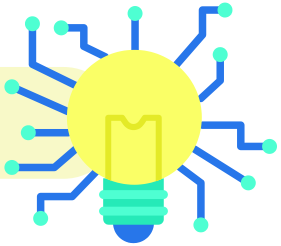
Drug discovery
The Earth is the third planet from the Sun

Machine Learning Infographics



Machine Learning Infographics

Machine learning advantages vs disadvantages



Advantages

- Efficiency data managing
- Continuous improvement
- Lots of applications
- Trend identification
- Pattern identification

Disadvantages

- Data acquisition
- Time and space
- Time-consuming
- High error possibilities
- Algorithm selection

Machine Learning Infographics

01

Identify data

Venus has a beautiful name, but it’s hot

02

Choose algorithm

Mercury is the closest planet to the Sun

03

Analytical model

Despite being red, Mars is a cold place

04

Train the model

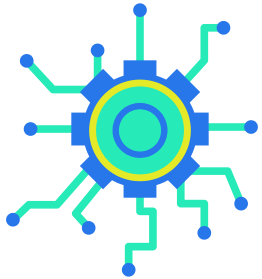
Jupiter is the biggest planet of them all

05

Run the model

Neptune is very far away from the Sun

Machine Learning Infographics



Machine learning

Input data
Jupiter is the biggest planet of them all

Relationships	Patterns
Dependencies	Structures

Algorithms + techniques

Output
Despite being red, Mars is a cold place

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