# Does GDP Affect a Country's Olympic Success?

In this example, we'll look at the relationship between a country's gross domestic product (GDP) and its Olympic success. We will use data from the Summer 2016 games in this example.

Read Medals Data

We'll start by reading the medals won by each country from an Excel file. We can plot these values on a geobubble chart where the size of the bubble indicates the number of medals won by that country. We can see that the United States, China, Russia, and the United Kingdom did quite well.

```
medals = readtable('olympic.xlsx');
f = figure;
f.Position = f.Position.*[1 1 1.8 1.2];
geobubble(medals, 'Latitude','Longitude','SizeVariable','Total');
title('2016 Summer Olympic Medals')
```
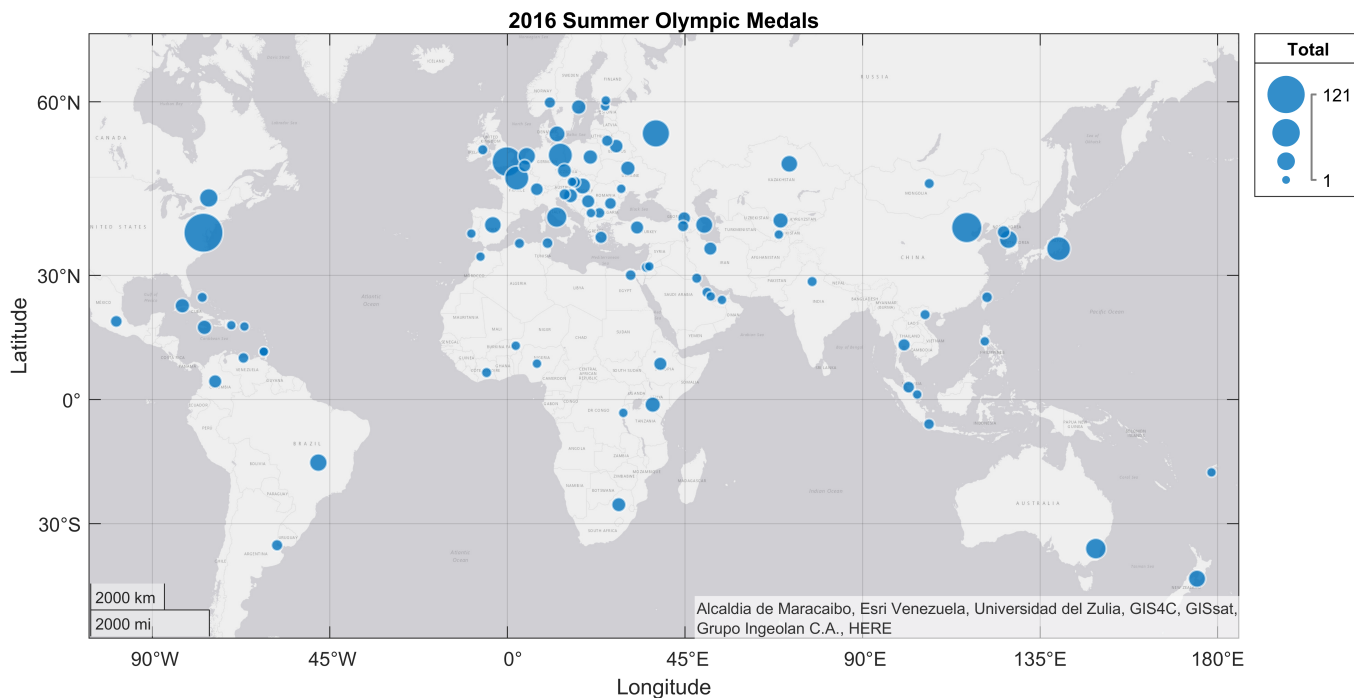

Read GDP data

Read the data for the country's gross domestic product (GDP) from an Excel file.

```
gdp = readtable('gdp.xlsx')
```

gdp = 191×3 table

	Index	Country	GDP
1	1	'United States'	18624450
2	2	'China'	11221836

	Index	Country	GDP
3	3	'Japan'	4949272
4	4	'Germany'	3479232
5	5	'United Kingdom'	2660687
6	6	'France'	2466472
7	7	'India'	2273556
8	8	'Italy'	1860152
9	9	'Brazil'	1793066
10	10	'Canada'	1535768
11	11	'South Korea'	1411042
12	12	'Russia'	1283286
13	13	'Australia'	1264944
14	14	'Spain'	1237766
15	15	'Mexico'	1076914
16	16	'Indonesia'	932445
17	17	'Turkey'	863390
18	18	'Netherlands'	777548
19	19	'Saudi Arabia'	644935
20	20	' Switzerland'	640765
21	21	'Argentina'	554107
22	22	'Taiwan'	530608
23	23	'Sweden'	514460
24	24	'Poland'	471216
25	25	'Belgium'	468148
26	26	'Thailand'	411847
27	27	'Nigeria'	405442
28	28	'Iran'	404447
29	29	'Austria'	390961
30	30	'Norway'	371064
31	31	'Israel'	351748
32	32	'United Arab...	348743
33	33	'Egypt'	332484
34	34	'Hong Kong'	320881
35	35	'Denmark'	306900

	Index	Country	GDP
36	36	'Philippines'	304906
37	37	'Ireland'	304499
38	38	'Singapore'	296966
39	39	'Malaysia'	296536
40	40	'South Africa'	295678
41	41	'Colombia'	279987
42	42	'Pakistan'	278592
43	43	'Chile'	250008
44	44	'Finland'	238776
45	45	'Venezuela'	236116
46	46	'Bangladesh'	235623
47	47	'Portugal'	205269
48	48	'Vietnam'	201309
49	49	'Peru'	195432
50	50	'Czech Republic'	195305
51	51	'Greece'	192770
52	52	'Romania'	187807
53	53	'New Zealand'	185380
54	54	'Iraq'	171716
55	55	'Algeria'	159049
56	56	'Qatar'	152469
57	57	'Kazakhstan'	133668
58	58	'Hungary'	129144
59	59	'Kuwait'	110873
60	60	'Puerto Rico'	105035
61	61	'Morocco'	103607
62	62	'Ecuador'	98614
63	63	'Angola'	95337
64	64	'Ukraine'	93263
65	65	'Slovakia'	89806
66	66	'Sri Lanka'	80978
67	67	'Ethiopia'	73151
68	68	'Dominican R...	71673

	Index	Country	GDP
69	69	'Kenya'	70527
70	70	'Guatemala'	68763
71	71	'Oman'	66824
72	72	'Uzbekistan'	66693
73	73	'Myanmar'	63251
74	74	'Luxembourg'	58655
75	75	'Panama'	57821
76	76	'Costa Rica'	57810
77	77	'Sudan'	57649
78	78	'Ghana'	54989
79	79	'Bulgaria'	53236
80	80	'Uruguay'	52420
81	81	'Croatia'	51350
82	82	'Lebanon'	49611
83	83	'Belarus'	47703
84	84	'Tanzania'	47653
85	85	'Macau'	45368
86	86	'Slovenia'	44727
87	87	'Lithuania'	42791
88	88	'Tunisia'	42074
89	89	'Democratic ...'	39324
90	90	'Jordan'	38709
91	91	'Serbia'	38300
92	92	'Azerbaijan'	37810
93	93	'Ivory Coast'	36375
94	94	'Turkmenistan'	36180
95	95	'Paraguay'	36054
96	96	'Bolivia'	34053
97	97	'Cameroon'	32230
98	98	'Bahrain'	32176
99	99	'Latvia'	27584
100	100	'El Salvador'	26798

⋮

Join the Medals Data with the GDP Data

We would like to see if there is a relationship between GDP and Olympic success. To do that, we need to join the medals table with the table that contains the GDP data. A *join* operation is a way to combine two tables of data using a common key variable -- in this case the country name. Here we'll use the ***Join Tables*** Live Editor Task to combine the data.

```
% Join tables
medalsVsGDP = innerjoin(medals,gdp,'Keys','Country')
```

medalsVsGDP = 80×10 table

. . .

	Ranking	Country	Gold	Silver	Bronze	Total	Latitude
1	62	'Algeria'	0	2	0	2	36.7529
2	27	'Argentina'	3	1	0	4	-34.6037
3	42	'Armenia'	1	3	0	4	40.1833
4	10	'Australia'	8	11	10	29	-35.3082
5	78	'Austria'	0	0	1	1	48.2082
6	39	'Azerbaijan'	1	7	10	18	40.4350
7	51	'Bahamas'	1	0	1	2	25.0600
8	48	'Bahrain'	1	1	0	2	26.2167
9	40	'Belarus'	1	4	4	9	53.9000
10	35	'Belgium'	2	2	2	6	50.8503
11	13	'Brazil'	7	6	6	19	-15.7801
12	65	'Bulgaria'	0	1	2	3	42.6978
13	69	'Burundi'	0	1	0	1	-3.3762
14	20	'Canada'	4	3	15	22	45.4215
15	3	'China'	26	18	26	70	39.9040
16	17	'Croatia'	5	3	2	10	45.8130
17	43	'Czech Republic'	1	2	7	10	50.0755
18	28	'Denmark'	2	6	7	15	55.6761
19	78	'Dominican R...'	0	0	1	1	18.5000
20	75	'Egypt'	0	0	3	3	30.0444
21	78	'Estonia'	0	0	1	1	59.4370
22	44	'Ethiopia'	1	2	5	8	9.0227
23	54	'Fiji'	1	0	0	1	-18.1416
24	78	'Finland'	0	0	1	1	60.1698
25	7	'France'	10	18	14	42	48.8566

	Ranking	Country	Gold	Silver	Bronze	Total	Latitude
26	38	'Georgia'	2	1	4	7	41.7100
27	5	'Germany'	17	10	15	42	52.5192
28	26	'Greece'	3	1	2	6	37.9837
29	69	'Grenada'	0	1	0	1	12.0535
30	12	'Hungary'	8	3	4	15	47.4979
31	67	'India'	0	1	1	2	28.6353
32	46	'Indonesia'	1	2	0	3	-6.2115
33	25	'Iran'	3	1	4	8	35.6962
34	62	'Ireland'	0	2	0	2	53.3498
35	77	'Israel'	0	0	2	2	31.7683
36	9	'Italy'	8	12	8	28	41.8929
37	51	'Ivory Coast'	1	0	1	2	6.8167
38	16	'Jamaica'	6	3	2	11	17.9927
39	6	'Japan'	12	8	21	41	35.6896
40	54	'Jordan'	1	0	0	1	31.9566
41	22	'Kazakhstan'	3	5	9	17	51.1667
42	15	'Kenya'	6	6	1	13	-1.2921
43	54	'Kosovo'	1	0	0	1	42.6724
44	64	'Lithuania'	0	1	3	4	54.6872
45	60	'Malaysia'	0	4	1	5	3.1390
46	61	'Mexico'	0	3	2	5	19.4326
47	78	'Moldova'	0	0	1	1	47.0269
48	67	'Mongolia'	0	1	1	2	47.9214
49	78	'Morocco'	0	0	1	1	34.0150
50	11	'Netherlands'	8	7	4	19	52.3702
51	19	'New Zealand'	4	9	5	18	-41.2865
52	69	'Niger'	0	1	0	1	13.5127
53	78	'Nigeria'	0	0	1	1	9.0667
54	74	'Norway'	0	0	4	4	59.9139
55	69	'Philippines'	0	1	0	1	14.5995
56	33	'Poland'	2	3	6	11	52.2297
57	78	'Portugal'	0	0	1	1	38.7253
58	54	'Puerto Rico'	1	0	0	1	18.2002

	Ranking	Country	Gold	Silver	Bronze	Total	Latitude
59	69	'Qatar'	0	1	0	1	25.2803
60	47	'Romania'	1	1	3	5	44.4325
61	4	'Russia'	19	18	19	56	55.7512
62	32	'Serbia'	2	4	2	8	44.8206
63	54	'Singapore'	1	0	0	1	1.2801
64	37	'Slovakia'	2	2	0	4	48.1459
65	45	'Slovenia'	1	2	1	4	46.0565
66	30	'South Africa'	2	6	2	10	-25.7313
67	14	'Spain'	7	4	6	17	40.4168
68	29	'Sweden'	2	6	3	11	59.3289
69	50	'Taiwan'	1	0	2	3	25.0911
70	54	'Tajikistan'	1	0	0	1	38.5367
71	35	'Thailand'	2	2	2	6	13.7279
72	75	'Tunisia'	0	0	3	3	36.8188
73	41	'Turkey'	1	3	4	8	39.9208
74	31	'Ukraine'	2	5	4	11	50.4501
75	78	'United Arab...'	0	0	1	1	24.4667
76	2	'United Kingdom'	27	23	17	67	51.5112
77	1	'United States'	46	37	38	121	38.8951
78	21	'Uzbekistan'	4	2	7	13	41.2667
79	65	'Venezuela'	0	1	2	3	10.4910
80	48	'Vietnam'	1	1	0	2	21.0333

```
medalsVsGDP = sortrows(medalsVsGDP, 'Total', 'descend');
```

Plot Olympic Medals vs. GDP

The last step is to plot the number of medals won against GDP for each country. We can see that countries with high GDP tend to do better in the Olympics maybe because they have more resources to spend on their athletes.

```
topNum = 10;
topMedals = medalsVsGDP(1:topNum,:);

f = figure;
f.Position = f.Position.*[1 1 1.8 1.2];
h_sc = scatter(medalsVsGDP.GDP, medalsVsGDP.Total);
h_sc.Parent.XScale = 'log';
hold on
```

7

```
h_sc = scatter(topMedals.GDP, topMedals.Total, 'om');
text(1.09*topMedals.GDP, topMedals.Total+2, string(topMedals.Country), ...
    'Color', [0.4 0.4 0.4], 'FontSize', 10)
hold off
xlabel('GDP'); ylabel('Number of Medals')
title(sprintf('Top %2d Medal-Winning Countries (Summer 2016)',topNum))
xlim([1000 100000000])
```


Top 10 Medal-Winning Countries (Summer 2016)
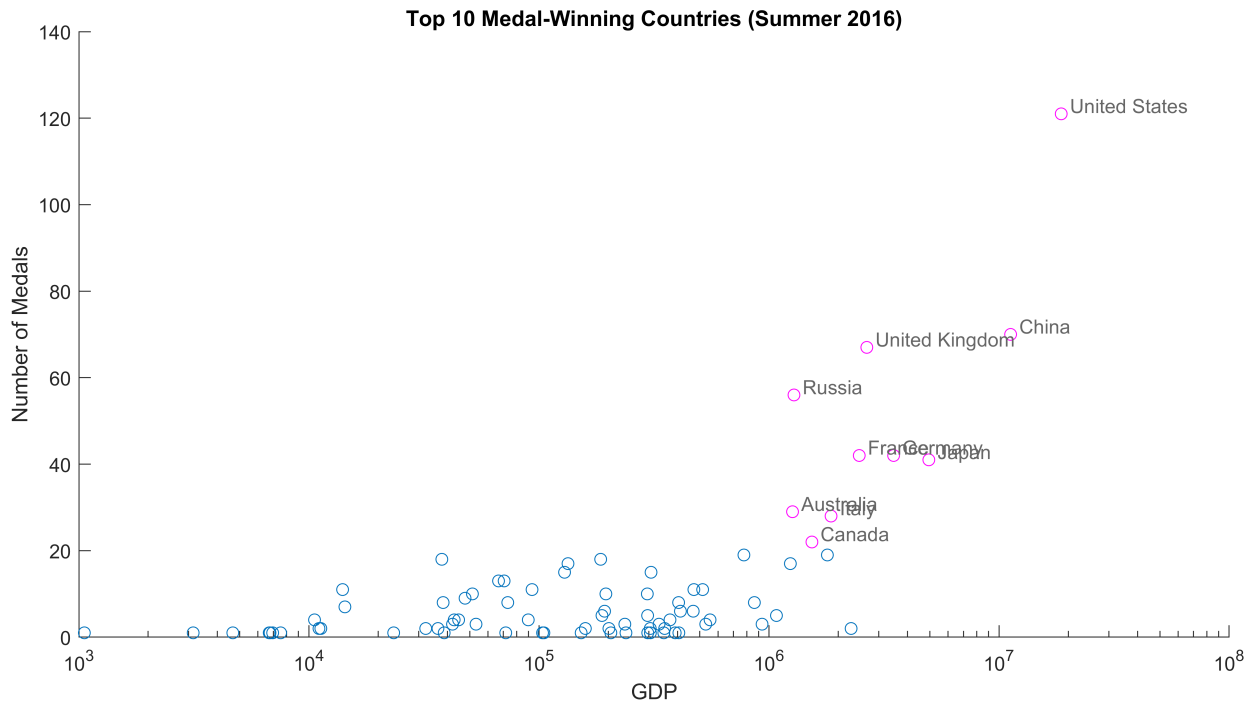
Copyright (c) 2019, The MathWorks, Inc.

Attribution

This example uses Olympic medal data from the Wikipedia article 2016_Summer_Olympics_medal_table which is released under the Creative Commons Attribution-Share-Alike License 3.0. It also uses 2016 GDP data from the Wikipedia article List_of_countries_by_past_and_projected_GDP_(nominal) which is released under the Creative Commons Attribution-Share-Alike License 3.0.

Downloads

OlympicAnalysis.mlx

gdp.xlsx

olympic.xlsx