

hw_02_ggplot_gapminder

Qi Yang

2019/9/23

Exercise 1: Basic dplyr

1.1 Subsetting gapminder to three countries in the 1970's with filter().

```
gapminder %>%
  filter(year > 1969 & year < 1980,
         country == "Italy" | country == "Australia" | country == "Mexico") %>%
  knitr::kable()
```

country	continent	year	lifeExp	pop	gdpPercap
Australia	Oceania	1972	71.930	13177000	16788.629
Australia	Oceania	1977	73.490	14074100	18334.198
Italy	Europe	1972	72.190	54365564	12269.274
Italy	Europe	1977	73.480	56059245	14255.985
Mexico	Americas	1972	62.361	55984294	6809.407
Mexico	Americas	1977	65.032	63759976	7674.929
###	1.2 Sele	cting "count	ry" and	"gdpPerca	p" from 1.1
					with %>%.

```
gapminder %>%
  filter(year > 1969 & year < 1980,
         country == "Italy" | country == "Australia" | country == "Mexico") %>%
  select(country, gdpPercap) %>%
  knitr::kable()
```

country	gdpPercap
Australia	16788.629
Australia	18334.198
Italy	12269.274
Italy	14255.985
Mexico	6809.407
Mexico	7674.929
###	1.3 Addi
	ng variable lifeExpInc to show filtered entries that have experienced drops in life expectancy with lag()

```
gapminder %>%
  mutate(lifeExpInc = lifeExp-lag(gapminder$lifeExp,1)) %>%
  filter(lifeExpInc < 0, year != 1952) %>%
  select(lifeExpInc, everything()) %>%
  arrange(lifeExpInc) %>%
  knitr::kable()
```

lifeExpInc	country	continent	year	lifeExp	pop	gdpPerCap
-20.4210	Rwanda	Africa	1992	23.59900	7290203	737.068
-13.5680	Zimbabwe	Africa	1997	46.80900	11404948	792.450
-10.9650	Lesotho	Africa	2002	44.59300	2046772	1275.184
-10.4200	Swaziland	Africa	2002	43.86900	1130269	4128.116
-10.1890	Botswana	Africa	1997	52.55600	1536536	8647.142
-9.0970	Cambodia	Asia	1977	31.22000	6978607	524.972
-7.4300	Namibia	Africa	2002	51.47900	1972153	4072.324
-6.8710	South Africa	Africa	2002	53.36500	44433622	7710.946
-6.8200	Zimbabwe	Africa	2002	39.98900	11926563	672.038
-6.0476	China	Asia	1962	44.50136	665770000	487.674
-5.9220	Botswana	Africa	2002	46.63400	1630347	11003.605
-5.8620	Zambia	Africa	1997	40.23800	9417789	1071.353
-5.5830	Iraq	Asia	1992	59.46100	17861905	3745.640
-5.2250	Liberia	Africa	1992	40.80200	1912974	636.622
-5.0980	Cambodia	Asia	1972	40.31700	7450606	421.624
-4.8780	Kenya	Africa	1997	54.40700	28263827	1360.485
-4.8430	Somalia	Africa	1992	39.65800	6099799	926.960
-4.7210	Zambia	Africa	1992	46.10000	8381163	1210.884
-4.2560	Swaziland	Africa	2007	39.61300	1133066	4513.480
-4.2470	Uganda	Africa	1997	44.57800	21210254	816.559
-4.1850	Swaziland	Africa	1997	54.28900	1054486	3876.768
-4.1270	Lesotho	Africa	1997	55.55800	1982823	1186.148
-4.0530	Cote d'Ivoire	Africa	1997	47.99100	14625967	1786.265
-4.0260	South Africa	Africa	2007	49.33900	43997828	9269.657
-3.7000	Gabon	Africa	2002	56.76100	1299304	12521.713
-3.4750	Burundi	Africa	1992	44.73600	5809236	631.699
-3.4710	Congo, Rep.	Africa	1997	52.96200	2800947	3484.164
-3.4150	Kenya	Africa	2002	50.99200	31386842	1287.514
-3.3300	Central African Republic	Africa	1997	46.06600	3696513	740.506
-3.0900	Namibia	Africa	1997	58.90900	1774766	3899.524
-2.9610	Congo, Dem. Rep.	Africa	1997	42.58700	47798986	312.188
-2.7580	Central African Republic	Africa	2002	43.30800	4048013	738.690
-2.6840	Uganda	Africa	1992	48.82500	18252190	644.170
-2.6110	Cote d'Ivoire	Africa	1992	52.04400	12772596	1648.073
-2.4860	Malawi	Africa	2002	45.00900	11824495	665.423
-2.3430	Cameroon	Africa	2002	49.85600	15929988	1934.011
-2.3180	Mozambique	Africa	2002	44.02600	18473780	633.617
-2.2510	Korea, Dem. Rep.	Asia	1997	67.72700	21585105	1690.756
-2.1980	Rwanda	Africa	1987	44.02000	6349365	847.991
-2.1150	Cameroon	Africa	1997	52.19900	14195809	1694.337
-2.0010	Lesotho	Africa	2007	42.59200	2012649	1569.331
-1.9740	Tanzania	Africa	1997	48.46600	30686889	789.186
-1.9740	Zimbabwe	Africa	1992	60.37700	10704340	693.420
-1.9440	Mozambique	Africa	2007	42.08200	19951656	823.685
-1.9250	Malawi	Africa	1997	47.49500	10419991	692.275
-1.8640	Congo, Dem. Rep.	Africa	1992	45.54800	41672143	457.719
-1.7650	Iraq	Asia	2002	57.04600	24001816	4390.717
-1.6730	Sierra Leone	Africa	1992	38.33300	4260884	1068.696
-1.6520	South Africa	Africa	1997	60.23600	42835005	7479.188
-1.5110	El Salvador	Americas	1977	56.69600	4282586	5138.922
-1.4640	Montenegro	Europe	2002	73.98100	720230	6557.194
-1.1590	Cote d'Ivoire	Africa	2002	46.83200	16252726	1648.800

lifeExpInc	country	continent	year	lifeExp	pop	gdpPerCap
-1.0950	Tanzania	Africa	1992	50.44000	26605473	825.682
-1.0890	Central African Republic	Africa	1992	49.39600	3265124	747.905
-1.0650	Korea, Dem. Rep.	Asia	2002	66.66200	22215365	1646.758
-1.0480	Chad	Africa	2002	50.52500	8835739	1156.18
-1.0450	Zambia	Africa	2002	39.19300	10595811	1071.613
-1.0370	Congo, Rep.	Africa	1992	56.43300	2409073	4016.239
-1.0000	Zambia	Africa	1987	50.82100	7272406	1213.315
-0.9050	Gabon	Africa	1997	60.46100	1126189	14722.841
-0.8770	Botswana	Africa	1992	62.74500	1342614	7954.111
-0.8700	Bulgaria	Europe	1997	70.32000	8066057	5970.388
-0.8560	Nigeria	Africa	2002	46.60800	119901274	1615.286
-0.8290	Togo	Africa	2002	57.56100	4977378	886.220
-0.7190	Puerto Rico	Americas	1992	73.91100	3585176	14641.587
-0.6710	Cameroon	Africa	1992	54.31400	12467171	1793.163
-0.6690	Korea, Dem. Rep.	Asia	1992	69.97800	20711375	3726.063
-0.6660	Uganda	Africa	1977	50.35000	11457758	843.733
-0.6500	Iraq	Asia	1997	58.81100	20775703	3076.239
-0.6450	Eritrea	Africa	1982	43.89000	2637297	524.875
-0.6300	Slovak Republic	Europe	1972	70.35000	4593433	9674.167
-0.5600	Hungary	Europe	1982	69.39000	10705535	12545.990
-0.5010	Uganda	Africa	1982	49.84900	12939400	682.266
-0.4890	Trinidad and Tobago	Americas	2002	68.97600	1101832	11460.600
-0.4200	Myanmar	Asia	2002	59.90800	45598081	611.000
-0.4190	Albania	Europe	1992	71.58100	3326498	2497.437
-0.4100	Hungary	Europe	1992	69.17000	10348684	10535.628
-0.3970	Trinidad and Tobago	Americas	1997	69.46500	1138101	8792.573
-0.3720	Congo, Dem. Rep.	Africa	1987	47.41200	35481645	672.774
-0.3710	Benin	Africa	2002	54.40600	7026113	1372.877
-0.3400	Poland	Europe	1987	70.98000	37740710	9082.351
-0.2150	Jamaica	Americas	2002	72.04700	2664659	6994.774
-0.1800	Croatia	Europe	1982	70.46000	4413368	13221.821
-0.1800	Poland	Europe	1977	70.67000	34621254	9508.141
-0.1700	Romania	Europe	1992	69.36000	22797027	6598.409
-0.1510	Chad	Africa	1997	51.57300	7562011	1004.961
-0.1500	Bulgaria	Europe	1992	71.19000	8658506	6302.623
-0.1380	Serbia	Europe	1982	70.16200	9032824	15181.092
-0.1300	Romania	Europe	1987	69.53000	22686371	9696.273
-0.1030	Ghana	Africa	2002	58.45300	20550751	1111.984
-0.0920	El Salvador	Americas	1982	56.60400	4474873	4098.344
-0.0900	Bulgaria	Europe	1977	70.81000	8797022	7612.240
-0.0900	Czech Republic	Europe	1972	70.29000	9862158	13108.453
-0.0800	Norway	Europe	1987	75.89000	4186147	31540.974
-0.0700	Netherlands	Europe	1972	73.75000	13329874	18794.745
-0.0600	Denmark	Europe	1982	74.63000	5117810	21688.040
-0.0540	Kenya	Africa	1992	59.28500	25020539	1341.921
-0.0360	Angola	Africa	1987	39.90600	7874230	2430.208
-0.0260	Gabon	Africa	2007	56.73500	1454867	13206.484
-0.0200	Congo, Dem. Rep.	Africa	1982	47.78400	30646495	673.747
-0.0080	Nigeria	Africa	1997	47.46400	106207839	1624.941
-0.0040	Jamaica	Americas	1992	71.76600	2378618	7404.923
### 1.4 Addin	g gdpPerCapMax to show th	e max GDP pe	r capit	a experienc	ed by each c	ountry with max()

```
gapminder %>%
  group_by(country) %>%
  filter(gdpPercap == max(gdpPercap)) %>%
  rename(gdpPercapMax = gdpPercap) %>%
  select(gdpPercapMax, country) %>%
  arrange(desc(gdpPercapMax)) %>%
  knitr::kable()
```

gdpPercapMax	country
113523.1329	Kuwait
49357.1902	Norway
47143.1796	Singapore
42951.6531	United States
40675.9964	Ireland
39724.9787	Hong Kong, China
37506.4191	Switzerland
36797.9333	Netherlands
36319.2350	Canada
36180.7892	Iceland
36126.4927	Austria
35278.4187	Denmark
34435.3674	Australia
34167.7626	Saudi Arabia
33859.7484	Sweden
33692.6051	Belgium
33207.0844	Finland
33203.2613	United Kingdom
32170.3744	Germany
31656.0681	Japan
30470.0167	France
29796.0483	Bahrain
28821.0637	Spain
28718.2768	Taiwan
28569.7197	Italy
27538.4119	Greece
25768.2576	Slovenia
25523.2771	Israel
25185.0091	New Zealand
23348.1397	Korea, Rep.
22833.3085	Czech Republic
22316.1929	Oman
21951.2118	Libya
21745.5733	Gabon
20509.6478	Portugal
19328.7090	Puerto Rico
18678.3144	Slovak Republic
18008.9444	Hungary
18008.5092	Trinidad and Tobago
15870.8785	Serbia
15389.9247	Poland
14688.2351	Iraq
14619.2227	Croatia
13171.6388	Chile

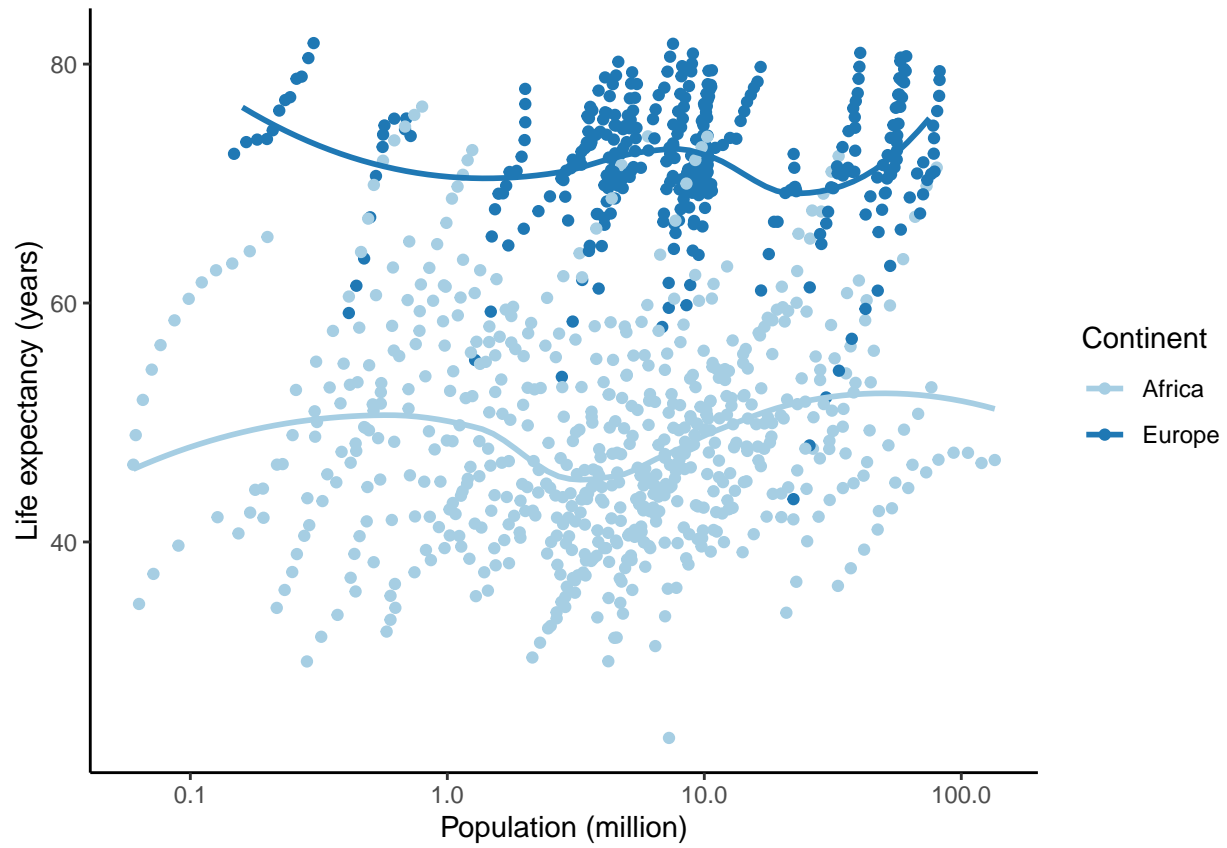
gdpPercapMax	country
13143.9510	Venezuela
12779.3796	Argentina
12569.8518	Botswana
12451.6558	Malaysia
12154.0897	Equatorial Guinea
11977.5750	Mexico
11888.5951	Iran
11732.5102	Montenegro
10956.9911	Mauritius
10808.4756	Romania
10680.7928	Bulgaria
10611.4630	Uruguay
10461.0587	Lebanon
9809.1856	Panama
9645.0614	Costa Rica
9269.6578	South Africa
9065.8008	Brazil
8948.1029	Cuba
8458.2764	Turkey
7670.1226	Reunion
7458.3963	Thailand
7446.2988	Bosnia and Herzegovina
7433.8893	Jamaica
7429.4559	Ecuador
7408.9056	Peru
7110.6676	West Bank and Gaza
7092.9230	Tunisia
7006.5804	Colombia
6223.3675	Algeria
6025.3748	Dominican Republic
5937.0295	Albania
5728.3535	El Salvador
5581.1810	Egypt
5522.7764	Angola
5486.3711	Nicaragua
5186.0500	Guatemala
4959.1149	China
4879.5075	Congo, Rep.
4811.0604	Namibia
4519.4612	Jordan
4513.4806	Swaziland
4258.5036	Paraguay
4184.5481	Syria
4106.5253	Korea, Dem. Rep.
3970.0954	Sri Lanka
3822.1371	Bolivia
3820.1752	Morocco
3694.2124	Djibouti
3548.3308	Honduras
3540.6516	Indonesia
3190.4810	Philippines
3095.7723	Mongolia

gdpPercapMax	country
2605.9476	Pakistan
2602.7102	Cote d'Ivoire
2602.6642	Cameroon
2602.3950	Sudan
2452.2104	India
2441.5764	Vietnam
2280.7699	Yemen, Rep.
2013.9773	Nigeria
2011.1595	Haiti
1937.5777	Comoros
1890.2181	Sao Tome and Principe
1803.1515	Mauritania
1777.0773	Zambia
1748.5630	Madagascar
1713.7787	Cambodia
1712.4721	Senegal
1704.0637	Chad
1649.6602	Togo
1569.3314	Lesotho
1465.0108	Sierra Leone
1463.2493	Kenya
1450.9925	Somalia
1441.2849	Benin
1391.2538	Bangladesh
1327.6089	Ghana
1217.0330	Burkina Faso
1193.0688	Central African Republic
1107.4822	Tanzania
1091.3598	Nepal
1056.3801	Uganda
1054.3849	Niger
1042.5816	Mali
978.0114	Afghanistan
945.5836	Guinea
944.0000	Myanmar
913.4708	Eritrea
905.8602	Congo, Dem. Rep.
884.7553	Gambia
881.5706	Rwanda
838.1240	Guinea-Bissau
823.6856	Mozambique
803.0055	Liberia
799.3622	Zimbabwe
759.3499	Malawi
690.8056	Ethiopia
631.6999	Burundi
### 1.5 Scatter	plot: Canada's life expectancy vs. GDP per capita.
[(hw_02_ggplo	t_gapminder_files/figure-latex/unnamed-chunk-5-1.pdf)

Exercise 2: Explore individual variables with dplyr

Exercise 3: Explore various plot types

3.1 Scatterplot: Life expectancy vs. population in Africa and Europe.



3.2 Bar plot: GDP per capita vs. year in each continent.

