pj17

March 7, 2019

1 Global trends in dietary components

```python
In [3]: import pyecharts
        import pandas as pd
        import numpy as np
        from pyecharts import Style
        from pyecharts import Map, Geo
        from pyecharts import Timeline
        style = Style(
            title_color="#fff",
            #title_pos="center",
            width=800,
            height=600,
            background_color='#bbb'
        )
```

```python
In [3]: import numpy as np
        import pandas as pd
        import matplotlib.pyplot as plt
        #plt.rcParams['font.sans-serif'] = ['SimHei']
```

```python
In [4]: ## mean of daily caloric supply
        df=pd.read_csv('daily-caloric-supply-derived-from-carbohydrates-protein-and-fat.csv')#
        df.head()
        name = ['Animal protein','Plant protein','Fat','Carbohydrates']   #labels
        theta = np.linspace(0,2*np.pi,len(name),endpoint=False)    #divide the circle to unifo
        value = [df[i].mean() for i in df.columns[3:]] # mean kilocalories in different macron
        print(value)
        theta = np.concatenate((theta,[theta[0]]))   #close
        value = np.concatenate((value,[value[0]]))   #close the circle

        ax = plt.subplot(111,projection = 'polar')
        ax.plot(theta,value,'r-',lw=1,alpha = 0.75)
        ax.fill(theta,value,'r',alpha = .55)              #fill, alpha is transparency
        ax.set_thetagrids(theta*180/np.pi,name,fontsize=12)         #label
        ax.set_ylim(0,2000)                                #set polar axis length
        ax.set_theta_zero_location('S')           #set polar axis direction
```

```
        ax.set_title('daily caloric supply',fontsize = 15,pad=20.0)    #description of plot
        plt.show()
```

[126.23653490702596, 165.8816701926289, 658.2440663623205, 1663.1690724863602]

daily caloric supply
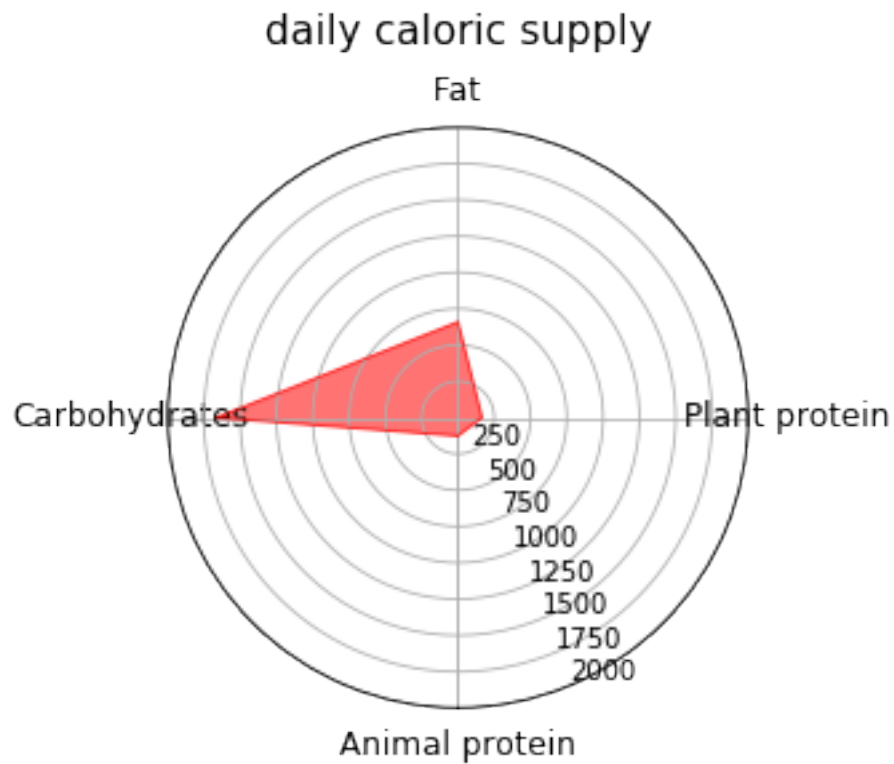

```
In [5]: df=pd.read_csv('dietary-compositions-by-commodity-group.csv')#,encoding = "ISO-8859-1",
        df.head()

Out[5]:        Entity Code  Year  Other (kilocalories per person per day)  \
        0  Afghanistan  AFG  1961                                       13
        1  Afghanistan  AFG  1962                                       12
        2  Afghanistan  AFG  1963                                       13
        3  Afghanistan  AFG  1964                                       11
        4  Afghanistan  AFG  1965                                       13

           Sugar (kilocalories per person per day)  \
        0                                       51
        1                                       45
        2                                       47
        3                                       55
        4                                       57
```

```
    Oils & Fats (kilocalories per person per day)  \
0                                               92
1                                               98
2                                              106
3                                              102
4                                              105

    Meat (kilocalories per person per day)  \
0                                        88
1                                        88
2                                        91
3                                        93
4                                        95

    Dairy & Eggs (kilocalories per person per day)  \
0                                               102
1                                               101
2                                               110
3                                               110
4                                               118

    Fruits & Vegetables (kilocalories per person per day)  \
0                                                     82
1                                                     76
2                                                     79
3                                                     95
4                                                     95

    Starchy Roots (kilocalories per person per day)  \
0                                                25
1                                                22
2                                                23
3                                                24
4                                                24

    Pulses (kilocalories per person per day)  \
0                                          16
1                                          17
2                                          17
3                                          18
4                                          18

    Cereals & Grains (kilocalories per person per day)  \
0                                                2530
1                                                2458
2                                                2212
3                                                2445
4                                                2431
```

```
    Alcoholic Beverages (kcal/person/day)
0                                      0.0
1                                      0.0
2                                      0.0
3                                      0.0
4                                      0.0
```

In [6]:
```python
## mean of diet components
name = ['Other','Sugar','Oils & Fats','Meat','Dairy & Eggs','Fruits & Vegetables','Sta
theta = np.linspace(0,2*np.pi,len(name),endpoint=False)    #divide the circle to unifo
value = [df[i].mean() for i in df.columns[3:]] # mean kilocalories in different food g
print(value)
theta = np.concatenate((theta,[theta[0]]))  #close
value = np.concatenate((value,[value[0]]))  #close the circle

ax = plt.subplot(111,projection = 'polar')
ax.plot(theta,value,'r-',lw=1,alpha = 0.75)
ax.fill(theta,value,'r',alpha = .55)              #fill, alpha is transparency
ax.set_thetagrids(theta*180/np.pi,name,fontsize=12)        #label
ax.set_ylim(0,1100)                                #set polar axis length
ax.set_theta_zero_location('S')         #set polar axis direction
ax.set_title('daily caloric supply',fontsize = 15,pad=20.0)   #description of plot
plt.show()
```

[28.833210694137847, 272.9000490556782, 357.62754476330633, 220.17341182241844, 170.5505273485

daily caloric supply
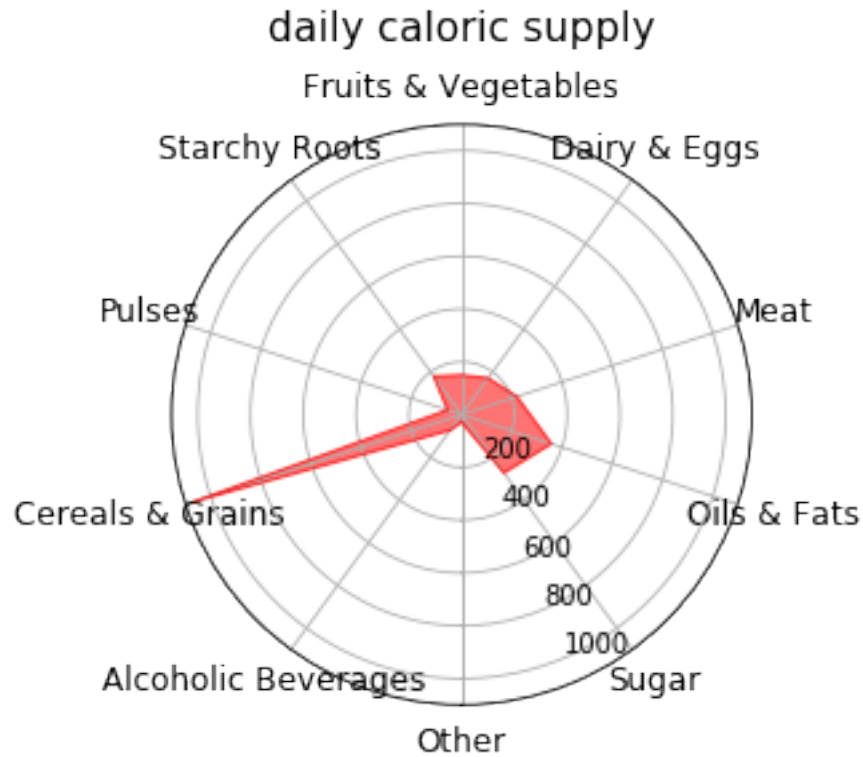

```
In [80]: df=pd.read_csv('per-capita-consumption-of-cereals-by-commodity-type-daily-kilocalories
         df.head()

Out[80]:        Entity Code  Year  Oats (kcal/capita/day)  Rye (kcal/capita/day)  \
         0  Afghanistan  AFG  1961                     NaN                    NaN
         1  Afghanistan  AFG  1962                     NaN                    NaN
         2  Afghanistan  AFG  1963                     NaN                    NaN
         3  Afghanistan  AFG  1964                     NaN                    NaN
         4  Afghanistan  AFG  1965                     NaN                    NaN

            Barley (kcal/capita/day)  Sorghum (kcal/capita/day)  \
         0                     237.0                        NaN
         1                     232.0                        NaN
         2                     227.0                        NaN
         3                     223.0                        NaN
         4                     218.0                        NaN

            Maize (kcal/capita/day)  Wheat (kcal/capita/day)  Rice (kcal/capita/day)
         0                    380.0                     1688                     209
         1                    372.0                     1633                     205
         2                    371.0                     1399                     199
         3                    367.0                     1602                     236
         4                    359.0                     1607                     230
```

```
In [81]: ## mean of different cereal preference
         name = ['Oats','Rye','Barley','Sorghum','Maize','Wheat','Rice']    #labels
         theta = np.linspace(0,2*np.pi,len(name),endpoint=False)     #divide the circle to unif
         value = [df[i].mean() for i in df.columns[3:]] # mean kilocalories in different food
         print(value)
         theta = np.concatenate((theta,[theta[0]]))   #close
         value = np.concatenate((value,[value[0]]))   #close the circle

         ax = plt.subplot(111,projection = 'polar')
         ax.plot(theta,value,'r-',lw=1,alpha = 0.75)
         ax.fill(theta,value,'r',alpha = .55)             #fill, alpha is transparency
         ax.set_thetagrids(theta*180/np.pi,name,fontsize=12)          #label
         ax.set_ylim(0,500)                                 #set polar axis length
         ax.set_theta_zero_location('S')         #set polar axis direction
         ax.set_title('cereal preference',fontsize = 15,pad=20.0)   #description of plot
         plt.show()
```

[4.154991152284793, 17.752185153268496, 13.582626680455016, 91.13961941415437, 173.50287664553

cereal preference
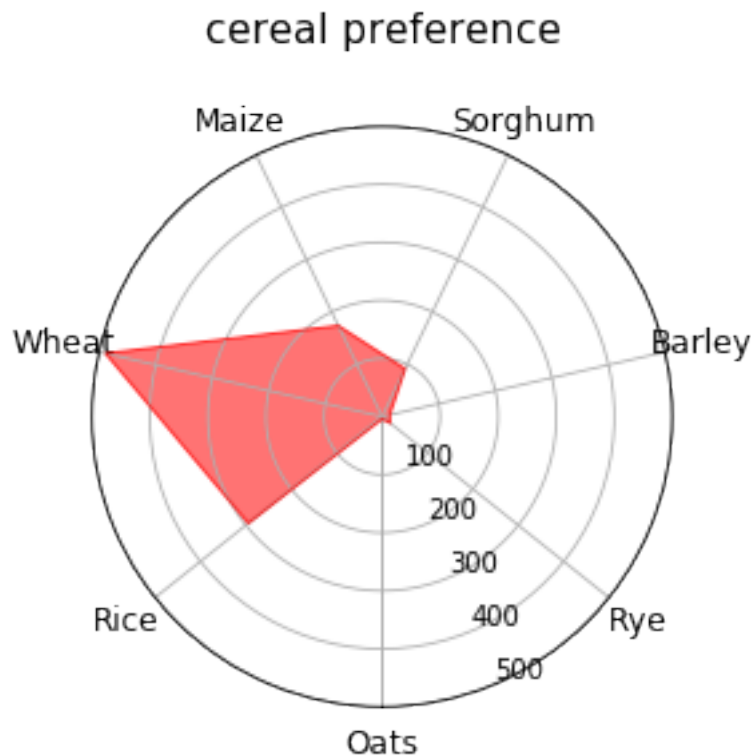
2 bar

```
In [94]: df=pd.read_csv('daily-caloric-supply-derived-from-carbohydrates-protein-and-fat.csv');
         df.head()
```

```
Out[94]:        Entity Code  Year  Animal protein (kilocalories per person per day)  \
         0  Afghanistan  AFG  1961                                             54.12
         1  Afghanistan  AFG  1962                                             53.92
         2  Afghanistan  AFG  1963                                             56.80
         3  Afghanistan  AFG  1964                                             57.32
         4  Afghanistan  AFG  1965                                             59.76

            Plant protein (kilocalories per person per day)  \
         0                                           285.52
         1                                           278.00
         2                                           251.68
         3                                           276.64
         4                                           275.68

            Fat (kilocalories per person per day)  \
         0                                 337.59
         1                                 338.49
         2                                 347.13
         3                                 350.55
         4                                 357.57

            Carbohydrates (kilocalories per person per day)
         0                                         2321.77
         1                                         2246.59
         2                                         2042.39
         3                                         2268.49
         4                                         2262.99
```

```
In [95]: grp = df.groupby('Entity')
         res=grp.mean()
         res
```

```
Out[95]:                         Year  \
         Entity
         Afghanistan           1987.0
         Albania               1987.0
         Algeria               1987.0
         Angola                1987.0
         Antigua and Barbuda   1987.0
         Argentina             1987.0
         Armenia               1987.0
         Australia             1987.0
         Austria               1987.0
         Azerbaijan            1987.0
```

```
Bahamas                    1987.0
Bangladesh                 1987.0
Barbados                   1987.0
Belarus                    1987.0
Belgium                    1987.0
Belize                     1987.0
Benin                      1987.0
Bermuda                    1987.0
Bolivia                    1987.0
Bosnia and Herzegovina     2002.5
Botswana                   1987.0
Brazil                     1987.0
Brunei                     1987.0
Bulgaria                   1987.0
Burkina Faso               1987.0
Cabo Verde                 1987.0
Cambodia                   1987.0
Cameroon                   1987.0
Canada                     1987.0
Central African Republic   1987.0
...                           ...
Sudan (former)             1986.0
Suriname                   1987.0
Swaziland                  1987.0
Sweden                     1987.0
Switzerland                1987.0
Taiwan                     1987.0
Tajikistan                 1987.0
Tanzania                   1987.0
Thailand                   1987.0
Timor                      1987.0
Togo                       1987.0
Trinidad and Tobago        1987.0
Tunisia                    1987.0
Turkey                     1987.0
Turkmenistan               1987.0
USSR                       1976.0
Uganda                     1987.0
Ukraine                    1987.0
United Arab Emirates       1987.0
United Kingdom             1987.0
United States             1987.0
Uruguay                    1987.0
Uzbekistan                 1987.0
Vanuatu                    1987.0
Venezuela                  1987.0
Vietnam                    1987.0
Yemen                      1987.0
```

```
Yugoslavia                    1976.0
Zambia                        1987.0
Zimbabwe                      1987.0


                              Animal protein (kilocalories per person per day)  \
Entity
Afghanistan                                                       58.148679
Albania                                                          122.298868
Algeria                                                           63.686792
Angola                                                            51.615094
Antigua and Barbuda                                              179.884528
Argentina                                                        258.003774
Armenia                                                          157.980377
Australia                                                        281.403019
Austria                                                          239.423396
Azerbaijan                                                       147.748679
Bahamas                                                          195.812075
Bangladesh                                                        25.444528
Barbados                                                         190.215094
Belarus                                                          197.940377
Belgium                                                          236.590189
Belize                                                           113.695849
Benin                                                             36.807547
Bermuda                                                          259.267170
Bolivia                                                           81.826415
Bosnia and Herzegovina                                            99.958182
Botswana                                                          94.718491
Brazil                                                           122.577358
Brunei                                                           151.023396
Bulgaria                                                         154.239245
Burkina Faso                                                      33.075472
Cabo Verde                                                        67.749434
Cambodia                                                          38.802264
Cameroon                                                          44.566038
Canada                                                           234.492075
Central African Republic                                          55.302642
...                                                                     ...
Sudan (former)                                                    92.189804
Suriname                                                         102.141887
Swaziland                                                         76.769811
Sweden                                                           258.208302
Switzerland                                                      234.843774
Taiwan                                                           136.258113
Tajikistan                                                       132.030943
Tanzania                                                          41.792453
Thailand                                                          76.417358
Timor                                                             93.762264
Togo                                                              28.891321
```

```
Trinidad and Tobago                                         123.582642
Tunisia                                                      75.095094
Turkey                                                      107.969057
Turkmenistan                                               166.566038
USSR                                                       193.469677
Uganda                                                      45.005283
Ukraine                                                    177.137358
United Arab Emirates                                       204.808302
United Kingdom                                             219.599245
United States                                              276.241509
Uruguay                                                    209.259623
Uzbekistan                                                 156.215094
Vanuatu                                                    114.356981
Venezuela                                                  120.795472
Vietnam                                                     52.803019
Yemen                                                       42.646792
Yugoslavia                                                 134.801290
Zambia                                                      43.910189
Zimbabwe                                                    43.224906


                    Plant protein (kilocalories per person per day)  \
Entity
Afghanistan                                                209.480000
Albania                                                    210.073208
Algeria                                                    203.744151
Angola                                                     116.751698
Antigua and Barbuda                                         93.214340
Argentina                                                  142.961509
Armenia                                                    203.473962
Australia                                                  143.449057
Austria                                                    150.649057
Azerbaijan                                                 218.243019
Bahamas                                                    118.303396
Bangladesh                                                 162.108679
Barbados                                                   138.819623
Belarus                                                    196.122264
Belgium                                                    157.848302
Belize                                                     150.357736
Benin                                                      161.761509
Bermuda                                                    114.881509
Bolivia                                                    135.132830
Bosnia and Herzegovina                                     238.296364
Botswana                                                   169.298868
Brazil                                                     158.851321
Brunei                                                     144.440000
Bulgaria                                                   216.978113
Burkina Faso                                               205.289057
Cabo Verde                                                 164.144906
```

```
Cambodia                                             152.329811
Cameroon                                             178.902642
Canada                                               156.334340
Central African Republic                             108.708679
...                                                         ...
Sudan (former)                                       157.427451
Suriname                                             133.172075
Swaziland                                            167.480755
Sweden                                               128.812075
Switzerland                                          142.513208
Taiwan                                               184.868679
Tajikistan                                           193.935094
Tanzania                                             164.307925
Thailand                                             135.417358
Timor                                                140.787170
Togo                                                 166.256604
Trinidad and Tobago                                  151.112453
Tunisia                                              245.646038
Turkey                                               296.840000
Turkmenistan                                         212.194717
USSR                                                 216.970323
Uganda                                               167.821887
Ukraine                                              205.699623
United Arab Emirates                                 194.656604
United Kingdom                                        159.241509
United States                                        145.516981
Uruguay                                              128.499623
Uzbekistan                                           208.127547
Vanuatu                                              141.916226
Venezuela                                            132.481509
Vietnam                                              156.021132
Yemen                                                183.221132
Yugoslavia                                           266.614194
Zambia                                               178.851321
Zimbabwe                                             175.984151

                        Fat (kilocalories per person per day)  \
Entity
Afghanistan                           342.613019
Albania                               606.888679
Algeria                               494.813208
Angola                                354.985472
Antigua and Barbuda                   669.294340
Argentina                             980.607736
Armenia                               691.930189
Australia                            1112.408491
Austria                              1316.978491
Azerbaijan                            644.272642
```

Bahamas	759.287547
Bangladesh	183.124528
Barbados	798.819623
Belarus	876.330000
Belgium	1310.515472
Belize	610.334151
Benin	387.529811
Bermuda	1057.121321
Bolivia	389.643962
Bosnia and Herzegovina	547.216364
Botswana	428.174151
Brazil	669.837736
Brunei	570.547358
Bulgaria	862.682264
Burkina Faso	364.980566
Cabo Verde	504.628302
Cambodia	214.412264
Cameroon	399.574528
Canada	1161.641887
Central African Republic	540.830377
...	...
Sudan (former)	571.800000
Suriname	503.527925
Swaziland	385.957358
Sweden	1103.450943
Switzerland	1359.324340
Taiwan	851.065472
Tajikistan	672.984340
Tanzania	294.721132
Thailand	379.847547
Timor	312.960566
Togo	348.817925
Trinidad and Tobago	633.436981
Tunisia	700.067547
Turkey	807.872264
Turkmenistan	749.652453
USSR	813.213871
Uganda	313.772264
Ukraine	789.191321
United Arab Emirates	885.133019
United Kingdom	1241.949057
United States	1234.699811
Uruguay	905.515472
Uzbekistan	731.440189
Vanuatu	861.935094
Venezuela	612.103585
Vietnam	294.541132
Yemen	350.806415

Yugoslavia	857.578065
Zambia	321.692264
Zimbabwe	454.484717

	Carbohydrates (kilocalories per person per day)
Entity	
Afghanistan	1737.758302
Albania	1711.022264
Algeria	1716.982264
Angola	1367.779811
Antigua and Barbuda	1208.606792
Argentina	1749.936415
Armenia	1920.011698
Australia	1575.531887
Austria	1734.967925
Azerbaijan	1997.263962
Bahamas	1494.219623
Bangladesh	1782.718491
Barbados	1749.032453
Belarus	1969.682830
Belgium	1708.536604
Belize	1665.121698
Benin	1493.523774
Bermuda	1342.880943
Bolivia	1419.868491
Bosnia and Herzegovina	2036.438182
Botswana	1407.223585
Brazil	1766.695849
Brunei	1714.008113
Bulgaria	1966.138113
Burkina Faso	1379.937925
Cabo Verde	1419.798113
Cambodia	1601.493396
Cameroon	1567.485094
Canada	1592.833585
Central African Republic	1402.592264
...	...
Sudan (former)	1222.112157
Suriname	1685.346792
Swaziland	1681.735472
Sweden	1508.906038
Switzerland	1683.526226
Taiwan	1649.600189
Tajikistan	1777.445849
Tanzania	1546.933208
Thailand	1756.732830
Timor	1390.225849
Togo	1557.694528

```
          Trinidad and Tobago                                    1788.320755
          Tunisia                                                1916.644151
          Turkey                                                 2242.205472
          Turkmenistan                                           1933.096226
          USSR                                                   2087.249355
          Uganda                                                 1732.721321
          Ukraine                                                2042.047170
          United Arab Emirates                                   1879.251132
          United Kingdom                                         1642.663019
          United States                                          1715.107736
          Uruguay                                                1547.385660
          Uzbekistan                                             1900.481321
          Vanuatu                                                1521.640755
          Venezuela                                              1595.185472
          Vietnam                                                1610.106415
          Yemen                                                  1448.193585
          Yugoslavia                                             2251.070968
          Zambia                                                 1525.772642
          Zimbabwe                                               1456.230755

          [179 rows x 5 columns]

In [96]: countries = ['Australia','Canada','Japan', 'Brazil', 'China','United Kingdom', 'France
          new_df=res.loc[countries,:]
          new_df.drop('Year',axis=1,inplace=True)
          new_df

Out[96]:                  Animal protein (kilocalories per person per day)  \
          Entity
          Australia                                             281.403019
          Canada                                                234.492075
          Japan                                                 185.308679
          Brazil                                                122.577358
          China                                                  66.621132
          United Kingdom                                        219.599245
          France                                                285.935094
          Egypt                                                  55.629434
          Mexico                                                116.947170
          United States                                         276.241509

                           Plant protein (kilocalories per person per day)  \
          Entity
          Australia                                             143.449057
          Canada                                                156.334340
          Japan                                                 171.530566
          Brazil                                                158.851321
          China                                                 195.984151
          United Kingdom                                        159.241509
```

14

```
France                                              157.116226
Egypt                                               265.155472
Mexico                                              193.892075
United States                                       145.516981

               Fat (kilocalories per person per day)  \
Entity
Australia                           1112.408491
Canada                              1161.641887
Japan                                659.394340
Brazil                               669.837736
China                                462.160189
United Kingdom                      1241.949057
France                              1336.033019
Egypt                                494.201887
Mexico                               677.051321
United States                       1234.699811

               Carbohydrates (kilocalories per person per day)
Entity
Australia                                     1575.531887
Canada                                        1592.833585
Japan                                         1779.143774
Brazil                                        1766.695849
China                                         1648.762830
United Kingdom                                1642.663019
France                                        1654.708113
Egypt                                         2124.069811
Mexico                                        1871.147170
United States                                 1715.107736
```
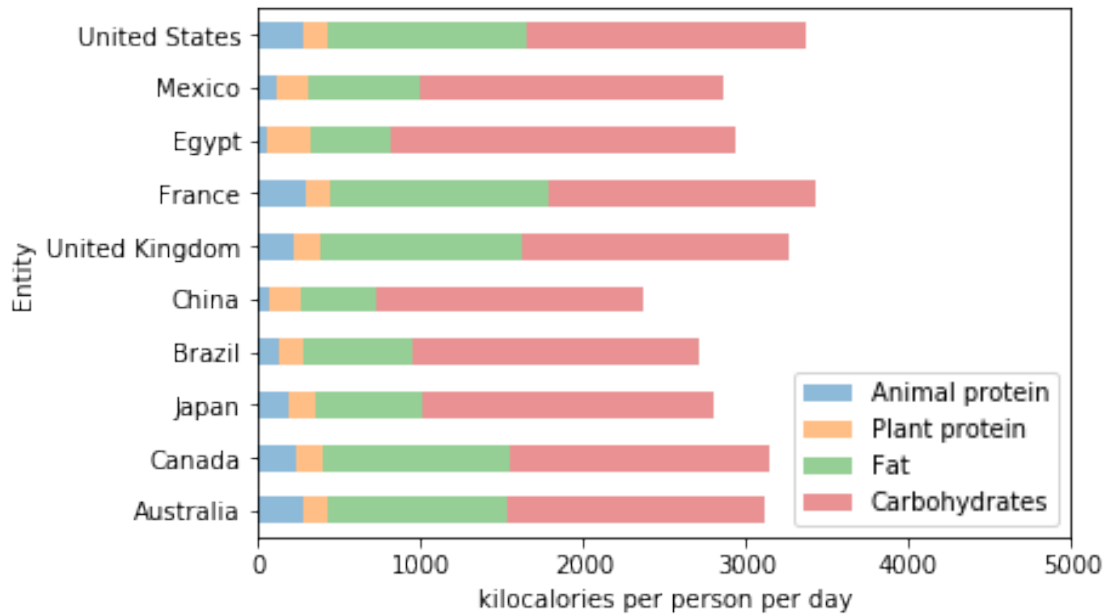
```
In [97]: ax=new_df.plot.barh(stacked=True, alpha=0.5)
         ax.legend(['Animal protein','Plant protein','Fat','Carbohydrates'],loc='best')
         ax.set(xlim=[0, 5000])
         plt.xlabel('kilocalories per person per day')
         # choose 6 countries to represent different continents and map their diet composition

Out[97]: Text(0.5, 0, 'kilocalories per person per day')
```

```
In [98]: res_new = res.drop('Year',axis=1)
         res_new

Out[98]:                             Animal protein (kilocalories per person per day)  \
         Entity
         Afghanistan                                                     58.148679
         Albania                                                        122.298868
         Algeria                                                         63.686792
         Angola                                                          51.615094
         Antigua and Barbuda                                            179.884528
         Argentina                                                      258.003774
         Armenia                                                        157.980377
         Australia                                                      281.403019
         Austria                                                        239.423396
         Azerbaijan                                                     147.748679
         Bahamas                                                        195.812075
         Bangladesh                                                      25.444528
         Barbados                                                       190.215094
         Belarus                                                        197.940377
         Belgium                                                        236.590189
         Belize                                                         113.695849
         Benin                                                           36.807547
         Bermuda                                                        259.267170
         Bolivia                                                         81.826415
         Bosnia and Herzegovina                                          99.958182
         Botswana                                                        94.718491
```

Brazil	122.577358
Brunei	151.023396
Bulgaria	154.239245
Burkina Faso	33.075472
Cabo Verde	67.749434
Cambodia	38.802264
Cameroon	44.566038
Canada	234.492075
Central African Republic	55.302642
...	...
Sudan (former)	92.189804
Suriname	102.141887
Swaziland	76.769811
Sweden	258.208302
Switzerland	234.843774
Taiwan	136.258113
Tajikistan	132.030943
Tanzania	41.792453
Thailand	76.417358
Timor	93.762264
Togo	28.891321
Trinidad and Tobago	123.582642
Tunisia	75.095094
Turkey	107.969057
Turkmenistan	166.566038
USSR	193.469677
Uganda	45.005283
Ukraine	177.137358
United Arab Emirates	204.808302
United Kingdom	219.599245
United States	276.241509
Uruguay	209.259623
Uzbekistan	156.215094
Vanuatu	114.356981
Venezuela	120.795472
Vietnam	52.803019
Yemen	42.646792
Yugoslavia	134.801290
Zambia	43.910189
Zimbabwe	43.224906

	Plant protein (kilocalories per person per day) \
Entity	
Afghanistan	209.480000
Albania	210.073208
Algeria	203.744151
Angola	116.751698
Antigua and Barbuda	93.214340

Argentina	142.961509
Armenia	203.473962
Australia	143.449057
Austria	150.649057
Azerbaijan	218.243019
Bahamas	118.303396
Bangladesh	162.108679
Barbados	138.819623
Belarus	196.122264
Belgium	157.848302
Belize	150.357736
Benin	161.761509
Bermuda	114.881509
Bolivia	135.132830
Bosnia and Herzegovina	238.296364
Botswana	169.298868
Brazil	158.851321
Brunei	144.440000
Bulgaria	216.978113
Burkina Faso	205.289057
Cabo Verde	164.144906
Cambodia	152.329811
Cameroon	178.902642
Canada	156.334340
Central African Republic	108.708679
...	...
Sudan (former)	157.427451
Suriname	133.172075
Swaziland	167.480755
Sweden	128.812075
Switzerland	142.513208
Taiwan	184.868679
Tajikistan	193.935094
Tanzania	164.307925
Thailand	135.417358
Timor	140.787170
Togo	166.256604
Trinidad and Tobago	151.112453
Tunisia	245.646038
Turkey	296.840000
Turkmenistan	212.194717
USSR	216.970323
Uganda	167.821887
Ukraine	205.699623
United Arab Emirates	194.656604
United Kingdom	159.241509
United States	145.516981
Uruguay	128.499623

```
Uzbekistan                                            208.127547
Vanuatu                                               141.916226
Venezuela                                             132.481509
Vietnam                                               156.021132
Yemen                                                 183.221132
Yugoslavia                                            266.614194
Zambia                                                178.851321
Zimbabwe                                              175.984151

                     Fat (kilocalories per person per day)  \
Entity
Afghanistan                                    342.613019
Albania                                        606.888679
Algeria                                        494.813208
Angola                                         354.985472
Antigua and Barbuda                            669.294340
Argentina                                      980.607736
Armenia                                        691.930189
Australia                                     1112.408491
Austria                                       1316.978491
Azerbaijan                                     644.272642
Bahamas                                        759.287547
Bangladesh                                     183.124528
Barbados                                       798.819623
Belarus                                        876.330000
Belgium                                       1310.515472
Belize                                         610.334151
Benin                                          387.529811
Bermuda                                       1057.121321
Bolivia                                        389.643962
Bosnia and Herzegovina                         547.216364
Botswana                                       428.174151
Brazil                                         669.837736
Brunei                                         570.547358
Bulgaria                                       862.682264
Burkina Faso                                   364.980566
Cabo Verde                                     504.628302
Cambodia                                       214.412264
Cameroon                                       399.574528
Canada                                        1161.641887
Central African Republic                       540.830377
...                                                   ...
Sudan (former)                                 571.800000
Suriname                                       503.527925
Swaziland                                      385.957358
Sweden                                        1103.450943
Switzerland                                   1359.324340
Taiwan                                         851.065472
```

Tajikistan	672.984340
Tanzania	294.721132
Thailand	379.847547
Timor	312.960566
Togo	348.817925
Trinidad and Tobago	633.436981
Tunisia	700.067547
Turkey	807.872264
Turkmenistan	749.652453
USSR	813.213871
Uganda	313.772264
Ukraine	789.191321
United Arab Emirates	885.133019
United Kingdom	1241.949057
United States	1234.699811
Uruguay	905.515472
Uzbekistan	731.440189
Vanuatu	861.935094
Venezuela	612.103585
Vietnam	294.541132
Yemen	350.806415
Yugoslavia	857.578065
Zambia	321.692264
Zimbabwe	454.484717

	Carbohydrates (kilocalories per person per day)
Entity	
Afghanistan	1737.758302
Albania	1711.022264
Algeria	1716.982264
Angola	1367.779811
Antigua and Barbuda	1208.606792
Argentina	1749.936415
Armenia	1920.011698
Australia	1575.531887
Austria	1734.967925
Azerbaijan	1997.263962
Bahamas	1494.219623
Bangladesh	1782.718491
Barbados	1749.032453
Belarus	1969.682830
Belgium	1708.536604
Belize	1665.121698
Benin	1493.523774
Bermuda	1342.880943
Bolivia	1419.868491
Bosnia and Herzegovina	2036.438182
Botswana	1407.223585

```
          Brazil                                      1766.695849
          Brunei                                      1714.008113
          Bulgaria                                    1966.138113
          Burkina Faso                                1379.937925
          Cabo Verde                                  1419.798113
          Cambodia                                    1601.493396
          Cameroon                                    1567.485094
          Canada                                      1592.833585
          Central African Republic                    1402.592264
          ...                                                  ...
          Sudan (former)                              1222.112157
          Suriname                                    1685.346792
          Swaziland                                   1681.735472
          Sweden                                      1508.906038
          Switzerland                                 1683.526226
          Taiwan                                      1649.600189
          Tajikistan                                  1777.445849
          Tanzania                                    1546.933208
          Thailand                                    1756.732830
          Timor                                       1390.225849
          Togo                                        1557.694528
          Trinidad and Tobago                         1788.320755
          Tunisia                                     1916.644151
          Turkey                                      2242.205472
          Turkmenistan                                1933.096226
          USSR                                        2087.249355
          Uganda                                      1732.721321
          Ukraine                                     2042.047170
          United Arab Emirates                        1879.251132
          United Kingdom                              1642.663019
          United States                               1715.107736
          Uruguay                                     1547.385660
          Uzbekistan                                  1900.481321
          Vanuatu                                     1521.640755
          Venezuela                                   1595.185472
          Vietnam                                     1610.106415
          Yemen                                       1448.193585
          Yugoslavia                                  2251.070968
          Zambia                                      1525.772642
          Zimbabwe                                    1456.230755

          [179 rows x 4 columns]

In [99]: df=pd.read_csv('dietary-compositions-by-commodity-group.csv')#,encoding = "ISO-8859-1
         df.head()

Out[99]:        Entity Code  Year  Other (kilocalories per person per day)  \
         0  Afghanistan  AFG  1961                                       13
```

```
1  Afghanistan  AFG  1962                                    12
2  Afghanistan  AFG  1963                                    13
3  Afghanistan  AFG  1964                                    11
4  Afghanistan  AFG  1965                                    13

   Sugar (kilocalories per person per day)  \
0                                    51
1                                    45
2                                    47
3                                    55
4                                    57

   Oils & Fats (kilocalories per person per day)  \
0                                         92
1                                         98
2                                        106
3                                        102
4                                        105

   Meat (kilocalories per person per day)  \
0                                    88
1                                    88
2                                    91
3                                    93
4                                    95

   Dairy & Eggs (kilocalories per person per day)  \
0                                         102
1                                         101
2                                         110
3                                         110
4                                         118

   Fruits & Vegetables (kilocalories per person per day)  \
0                                              82
1                                              76
2                                              79
3                                              95
4                                              95

   Starchy Roots (kilocalories per person per day)  \
0                                          25
1                                          22
2                                          23
3                                          24
4                                          24

   Pulses (kilocalories per person per day)  \
```

```
0                                                    16
1                                                    17
2                                                    17
3                                                    18
4                                                    18

    Cereals & Grains (kilocalories per person per day)  \
0                                                2530
1                                                2458
2                                                2212
3                                                2445
4                                                2431

    Alcoholic Beverages (kcal/person/day)
0                                      0.0
1                                      0.0
2                                      0.0
3                                      0.0
4                                      0.0
```

In [100]: grp = df.groupby('Entity')
          res=grp.mean()
          countries = ['Australia','Canada','Japan', 'Brazil', 'China','United Kingdom', 'Fran
          new_df=res.loc[countries,:]
          new_df.drop('Year',axis=1,inplace=True)
          new_df

Out[100]:   Other (kilocalories per person per day) \
          Entity
          Australia   47.075472
          Canada   28.415094
          Japan   30.547170
          Brazil   14.452830
          China   10.679245
          United Kingdom   40.830189
          France   51.924528
          Egypt   14.886792
          Mexico   23.377358
          United States   24.905660

                           Sugar (kilocalories per person per day) \
          Entity
          Australia   476.735849
          Canada   470.584906
          Japan   284.905660
          Brazil   442.509434
          China   54.301887
          United Kingdom   413.169811

23

```
France                                361.000000
Egypt                                 271.358491
Mexico                                416.547170
United States                         582.849057


                 Oils & Fats (kilocalories per person per day)  \
Entity
Australia                                 546.584906
Canada                                    738.358491
Japan                                     439.415094
Brazil                                    391.452830
China                                     201.660377
United Kingdom                            625.396226
France                                    645.188679
Egypt                                     262.603774
Mexico                                    296.396226
United States                             714.094340


                 Meat (kilocalories per person per day)  \
Entity
Australia                             513.981132
Canada                                384.207547
Japan                                 293.339623
Brazil                                243.566038
China                                 241.943396
United Kingdom                        474.981132
France                                551.226415
Egypt                                  89.452830
Mexico                                226.716981
United States                         430.698113


                 Dairy & Eggs (kilocalories per person per day)  \
Entity
Australia                                 368.981132
Canada                                    318.811321
Japan                                     173.207547
Brazil                                    178.528302
China                                      50.924528
United Kingdom                            390.150943
France                                    417.584906
Egypt                                      66.735849
Mexico                                    178.754717
United States                             435.188679


                 Fruits & Vegetables (kilocalories per person per day)  \
Entity
Australia                                       162.113208
Canada                                          189.584906
```

```
Japan                                          128.886792
Brazil                                         135.773585
China                                          124.471698
United Kingdom                                 150.811321
France                                         175.792453
Egypt                                          212.132075
Mexico                                         125.037736
United States                                  176.735849

             Starchy Roots (kilocalories per person per day)  \
Entity
Australia                                       86.113208
Canada                                         129.924528
Japan                                           81.000000
Brazil                                         177.849057
China                                          211.735849
United Kingdom                                 191.603774
France                                         140.679245
Egypt                                           46.622642
Mexico                                          25.320755
United States                                   95.622642

             Pulses (kilocalories per person per day)  \
Entity
Australia                                       20.830189
Canada                                          44.679245
Japan                                           22.339623
Brazil                                         166.094340
China                                           35.792453
United Kingdom                                  36.452830
France                                          18.830189
Egypt                                           73.641509
Mexico                                         138.981132
United States                                   33.000000

             Cereals & Grains (kilocalories per person per day)  \
Entity
Australia                                      738.150943
Canada                                         713.735849
Japan                                         1209.773585
Brazil                                         909.943396
China                                         1394.716981
United Kingdom                                 761.415094
France                                         839.415094
Egypt                                         1900.037736
Mexico                                        1378.207547
United States                                  721.924528
```

```
                  Alcoholic Beverages (kcal/person/day)
Entity
Australia                                    152.226415
Canada                                       127.000000
Japan                                        131.962264
Brazil                                        57.792453
China                                         47.301887
United Kingdom                               178.641509
France                                       232.150943
Egypt                                          1.584906
Mexico                                        49.698113
United States                                156.547170
```

In [101]: ax=new_df.plot.barh(stacked=True, alpha=0.5)
          ax.legend(['Other','Sugar','Oils& Fats','Meat','Dairy& Eggs','Fruits & Vegetables','S
          ax.set(xlim=[0, 7000])
          plt.xlabel('kilocalories per person per day')

Out[101]: Text(0.5, 0, 'kilocalories per person per day')
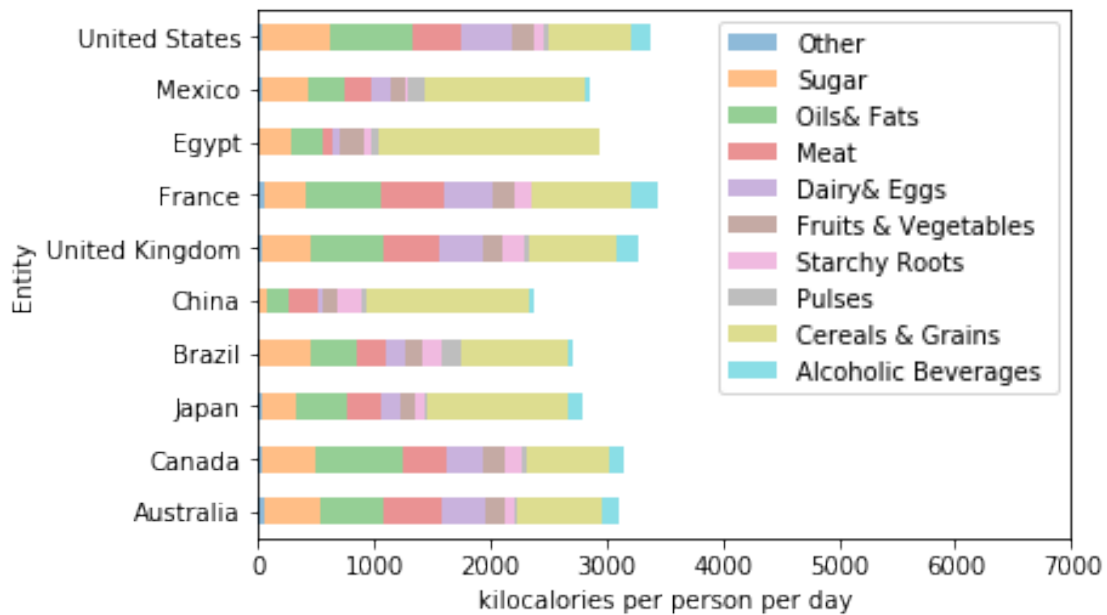
In [102]: df=pd.read_csv('per-capita-consumption-of-cereals-by-commodity-type-daily-kilocalorie
          df.head()

Out[102]:   Entity Code Year Oats (kcal/capita/day) Rye (kcal/capita/day) \
          0 Afghanistan AFG 1961   NaN   NaN
          1 Afghanistan AFG 1962   NaN   NaN
          2 Afghanistan AFG 1963   NaN   NaN

```
3  Afghanistan  AFG  1964                          NaN                        NaN
4  Afghanistan  AFG  1965                          NaN                        NaN

   Barley (kcal/capita/day)  Sorghum (kcal/capita/day)  \
0                     237.0                        NaN
1                     232.0                        NaN
2                     227.0                        NaN
3                     223.0                        NaN
4                     218.0                        NaN

   Maize (kcal/capita/day)  Wheat (kcal/capita/day)  Rice (kcal/capita/day)
0                    380.0                     1688                     209
1                    372.0                     1633                     205
2                    371.0                     1399                     199
3                    367.0                     1602                     236
4                    359.0                     1607                     230
```

```
In [104]: grp = df.groupby('Entity')
          res=grp.mean()
          countries = ['Australia','Canada','Japan', 'Brazil', 'China','United Kingdom', 'Franc
          new_df=res.loc[countries,:]
          new_df.drop('Year',axis=1,inplace=True)
          new_df
```

```
Out[104]:                 Oats (kcal/capita/day)  Rye (kcal/capita/day)  \
          Entity
          Australia                     9.245283              10.169811
          Canada                       14.622642               5.000000
          Japan                         0.886792               0.603774
          Brazil                        5.132075               0.339623
          China                         2.471698               5.339623
          United Kingdom               20.867925               2.830189
          France                        1.396226               3.509434
          Egypt                         0.000000               0.018868
          Mexico                        2.075472               0.000000
          United States                16.849057               2.641509

                          Barley (kcal/capita/day)  Sorghum (kcal/capita/day)  \
          Entity
          Australia                            NaN                        NaN
          Canada                          2.245283                        NaN
          Japan                          18.509434                   0.000000
          Brazil                          0.000000                        NaN
          China                          10.735849                  29.226415
          United Kingdom                  2.735849                        NaN
          France                          1.396226                        NaN
          Egypt                           1.698113                  43.735849
          Mexico                          0.094340                        NaN
```

```
         United States                  5.924528                    5.264151

                       Maize (kcal/capita/day)  Wheat (kcal/capita/day)  \
         Entity
         Australia                  30.603774                629.320755
         Canada                     48.830189                585.622642
         Japan                      70.811321                335.924528
         Brazil                    193.037736                321.603774
         China                      39.754717                506.283019
         United Kingdom             25.056604                672.566038
         France                     55.716981                734.471698
         Egypt                     513.094340               1011.849057
         Mexico                   1045.150943                271.377358
         United States              78.962264                552.679245

                       Rice (kcal/capita/day)
         Entity
         Australia                  58.792453
         Canada                     55.094340
         Japan                     778.622642
         Brazil                    387.245283
         China                     762.226415
         United Kingdom             31.981132
         France                     39.132075
         Egypt                     329.094340
         Mexico                     49.905660
         United States              55.264151
```

In [105]: `ax=new_df.plot.barh(stacked=True, alpha=0.5)`
`ax.legend(['Oats','Rye','Barley','Sorghum','Maize','Wheat','Rice'],loc='best')`
`ax.set(xlim=[0, 3000])`
`plt.xlabel('kilocalories per person per day')`

Out[105]: `Text(0.5, 0, 'kilocalories per person per day')`
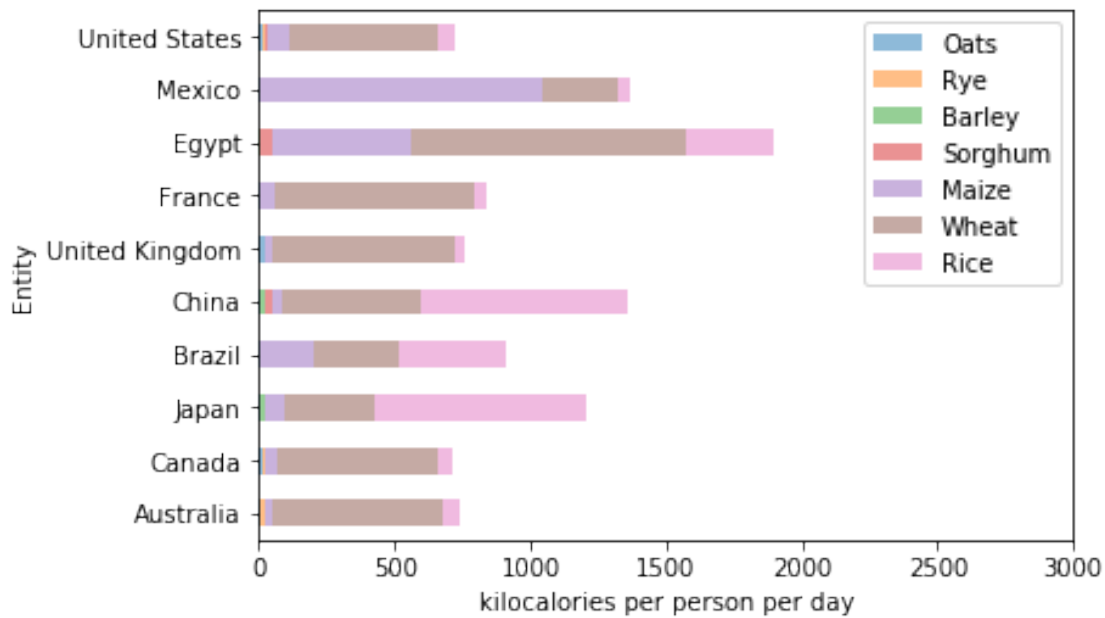
```
In [112]: df=pd.read_csv('fruit-consumption-per-capita.csv')#,encoding = "ISO-8859-1")
          df.head()
```

```
Out[112]:         Entity Code  Year  (kilograms per person)
          0  Afghanistan  AFG  1961                   41.13
          1  Afghanistan  AFG  1962                   38.00
          2  Afghanistan  AFG  1963                   38.25
          3  Afghanistan  AFG  1964                   47.92
          4  Afghanistan  AFG  1965                   48.69
```

```
In [113]: grp = df.groupby('Entity')
          res=grp.mean()
          countries = ['Australia','Canada','Japan', 'Brazil', 'China','United Kingdom', 'Franc
          new_df=res.loc[countries,:]
          new_df.drop('Year',axis=1,inplace=True)
          new_df
```

```
Out[113]:                  (kilograms per person)
          Entity
          Australia                     88.796038
          Canada                       111.866415
          Japan                         52.000566
          Brazil                        95.219434
          China                         26.998491
          United Kingdom                80.011132
          France                        84.469811
          Egypt                         65.648491
```

```
        Mexico                          92.071321
        United States                  103.873774
```

In [119]: `ax=new_df.plot.barh(stacked=True, alpha=0.5,legend=False)`
`#ax.legend(['Oats''],loc='best')`
`ax.set(xlim=[0, 150])`
`plt.xlabel('fruit intake')`

Out[119]: `Text(0.5, 0, 'fruit intake')`
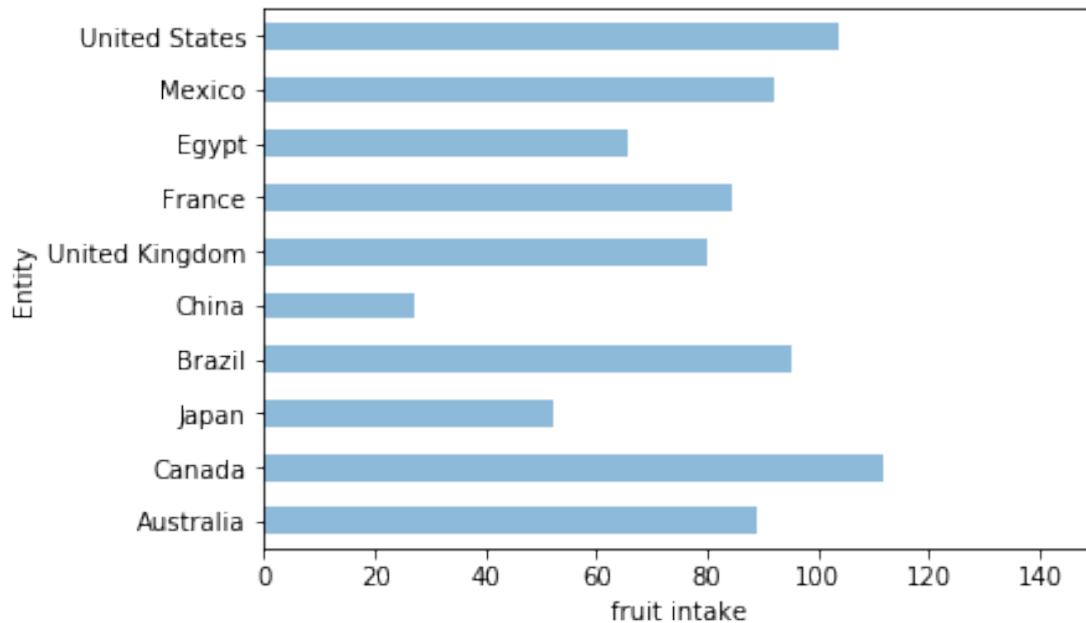
In [120]: `df=pd.read_csv('vegetable-consumption-per-capita.csv')#,encoding = "ISO-8859-1")`
`df.head()`

Out[120]:
```
          Entity Code  Year  \
0  Afghanistan  AFG   1961
1  Afghanistan  AFG   1962
2  Afghanistan  AFG   1963
3  Afghanistan  AFG   1964
4  Afghanistan  AFG   1965


   Food Balance Sheets: Vegetables - Food supply quantity (kg/capita/yr) (FAO (2017))
0                                                  36.75
1                                                  37.47
2                                                  38.87
3                                                  40.17
4                                                  40.83
```

```
In [121]: grp = df.groupby('Entity')
          res=grp.mean()
          countries = ['Australia','Canada','Japan', 'Brazil', 'China','United Kingdom', 'Franc
          new_df=res.loc[countries,:]
          new_df.drop('Year',axis=1,inplace=True)
          new_df
```

Out[121]:   Food Balance Sheets: Vegetables - Food supply quantity (kg/capita/yr)
          Entity
          Australia   80.154717
          Canada   104.773774
          Japan   116.324906
          Brazil   34.441698
          China   139.661321
          United Kingdom   82.063019
          France   117.677170
          Egypt   160.340943
          Mexico   45.074717
          United States   111.386981

```
In [124]: ax=new_df.plot.barh(stacked=True, alpha=0.5,legend=False)
          #ax.legend(['Oats''],loc='best')
          ax.set(xlim=[0, 200])
          plt.xlabel('fruit intake')
```

Out[124]: Text(0.5, 0, 'fruit intake')
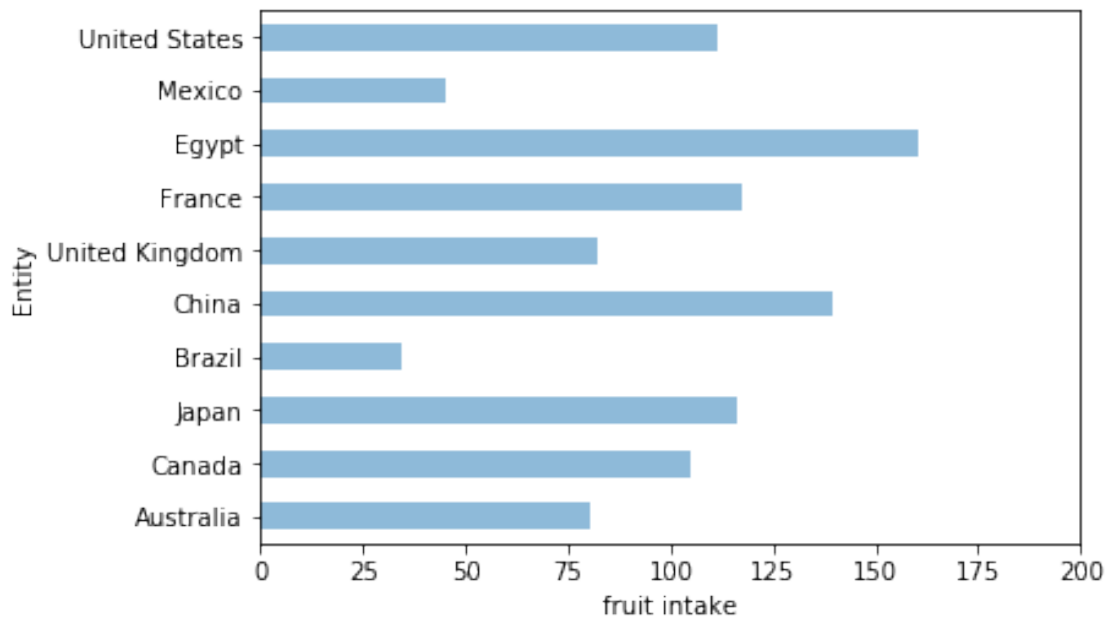
3 Seaborn

In [125]: `import seaborn as sns`

In [219]: `df=pd.read_csv('daily-caloric-supply-derived-from-carbohydrates-protein-and-fat.csv')`
`df.head()`

Out[219]:   Entity Code Year Animal protein (kilocalories per person per day) \
        0 Afghanistan AFG 1961   54.12
        1 Afghanistan AFG 1962   53.92
        2 Afghanistan AFG 1963   56.80
        3 Afghanistan AFG 1964   57.32
        4 Afghanistan AFG 1965   59.76

           Plant protein (kilocalories per person per day) \
        0   285.52
        1   278.00
        2   251.68
        3   276.64
        4   275.68

           Fat (kilocalories per person per day) \
        0   337.59
        1   338.49
        2   347.13
        3   350.55
        4   357.57

           Carbohydrates (kilocalories per person per day)
        0   2321.77
        1   2246.59
        2   2042.39
        3   2268.49
        4   2262.99

In [228]: `# boxplot`
`#`
`#new_df1 = pd.DataFrame({'calory':list(grp['Animal protein (kilocalories per person p`
`#new_df2 = pd.DataFrame({'calory':list(grp['Plant protein (kilocalories per person pe`
`#new_df3 = pd.DataFrame({'calory':list(grp['Fat (kilocalories per person per day)'])`
`#new_df4 = pd.DataFrame({'calory':list(grp['Carbohydrates (kilocalories per person pe`
`#tmp = new_df1.append(new_df2,ignore_index=True)`
`#tmp = tmp.append(new_df3,ignore_index=True)`
`#tmp = tmp.append(new_df4,ignore_index=True)`
`#sns.boxplot(x='Category',y='calory',data=tmp,orient=h)`

`new_df = df[['Animal protein (kilocalories per person per day)','Plant protein (kiloc`
`ax=sns.boxplot(data=new_df,orient="h",width=0.8,palette="Set3")`
`ax.set_yticklabels(ax.get_yticklabels(),fontsize=12)`

```
        ax.tick_params(axis='x',labelsize=12)
        ax.set_yticklabels(labels=['Animal protein','Plant protein','Fat','Carbohydrates'])
        plt.xlabel('kilocalories per person per day',fontsize=12)
        #ax.set_xticklabels(ax.get_xticklabels(), fontsize=200)
        #sns.plotting_context(figure.figsize= [8.0, 5.5])
        #[126.23653490702596, 165.8816701926289, 658.2440663623205, 1663.1690724863602]
```

Out[228]: Text(0.5, 0, 'kilocalories per person per day')
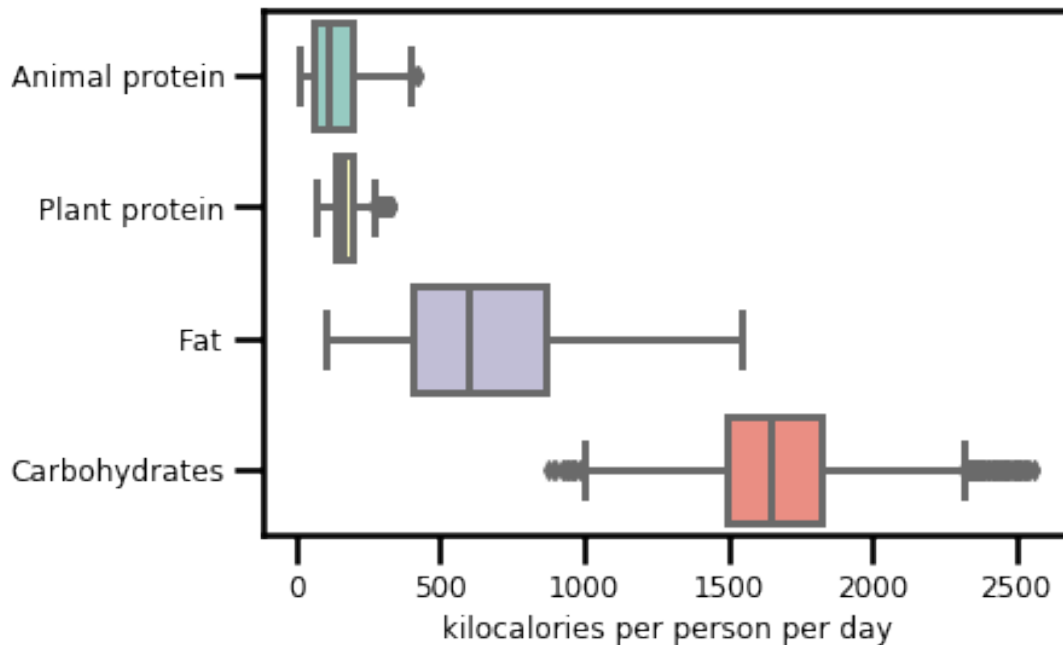

```
In [247]: df=pd.read_csv('dietary-compositions-by-commodity-group.csv')#,encoding = "ISO-8859-
        df.head()
```

```
Out[247]:      Entity  Code  Year  Other (kilocalories per person per day)  \
        0  Afghanistan  AFG  1961                                       13
        1  Afghanistan  AFG  1962                                       12
        2  Afghanistan  AFG  1963                                       13
        3  Afghanistan  AFG  1964                                       11
        4  Afghanistan  AFG  1965                                       13

           Sugar (kilocalories per person per day)  \
        0                                       51
        1                                       45
        2                                       47
        3                                       55
        4                                       57
```

```
    Oils & Fats (kilocalories per person per day)  \
0                                               92
1                                               98
2                                              106
3                                              102
4                                              105

    Meat (kilocalories per person per day)  \
0                                        88
1                                        88
2                                        91
3                                        93
4                                        95

    Dairy & Eggs (kilocalories per person per day)  \
0                                               102
1                                               101
2                                               110
3                                               110
4                                               118

    Fruits & Vegetables (kilocalories per person per day)  \
0                                                     82
1                                                     76
2                                                     79
3                                                     95
4                                                     95

    Starchy Roots (kilocalories per person per day)  \
0                                                25
1                                                22
2                                                23
3                                                24
4                                                24

    Pulses (kilocalories per person per day)  \
0                                          16
1                                          17
2                                          17
3                                          18
4                                          18

    Cereals & Grains (kilocalories per person per day)  \
0                                                  2530
1                                                  2458
2                                                  2212
3                                                  2445
```

```
                4                                                              2431

            Alcoholic Beverages (kcal/person/day)
        0                                        0.0
        1                                        0.0
        2                                        0.0
        3                                        0.0
        4                                        0.0
```

In [252]:
```python
'''
grp = df.groupby('Year').mean()
new_df1 = pd.DataFrame({'calory':list(grp['Other (kilocalories per person per day)'],
new_df2 = pd.DataFrame({'calory':list(grp['Sugar (kilocalories per person per day)'],
new_df3 = pd.DataFrame({'calory':list(grp['Oils & Fats (kilocalories per person per 
new_df4 = pd.DataFrame({'calory':list(grp['Meat (kilocalories per person per day)'])
new_df5 = pd.DataFrame({'calory':list(grp['Dairy & Eggs (kilocalories per person per
new_df6 = pd.DataFrame({'calory':list(grp['Fruits & Vegetables (kilocalories per per
new_df7 = pd.DataFrame({'calory':list(grp['Starchy Roots (kilocalories per person pe
new_df8 = pd.DataFrame({'calory':list(grp['Pulses (kilocalories per person per day)'
new_df9 = pd.DataFrame({'calory':list(grp['Cereals & Grains (kilocalories per person
new_df10 = pd.DataFrame({'calory':list(grp['Alcoholic Beverages (kcal/person/day)'])

tmp = new_df1.append(new_df2,ignore_index=True)
tmp = tmp.append(new_df3,ignore_index=True)
tmp = tmp.append(new_df4,ignore_index=True)
tmp = tmp.append(new_df5,ignore_index=True)
tmp = tmp.append(new_df6,ignore_index=True)
tmp = tmp.append(new_df7,ignore_index=True)
tmp = tmp.append(new_df8,ignore_index=True)
#tmp = tmp.append(new_df9,ignore_index=True)
tmp = tmp.append(new_df10,ignore_index=True)
'''


new_df = df.iloc[:,3:]
ax = sns.boxplot(data=new_df,orient="h",width=0.8,palette="Set3",fliersize=1)
ax.tick_params(axis='x',labelsize=12)

ax.set_yticklabels(labels=['Other','Sugar','Oils & Fats','Meat','Dairy & Eggs','Frui
ax.set_yticklabels(ax.get_yticklabels(),fontsize=12)
plt.xlabel('kilocalories per person per day',fontsize=12)

#ax=sns.violinplot(x='Category',y='calory',data=tmp,width=0.8,palette="Set3")
#ax.set_yticklabels(ax.get_yticklabels(),fontsize=12)
#ax.tick_params(axis='x',labelsize=12)
```

Out[252]: Text(0.5, 0, 'kilocalories per person per day')
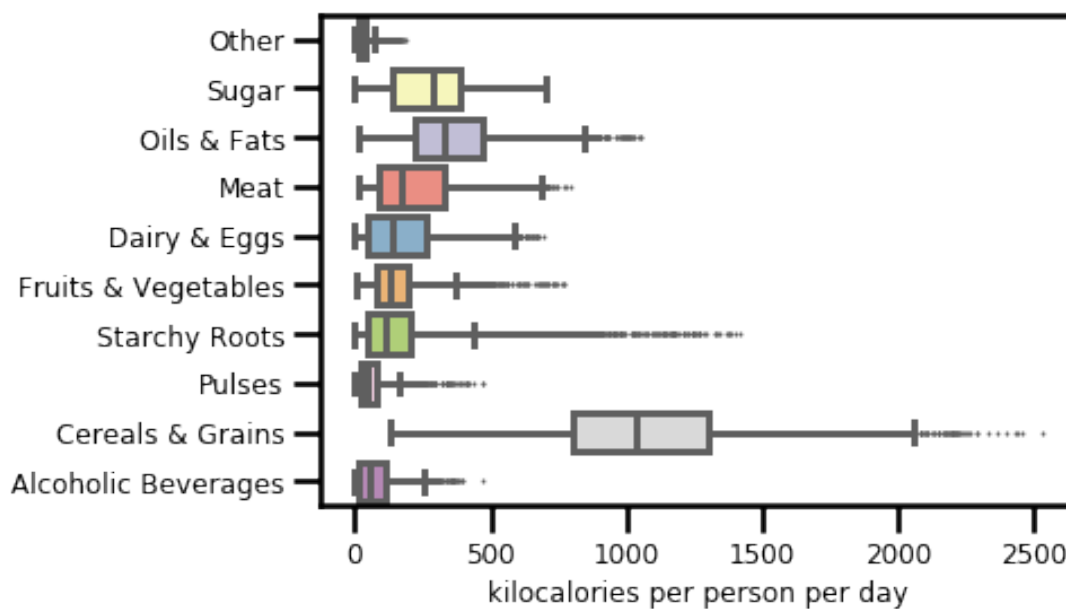
```
In [267]: df=pd.read_csv('fruit-consumption-per-capita.csv')#,encoding = "ISO-8859-1")
          df.head()

Out[267]:       Entity Code  Year   (kilograms per person)
          0  Afghanistan  AFG  1961                   41.13
          1  Afghanistan  AFG  1962                   38.00
          2  Afghanistan  AFG  1963                   38.25
          3  Afghanistan  AFG  1964                   47.92
          4  Afghanistan  AFG  1965                   48.69

In [319]: countries = ['Australia','Canada','Japan', 'Brazil', 'China','United Kingdom', 'Franc
          findbool = [i in countries for i in df.Entity]
          castEntity = df[findbool]

          plt.rcParams["figure.figsize"] = [12, 4.8]
          ax = sns.swarmplot(x="Year", y=" (kilograms per person)", hue="Entity", data=castEnti
          #ax.set_yticklabels(ax.get_yticklabels(),fontsize=4)
          plt.xlabel('Year',fontsize=12)
          plt.ylabel('kilograms per person',fontsize=12)
          ax.legend(fontsize=8)
          ax.tick_params(axis='x',labelsize=12)
          ax.tick_params(axis='y',labelsize=12)
          plt.xticks(range(10))


          year = []
```

```python
for i in range(1961,2014,4):
    year.append(i)
plt.xticks(np.arange(0,54,4),year)
```

Out[319]: ([<matplotlib.axis.XTick at 0x1a2f49c748>,
            <matplotlib.axis.XTick at 0x1a2f49c6a0>,
            <matplotlib.axis.XTick at 0x1a2f44a5f8>,
            <matplotlib.axis.XTick at 0x1a2f6432e8>,
            <matplotlib.axis.XTick at 0x1a2f6437b8>,
            <matplotlib.axis.XTick at 0x1a2f643c88>,
            <matplotlib.axis.XTick at 0x1a2f648198>,
            <matplotlib.axis.XTick at 0x1a2f648668>,
            <matplotlib.axis.XTick at 0x1a2f648b70>,
            <matplotlib.axis.XTick at 0x1a2f648b38>,
            <matplotlib.axis.XTick at 0x1a2f643be0>,
            <matplotlib.axis.XTick at 0x1a2f622470>,
            <matplotlib.axis.XTick at 0x1a2f650630>,
            <matplotlib.axis.XTick at 0x1a2f650b38>],
           <a list of 14 Text xticklabel objects>)


```python
In [320]: df=pd.read_csv('vegetable-consumption-per-capita.csv')#,encoding = "ISO-8859-1")
          df.head()
```

Out[320]:   Entity Code Year \
          0 Afghanistan AFG 1961
          1 Afghanistan AFG 1962
          2 Afghanistan AFG 1963
          3 Afghanistan AFG 1964
          4 Afghanistan AFG 1965

```
          Food Balance Sheets: Vegetables - Food supply quantity (kg/capita/yr) (FAO (2017)
       0                                                       36.75
       1                                                       37.47
       2                                                       38.87
       3                                                       40.17
       4                                                       40.83
```
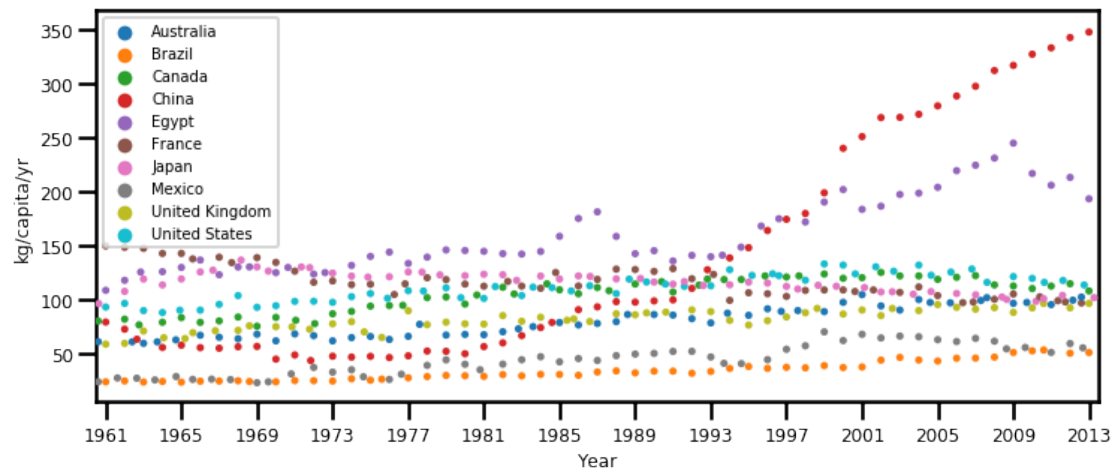
In [323]: `countries = ['Australia','Canada','Japan', 'Brazil', 'China','United Kingdom', 'Franc`
```
          findbool = [i in countries for i in df.Entity]
          castEntity = df[findbool]

          plt.rcParams["figure.figsize"] = [12, 4.8]
          ax = sns.swarmplot(x="Year", y="Food Balance Sheets: Vegetables - Food supply quanti
          #ax.set_yticklabels(ax.get_yticklabels(),fontsize=4)
          plt.xlabel('Year',fontsize=12)
          plt.ylabel('kg/capita/yr',fontsize=12)
          ax.legend(fontsize=10)
          ax.tick_params(axis='x',labelsize=12)
          ax.tick_params(axis='y',labelsize=12)
          plt.xticks(range(10))

          year = []
          for i in range(1961,2014,4):
              year.append(i)
          plt.xticks(np.arange(0,54,4),year)
```

Out[323]: `([<matplotlib.axis.XTick at 0x11cb3d208>,`
```
            <matplotlib.axis.XTick at 0x11cb34b38>,
            <matplotlib.axis.XTick at 0x11cb34908>,
            <matplotlib.axis.XTick at 0x1a27284630>,
            <matplotlib.axis.XTick at 0x1a27284048>,
            <matplotlib.axis.XTick at 0x11de4da58>,
            <matplotlib.axis.XTick at 0x11de4d208>,
            <matplotlib.axis.XTick at 0x11de4db00>,
            <matplotlib.axis.XTick at 0x11de32c88>,
            <matplotlib.axis.XTick at 0x11de321d0>,
            <matplotlib.axis.XTick at 0x11de32668>,
            <matplotlib.axis.XTick at 0x1a27284550>,
            <matplotlib.axis.XTick at 0x1a229d9908>,
            <matplotlib.axis.XTick at 0x1a229d95f8>],
          <a list of 14 Text xticklabel objects>)
```

In [ ]: