Data_Coverage.nb

August 15, 2017

```
In [1]: from IPython.display import HTML
        HTML('''<script>
        code_show=true;
        function code_toggle() {
         if (code_show){
         $('div.input').hide();
         } else {
         $('div.input').show();
         }
         code_show = !code_show
        }
        $( document ).ready(code_toggle);
        </script>''')
```

```
Out[1]: <IPython.core.display.HTML object>
```

```
In [1]: from IPython.display import HTML
        HTML('''
        <style>
            .yourDiv {position: fixed;top: 100px; right: 0px;
                      background: white;
                      height: 100%;
                      width: 175px;
                      padding: 10px;
                      z-index: 10000}
        </style>
        <script>
        function showthis(url) {
                window.open(url, "pres",
                        "toolbar=yes,scrollbars=yes,resizable=yes,top=10,left=400,width=500,heig
                return(false);
        }
        </script>

        <div class=yourDiv>
            <h4>MENU</h4><br>
            <a href=#Data>1. Data</a><br>
            <a href=#SpatialCoverage>2. Spatial Coverage</a><br>
            <a href=#TemporalCoverage>3. Temporal Coverage</a><br>
            <a href=#ClassOverlaps>4. Farm size class overlaps</a><br>
            <a href=#YieldLookUpTable>5. Yield look-up table</a><br><br>

            <a href="javascript:code_toggle()">Toggle Code On/Off</a><br>
            <a href=#Top>Top</a><br>
            <a href=#LeftOff>Left Off Here</a><br>
        </div>
        ''')
```

```
Out[1]: <IPython.core.display.HTML object>
```

#
Data Coverage Overview
##
What portion of the global food supply is produced by smallholders?
###
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Data
1. Harvested area per farm size class 2. Yield per crop per farm size class
To Dos:

- Update this document with new database codes. This is partially updated, but after the spartial coverage section, it relies on the old data.

```
In [3]: # Import dependencies
        import warnings
        warnings.filterwarnings('ignore')
        import pandas as pd
        import geopandas as gpd
        import seaborn as sns
        from matplotlib import pyplot as plt
        import matplotlib.pyplot as plt
        from matplotlib.path import Path
        import matplotlib.patches as patches
        from matplotlib.pyplot import cm
        import matplotlib as mpl
        import numpy as np
        import re
        import geopy
        import mpld3
        import plotly.plotly as py
        import cmocean

        pd.set_option('display.max_columns', 500)
        %matplotlib inline
```

```
In [4]: # Set all plotting params:
        title_sz = 20
        x_lab_tick_sz = 18
        y_lab_tick_sz = 18
        x_lab_label_sz = 18
        y_lab_label_sz = 18
        lengend_sz = 16
```

```
In [6]: PATH = '/Users/Vinny_Ricciardi/Documents/Data_Library_Big/Survey/Global/Farm_Size/Data/F
        df = pd.read_csv(PATH, low_memory=False)
```

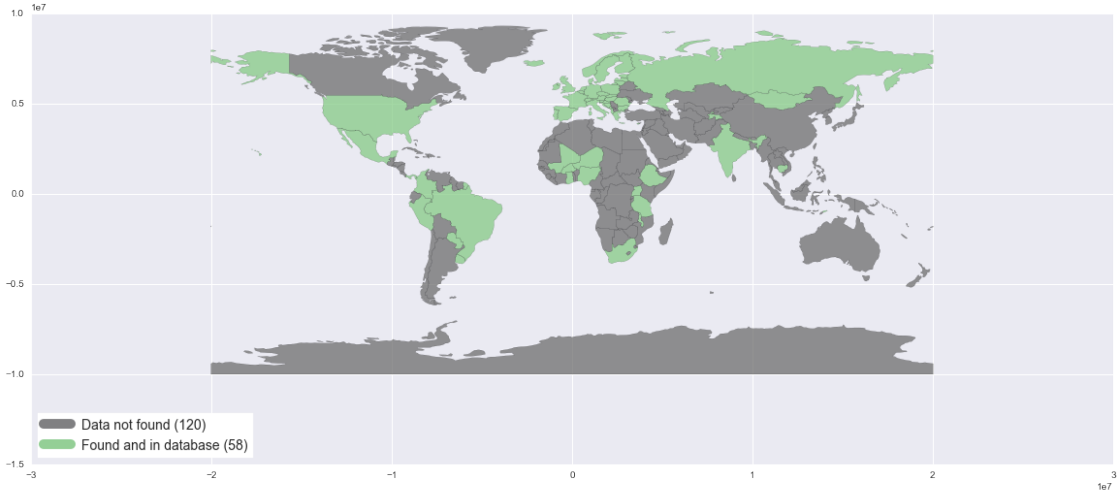
Spatial Coverage

```
In [7]: df['NAME_0'].replace(['United States of America'], ['United States'], inplace=True)
        df['NAME_0'].replace(['Bosnia and Herzegovina'], ['Bosnia and Herz.'], inplace=True)
        df['NAME_0'].replace(['United Republic of Tanzania'], ['Tanzania'], inplace=True)
        df['NAME_0'].replace(['Russian Federation'], ['Russia'], inplace=True)
        df['NAME_0'].replace(['Czech Republic'], ['Czech Rep.'], inplace=True)
        df['NAME_0'].replace(['Czech Republic'], ['Czech Rep.'], inplace=True)
        df['NAME_0'].replace(['Czech Republic'], ['Czech Rep.'], inplace=True)
```

To do: - What percentage of global production does our sample represent?

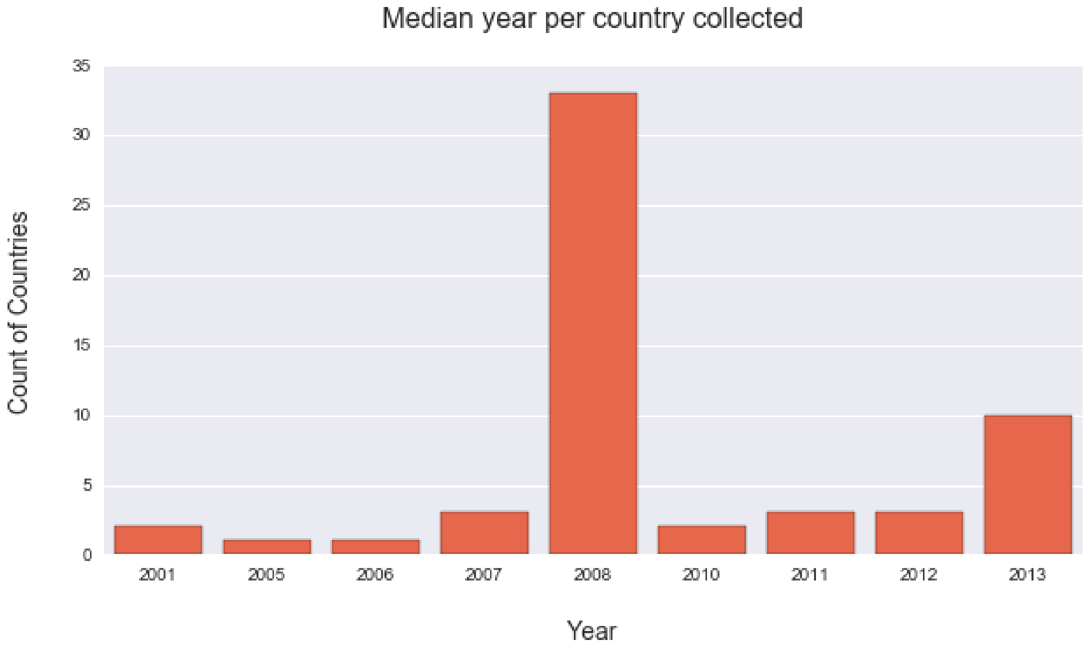
```
In [8]: pivoted = pd.pivot_table(df,
                                 index='NAME_0',
                                 values='Crop',
                                 aggfunc=lambda x: len(x.unique()))
        pivoted = pivoted.reset_index()
        pivoted = pivoted.sort_values('Crop', ascending=False)
        pivoted['Data_Available'] = pivoted['Crop'].astype(int)

        world = gpd.read_file(gpd.datasets.get_path('naturalearth_lowres'))

        world = world.to_crs(epsg=3786)

        world = pd.merge(world, pivoted,
                         how='outer',
                         left_on='name',
                         right_on='NAME_0')

        world['Orig_crop'] = world['Crop'].fillna(0)
        world['coverage'] = np.where(world['Crop'] > 0,
                                     'Found and downloaded',
                                     np.where(world['Crop'] == -1,
                                              'Found not downloaded',
                                              'No data found'))

        warnings.filterwarnings('ignore')
```

```
x = len(pivoted.NAME_0.unique())

try:
    fig, ax = plt.subplots(figsize=(20, 10))
    ax.set_aspect('equal')
    world.plot(column='coverage', cmap='Accent', ax=ax, alpha=0.7, linewidth=0.1)  #cmoc
except:
    pass

ndf, fad = world.coverage.value_counts()
cmap_ = cmocean.tools.get_dict(cmocean.cm.deep, N=4)

p1 = mpl.lines.Line2D([], [],
                             color=[x / 255. for x in [128, 128, 130]],
                             linewidth=10,
                             label='Data not found ({})'.format(ndf))
p2 = mpl.lines.Line2D([], [],
                             color=[x / 255. for x in [148, 207, 150]],
                             linewidth=10,
                             label='Found and in database ({})'.format(fad))

handles = [p1, p2]
labels = [h.get_label() for h in handles]

legend = ax.legend(handles=handles, labels=labels, frameon=True,
                   fontsize=14, loc='lower left')

legend.get_frame().set_facecolor('#ffffff')

plt.show()
```



Temporal Coverage

```
In [9]: df = df.sort_values('NAME_0')
        grouped = df.groupby('NAME_0').mean()
        grouped['year'] = grouped['year'].astype(int)
        grouped = grouped.sort('year')

        fig = plt.figure(figsize=(10, 5))
        ax = fig.add_subplot(111)
        sns.countplot(x=grouped.year, color='#FF5733', ax=ax)
        ax.set_title('\n Median year per country collected \n', fontsize=title_sz-4)
        ax.set_xlabel('\nYear\n', fontsize=y_lab_tick_sz-4)
        ax.set_ylabel('\nCount of Countries\n', fontsize=y_lab_tick_sz-4)
        mpl.rcParams['xtick.labelsize'] = x_lab_tick_sz-8
        mpl.rcParams['ytick.labelsize'] = y_lab_tick_sz-8
        plt.show()
```



Left Off
To Do: - Need to put into the global context