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Data Visualization with Python

Area Plots

COGNITIVE CLASS In this video, we will learn about another visualization tool: the area plot, 1

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Area Plot

- Also known as area chart or area graph.
- Commonly used to represent cumulated totals using numbers or percentages over time.
- Is based on the line plot.

COGNITIVE CLASS trying to compare two or more quantiles. So how can we generate an area plot with 2

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Dataset - Recap

Type	Coverage	OdName	AREA	AreaName	REG	RegName	DEV	DevName	1980	...	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
0	Immigrants	Foreigners	Afghanistan	935	Asia	5501	Southern Asia	902	Developing regions	16	...	2978	3436	3009	2652	2111	1746	1758	2203	2635	2004
1	Immigrants	Foreigners	Albania	908	Europe	925	Southern Europe	901	Developed regions	1	...	1450	1223	856	702	560	716	561	539	620	603
2	Immigrants	Foreigners	Algeria	903	Africa	912	Northern Africa	902	Developing regions	80	...	3616	3626	4807	3623	4005	5393	4752	4325	3774	4331
3	Immigrants	Foreigners	American Samoa	909	Oceania	957	Polynesia	902	Developing regions	0	...	0	0	1	0	0	0	0	0	0	0
4	Immigrants	Foreigners	Andorra	908	Europe	925	Southern Europe	901	Developed regions	0	...	0	0	1	1	0	0	0	0	1	1

dataset. Recall that each row represents a country and contains metadata about

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Dataset - Processed

	Continent	Region	DevName	1980	1981	1982	1983	1984	1985	1986	...	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Country																					
Afghanistan	Asia	Southern Asia	Developing regions	16	39	39	47	71	340	496	...	3436	3009	2652	2111	1746	1758	2203	2635	2004	58639
Albania	Europe	Southern Europe	Developed regions	1	0	0	0	0	0	1	...	1223	856	702	560	716	561	539	620	603	15699
Algeria	Africa	Northern Africa	Developing regions	80	67	71	69	63	...	69	...	3626	4807	3623	4005	5393	4752	4325	3774	4331	69439
American Samoa	Oceania	Polynesia	Developing regions	0	1	0	0	0	0	0	...	0	1	0	0	0	0	0	0	0	6
Andorra	Europe	Southern Europe	Developed regions	0	0	0	0	0	0	2	...	0	1	1	0	0	0	0	1	1	15

each row. This should make retrieving rows pertaining to specific countries a

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Dataset - Processed

	Continent	Region	DevName	1980	1981	1982	1983	1984	1985	1986	...	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Country																					
Afghanistan	Asia	Southern Asia	Developing regions	16	39	39	47	71	340	496	...	3436	3009	2652	2111	1746	1758	2203	2635	2004	58639
Albania	Europe	Southern Europe	Developed regions	1	0	0	0	0	0	1	...	1223	856	702	560	716	561	539	620	603	15699
Algeria	Africa	Northern Africa	Developing regions	80	67	71	69	63	44	69	...	3626	4807	3623	4005	5393	4752	4325	3774	4331	89439
American Samoa	Oceania	Polynesia	Developing regions	0	1	0	0	0	0	0	...	0	1	0	0	0	0	0	0	0	6
Andorra	Europe	Southern Europe	Developed regions	0	0	0	0	0	0	2	...	0	1	1	0	0	0	0	1	1	15

sum of annual immigration from each country from 1980 to 2013. So for

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Generating Area Plots

```
df_canada.sort_values(['Total'], ascending = False, axis = 0, inplace = True)
```

	Continent	Region	DevName	1980	1981	1982	1983	1984	1985	1986	...	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Country																					
India	Asia	Southern Asia	Developing regions	8880	8670	8147	7338	5704	4211	7150	...	36210	33848	28742	28281	29456	34235	27509	30833	33087	691904
China	Asia	Eastern Asia	Developing regions	5123	6682	3308	1863	1527	1816	1960	...	42584	33518	27642	30037	29622	30391	28502	33024	34129	659962
United Kingdom of Great Britain and Northern Ireland	Europe	Northern Europe	Developed regions	22045	24796	20820	10015	10170	9564	9470	...	7258	7140	8216	8979	8676	8724	8204	6195	5827	551500
Philippines	Asia	South-Eastern Asia	Developing regions	6051	5821	5249	4562	3801	3150	4166	...	18138	18400	19837	24887	28573	38617	36765	34315	29544	511381
Pakistan	Asia	Southern Asia	Developing regions	978	972	1201	900	668	514	691	...	14314	13127	10124	8994	7217	6811	7468	11227	12603	241800

India China United Kingdom Philippines Pakistan

Let's see how we can do this. After we sort our dataframe in descending order

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Generating Area Plots

```
years = list(map(str, range(1980, 2014)))  
df_canada.sort_values(['Total'], ascending = False, axis = 0, inplace = True)  
df_top5 = df_canada.head()  
df_top5 = df_top5[years].transpose()
```

Country	India	China	United Kingdom of Great Britain and Northern Ireland	Philippines	Pakistan
1980	8880	5123	22045	6051	978
1981	8670	6682	24796	5921	972
1982	8147	3308	20620	5249	1201
1983	7338	1863	10015	4562	900
1984	5704	1527	10170	3801	668

plots. To do that, first we import Matplotlib as mpl and its

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Generating Area Plots

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years = list(map(str, range(1980, 2014)))  
df_canada.sort_values(['Total'], ascending = False, axis = 0, inplace = True)  
df_top5 = df_canada.head()  
df_top5 = df_top5[years].transpose()
```

Country	India	China	United Kingdom of Great Britain and Northern Ireland	Philippines	Pakistan
1980	8880	5123	22045	6051	978
1981	8670	6682	24796	5921	972
1982	8147	3308	20620	5249	1201
1983	7338	1863	10015	4562	900
1984	5704	1527	10170	3801	668

the plot function on dataframe df_top5 to generate the area

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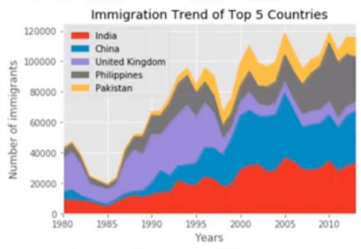
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Area Plots

```
import matplotlib as mpl
import matplotlib.pyplot as plt

df_top5.plot(kind='area')

plt.title('Immigration trend of top 5 countries')
plt.ylabel('Number of immigrants')
plt.xlabel('Years')
plt.show()
```



COGNITIVE CLASS explore area plots in more details, so make sure to complete this module's lab

youtube

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Histograms (4:58) | Histogram: X Day 1.pdf X Desktop/Jupyter/Recogniz... X Workshop 0 - Basics of Python X Workshop 0 - Basics of Python X

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Data Visualization with Python

Histograms

COGNITIVE

In this video, we will learn about another visualization tool: the histogram.

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Histogram

A histogram is a way of representing the frequency distribution of a variable.

do we create a histogram using Matplotlib. Before we go over the code to

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Dataset - Recap

Type	Coverage	OdName	AREA	AreaName	REG	RegName	DEV	DevName	1980	...	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
0	Immigrants	Foreigners	Afghanistan	935	Asia	5501	Southern Asia	902	Developing regions	16	...	2978	3436	3009	2652	2111	1746	1758	2203	2635	2004
1	Immigrants	Foreigners	Albania	908	Europe	925	Southern Europe	901	Developed regions	1	...	1450	1223	856	702	560	716	561	539	620	603
2	Immigrants	Foreigners	Algeria	903	Africa	912	Northern Africa	902	Developing regions	80	...	3616	3626	4807	3623	4005	5393	4752	4325	3774	4331
3	Immigrants	Foreigners	American Samoa	909	Oceania	957	Polynesia	902	Developing regions	0	...	0	0	1	0	0	0	0	0	0	0
4	Immigrants	Foreigners	Andorra	908	Europe	925	Southern Europe	901	Developed regions	0	...	0	0	1	1	0	0	0	0	1	1

immigration from that country to Canada from 1980 to 2013.

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Dataset - Processed

	Continent	Region	DevName	1980	1981	1982	1983	1984	1985	1986	...	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Afghanistan	Asia	Southern Asia	Developing regions	16	39	39	47	71	340	496	...	3436	3009	2652	2111	1746	1758	2203	2635	2004	58639
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American Samoa	Oceania	Polynesia	Developing regions	0	1	0	0	0	0	0	...	0	1	0	0	0	0	0	0	0	6
Andorra	Europe	Southern Europe	Developed regions	0	0	0	0	0	0	2	...	0	1	1	0	0	0	0	1	1	15

to 2013. So for Afghanistan for example, it is 58,639.

Histograms

```

import matplotlib as mpl
import matplotlib.pyplot as plt
import numpy as np

count, bin_edges = np.histogram(df_canada['2013'])
df_canada['2013'].plot(kind='hist', ticks = bin_edges)

plt.title('Histogram of Immigration from 195 countries in 2013')
plt.ylabel('Number of Countries')
plt.xlabel('Number of Immigrants')
plt.show()

```

whose bin edges are aligned with the tick marks on the horizontal axis. In the

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Data Visualization with Python

Bar Charts

In this video, we will learn about an additional visualization tool, namely the

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Bar Chart

Unlike a histogram, a bar chart is commonly used to compare the values of a variable at a given point in time.

Icelandic immigrants to Canada from 1980 to 2013

Year	Number of Immigrants
1980	15
1981	35
1982	10
1983	15
1984	10
1985	15
1986	10
1987	15
1988	10
1989	15
1990	10
1991	15
1992	10
1993	15
1994	10
1995	15
1996	10
1997	15
1998	10
1999	15
2000	10
2001	15
2002	10
2003	15
2004	10
2005	15
2006	10
2007	15
2008	10
2009	15
2010	10
2011	15
2012	10
2013	15

the height of the bar represents the total immigration from Iceland to Canada

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Dataset - Recap

Type	Coverage	OdName	AREA	AreaName	REG	RegName	DEV	DevName	1980	...	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
0	Immigrants	Foreigners	Afghanistan	935	Asia	5501	Southern Asia	902	Developing regions	16	...	2978	3436	3009	2652	2111	1746	1758	2203	2635	2004
1	Immigrants	Foreigners	Albania	908	Europe	925	Southern Europe	901	Developed regions	1	...	1450	1223	856	702	560	716	561	539	620	603
2	Immigrants	Foreigners	Algeria	903	Africa	912	Northern Africa	902	Developing regions	80	...	3616	3626	4807	3623	4005	5393	4752	4325	3774	4331
3	Immigrants	Foreigners	American Samoa	909	Oceania	957	Polynesia	902	Developing regions	0	...	0	0	1	0	0	0	0	0	0	0
4	Immigrants	Foreigners	Andorra	908	Europe	925	Southern Europe	901	Developed regions	0	...	0	0	1	1	0	0	0	0	1	1

COGNITIVE CLASS row represents a country and contains metadata about the country such as where

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1:00 / 3:30

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Dataset - Processed

	Continent	Region	DevName	1980	1981	1982	1983	1984	1985	1986	...	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Country																					
Afghanistan	Asia	Southern Asia	Developing regions	16	39	39	47	71	340	496	...	3436	3009	2652	2111	1746	1758	2203	2635	2004	58639
Albania	Europe	Southern Europe	Developed regions	1	0	0	0	0	0	1	...	1223	856	702	560	716	561	539	620	603	15699
Algeria	Africa	Northern Africa	Developing regions	80	67	71	69	63	44	69	...	3626	4807	3623	4005	5393	4752	4325	3774	4331	69439
American Samoa	Oceania	Polynesia	Developing regions	0	1	0	0	0	0	0	...	0	1	0	0	0	0	0	0	0	6
Andorra	Europe	Southern Europe	Developed regions	0	0	0	0	0	0	2	...	0	1	1	0	0	0	0	1	1	15

COGNITIVE CLASS each row. This should make retrieving rows pertaining to specific countries a

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1:27 / 3:30

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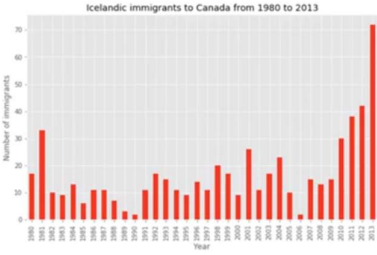
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Bar Chart

```
import matplotlib as mpl
import matplotlib.pyplot as plt

years = list(map(str, range(1980, 2014)))
df_iceland = df_canada.loc['Iceland', years]

df_iceland.plot(kind='bar')
plt.title('Icelandic immigrants to Canada from 1980 to 2013')
plt.xlabel('Year')
plt.ylabel('Number of immigrants')
plt.show()
```



A bar chart titled "Icelandic immigrants to Canada from 1980 to 2013". The x-axis represents the "Year" from 1980 to 2013, and the y-axis represents the "Number of immigrants" from 0 to 70. The chart shows a general upward trend in immigration over the period, with a notable peak in 2013.

Year	Number of immigrants
1980	15
1981	35
1982	10
1983	12
1984	10
1985	10
1986	10
1987	10
1988	10
1989	10
1990	10
1991	10
1992	10
1993	10
1994	10
1995	10
1996	10
1997	10
1998	10
1999	10
2000	10
2001	10
2002	10
2003	10
2004	10
2005	10
2006	10
2007	10
2008	10
2009	10
2010	10
2011	10
2012	10
2013	70

COGNITIVE CLASS A bar chart that depicts the immigration from Iceland to Canada from 1980 to 2013.

2:56 / 3:30 | Speed 1.0x | HD | ENG US | 20:20 | 10/02/2021