Matplotlib

IMD0033 - Probabilidades

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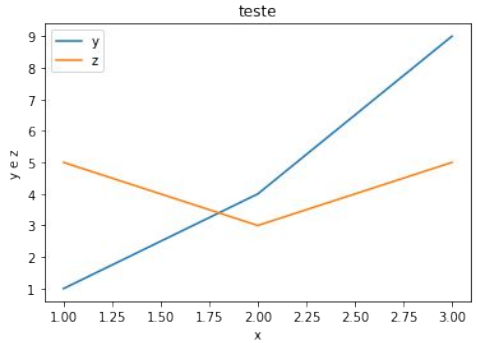
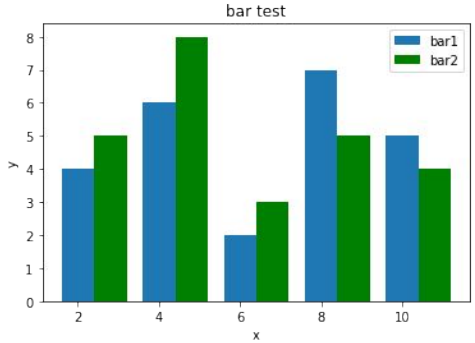
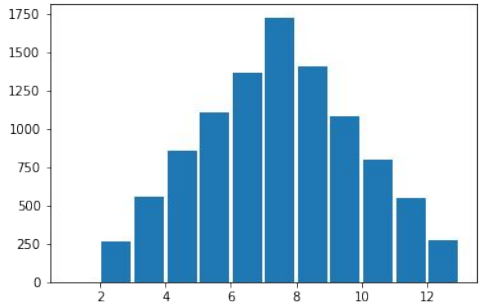
Objetivos da aula

- Compreender a importância da visualização de dados;
- Obter noções do uso da biblioteca Matplotlib;







- Resolução de exercícios;

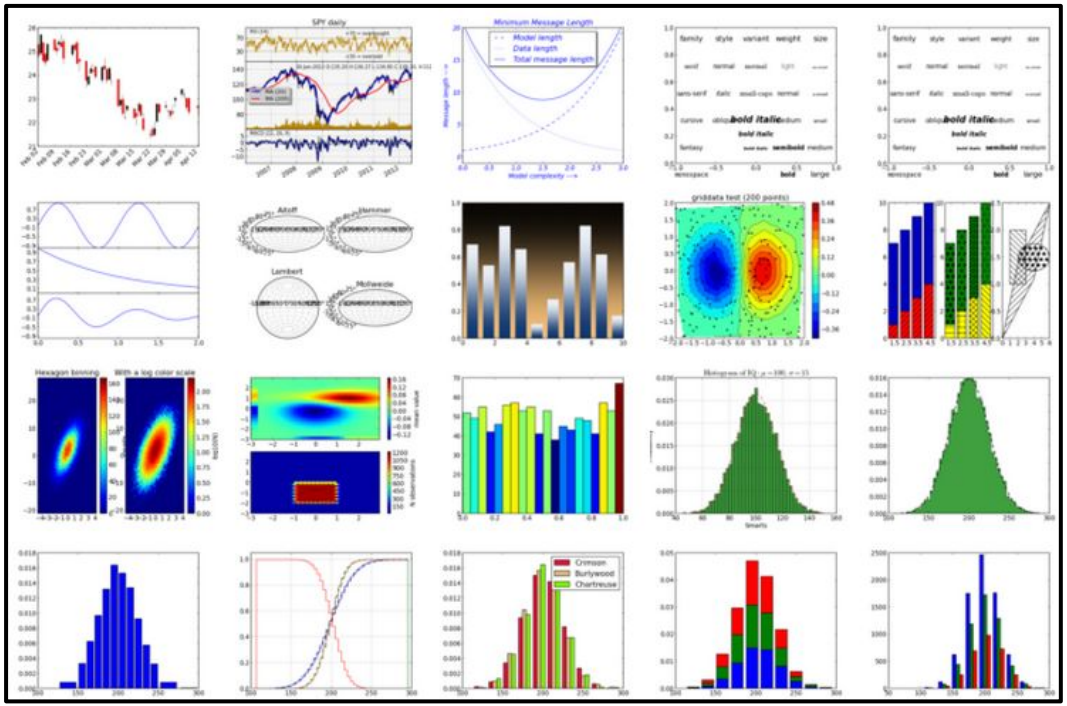
Visualização de dados

Microsoft Date	Microsoft Open	Microsoft High	Microsoft Low	Microsoft Close	Microsoft Volume	Google Date	Google Open	Google High	Google Low	Google Close	Google Volume	Amazon Date	Amazon Open	Amazon High	Amazon Low	Amazon Close	Amazon Volume	Apple Date	Apple Open	Ap Hig
31-Dec-14	46.73	47.44	46.45	46.45	21552450	31-Dec-14	537.74	538.4	530.2	530.66	1236445	31-Dec-14	311.55	312.98	310.01	310.35	2057766	31-Dec-14	112.82	11
30-Dec-14	47.44	47.62	46.84	47.02	16384692	30-Dec-14	534.96	537.84	533.61	535.28	1048631	30-Dec-14	309.91	313.94	309.34	310.3	2093023	30-Dec-14	113.64	11
29-Dec-14	47.7	47.78	47.26	47.45	14439518	29-Dec-14	540.5	543.93	537.16	537.31	2218632	29-Dec-14	307.85	314.27	306.58	312.04	3009046	29-Dec-14	113.79	11
26-Dec-14	48.41	48.41	47.82	47.88	13197817	26-Dec-14	536.93	543.25	535.49	541.52	1113464	26-Dec-14	305	310.78	303.81	309.09	2893801	26-Dec-14	112.1	11
24-Dec-14	48.64	48.64	48.08	48.14	11442790	24-Dec-14	538.82	540.29	535.1	536.93	737848	24-Dec-14	306.38	307	302.88	303.03	1518107	24-Dec-14	112.58	11
23-Dec-14	48.37	48.8	48.13	48.45	23656529	23-Dec-14	534.51	542.3	533.72	538.77	2877222	23-Dec-14	306.98	307.49	303.25	306.28	2718359	23-Dec-14	113.23	11
22-Dec-14	47.78	48.12	47.71	47.98	26565984	22-Dec-14	520.61	532.97	520.59	532.3	3319461	22-Dec-14	301.94	307.36	301.94	306.54	4003827	22-Dec-14	112.16	11
19-Dec-14	47.63	48.1	47.17	47.66	64551182	19-Dec-14	516.99	520.81	508.86	520.04	4872059	19-Dec-14	296.91	301.54	295.52	299.9	8709129	19-Dec-14	112.26	11
18-Dec-14	46.58	47.52	46.34	47.52	40105550	18-Dec-14	515.99	516.25	506.56	514.62	3876732	18-Dec-14	304.01	304.5	293.25	297.73	7738067	18-Dec-14	111.87	11
17-Dec-14	45.05	45.94	44.9	45.74	34970865	17-Dec-14	499.86	509.07	499.11	506.45	3639437	17-Dec-14	296.37	299.67	293.03	298.88	4433505	17-Dec-14	107.12	10
16-Dec-14	45.9	46.34	45.13	45.16	47801392	16-Dec-14	513.6	515.58	497.19	498.16	4349882	16-Dec-14	304.35	304.49	295.01	295.06	6501252	16-Dec-14	106.37	11
15-Dec-14	47.2	47.67	46.55	46.67	29247761	15-Dec-14	523.76	525.37	515.4	515.84	2621977	15-Dec-14	308.87	310.86	302.15	306.07	3841577	15-Dec-14	110.7	1
12-Dec-14	46.78	47.73	46.67	46.95	34248371	12-Dec-14	527.44	532.24	521.46	521.51	2371543	12-Dec-14	303.99	310.64	303.01	307.32	3162322	12-Dec-14	110.46	11
11-Dec-14	47.08	47.74	46.68	47.17	29061918	11-Dec-14	530.01	537.04	529.16	532.11	2073290	11-Dec-14	307.89	312.64	306.01	307.36	3272919	11-Dec-14	112.26	1
10-Dec-14	47.58	47.66	46.7	46.9	30431788	10-Dec-14	535.9	539.36	527.49	528.04	2316204	10-Dec-14	312	313.19	304.68	305.84	3245890	10-Dec-14	114.41	11
9-Dec-14	47.11	47.92	47.05	47.59	24330506	9-Dec-14	525.88	536.65	523.41	536.11	2168813	9-Dec-14	302.99	313.64	301.14	312.5	4049506	9-Dec-14	110.19	1
8-Dec-14	48.26	48.35	47.44	47.7	26663107	8-Dec-14	529.22	533.82	527	530.73	3231818	8-Dec-14	311.57	316.56	304.82	306.64	3639180	8-Dec-14	114.1	11
5-Dec-14	48.82	48.97	48.38	48.42	27313449	5-Dec-14	536.7	538.2	527.26	528.08	3070118	5-Dec-14	316.8	316.93	310.84	312.63	3265214	5-Dec-14	115.99	11
4-Dec-14	48.39	49.06	48.2	48.84	30345132	4-Dec-14	537.64	542.69	534.89	542.58	1633688	4-Dec-14	315.53	318.59	313.47	316.93	3296642	4-Dec-14	115.77	1
3-Dec-14	48.44	48.5	47.8	48.08	23534752	3-Dec-14	537.5	541.4	535.21	536.97	1623977	3-Dec-14	325.73	326.77	314.36	316.5	5689904	3-Dec-14	115.75	11
2-Dec-14	48.84	49.05	48.2	48.46	25773478	2-Dec-14	539.45	541.85	534.66	538.59	2073974	2-Dec-14	327.5	327.93	323.25	326.31	2790257	2-Dec-14	113.5	11

Visualização de dados

Matplotlib

- https://matplotlib.org/gallery/index.html
- Amplo uso dentro da comunidade do Python;
  - Bastante eficaz para gerar diversos tipos de imagem;
- Base para outras bibliotecas de visualização de dados (Seaborn);
- Instalação:
  - Anaconda
  - python -mpip install -U matplotlib



Matplotlib - prática

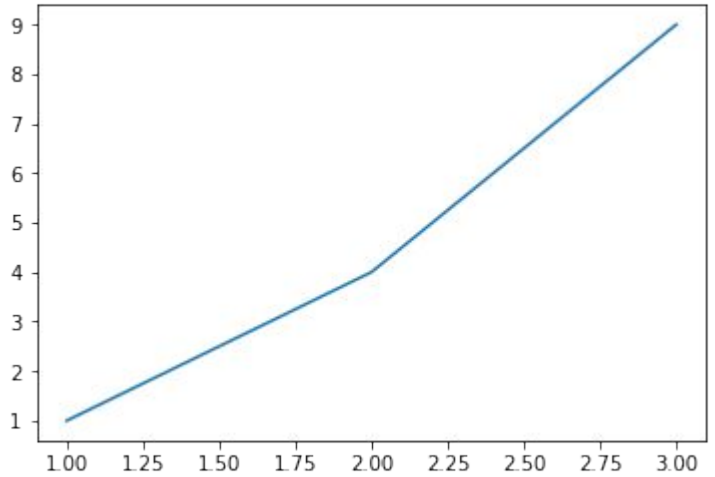
- Notebook desta aula em:
  - https://github.com/tetsufmbio/IMD0033/
  - Na pasta aula04

Matplotlib - prática (gráfico de linha)

```
import matplotlib.pyplot as plt

x = [1,2,3] # valores do eixo X
y = [1,4,9] # valores do eixo Y

plt.plot(x,y)
plt.show()
```

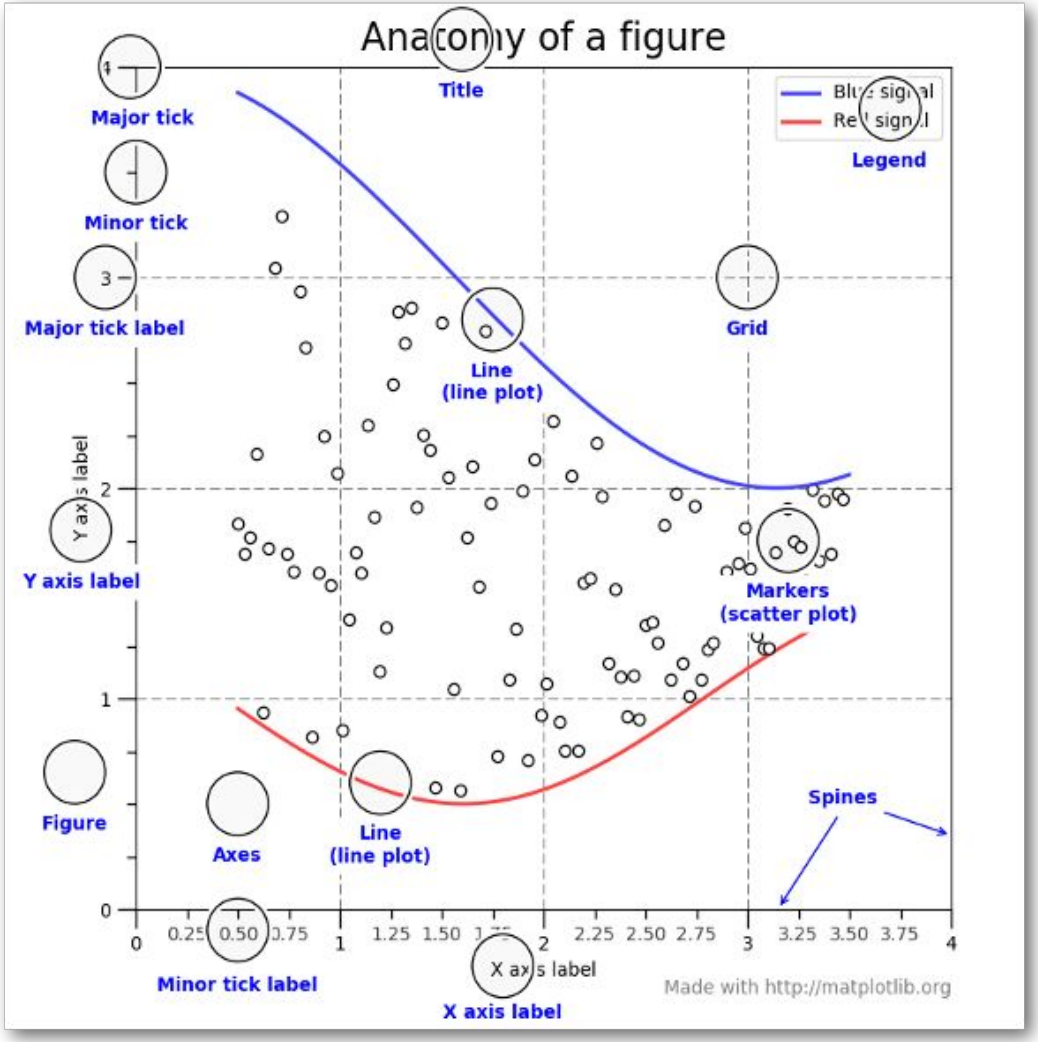


Matplotlib

- Anatomia de uma figura do Matplotlib

Sumário dos atributos do **matplotlib.pyplot**:

- https://matplotlib.org/api/pyplot_summary.html

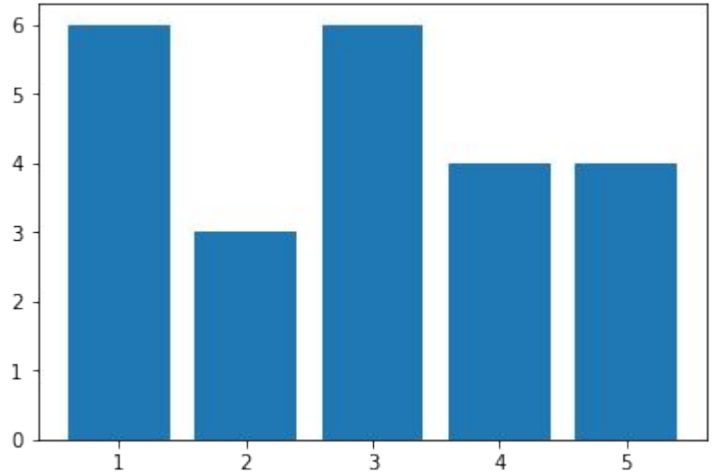


Matplotlib - prática (gráfico de barras)

```
import matplotlib.pyplot as plt

x = [1,2,3,4,5] # valores do eixo X
y = [6,3,6,4,4] # valores do eixo Y

plt.bar(x,y)
plt.show()
```

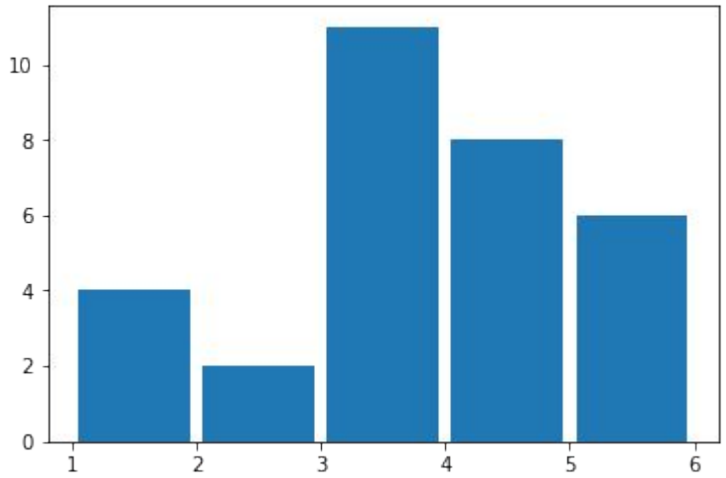


Matplotlib - prática (histograma)

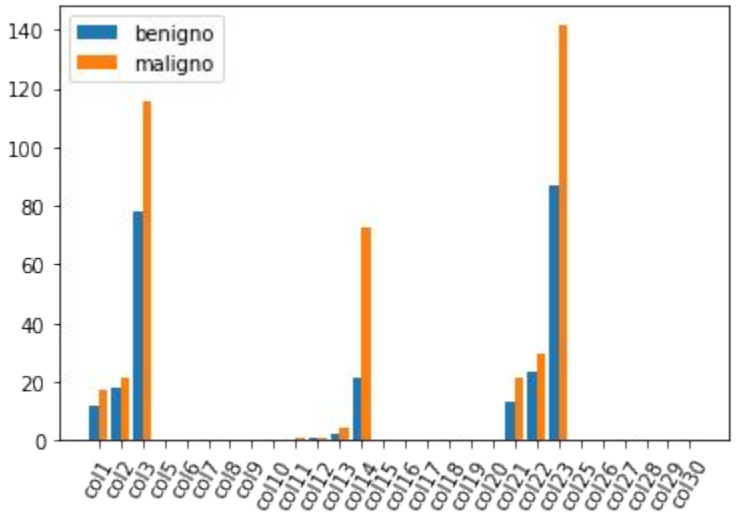
```
import matplotlib.pyplot as plt

x = np.array([1,3,5,1,1,1,2,3,4,5,3,4,3,4,5,3,3,4,2,3,4,5,4,3,4,4,3,3,3,5,5])
bins = np.arange(1,7)

plt.hist(x, bins, rwidth=0.9)
plt.show()
```



Questão 2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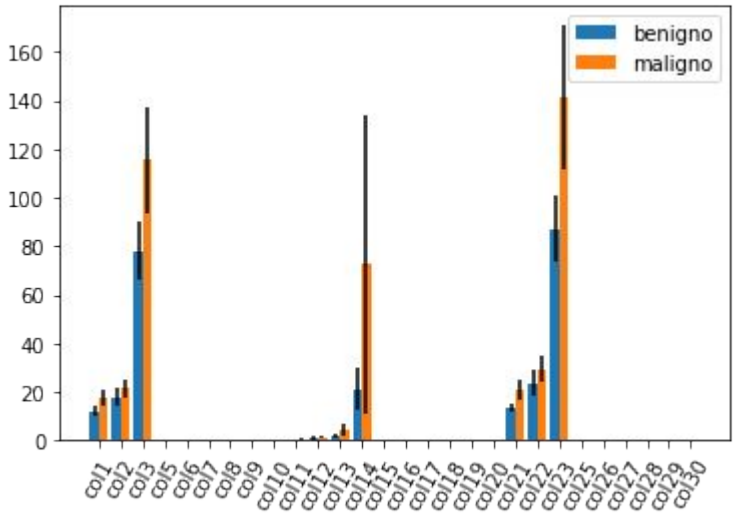
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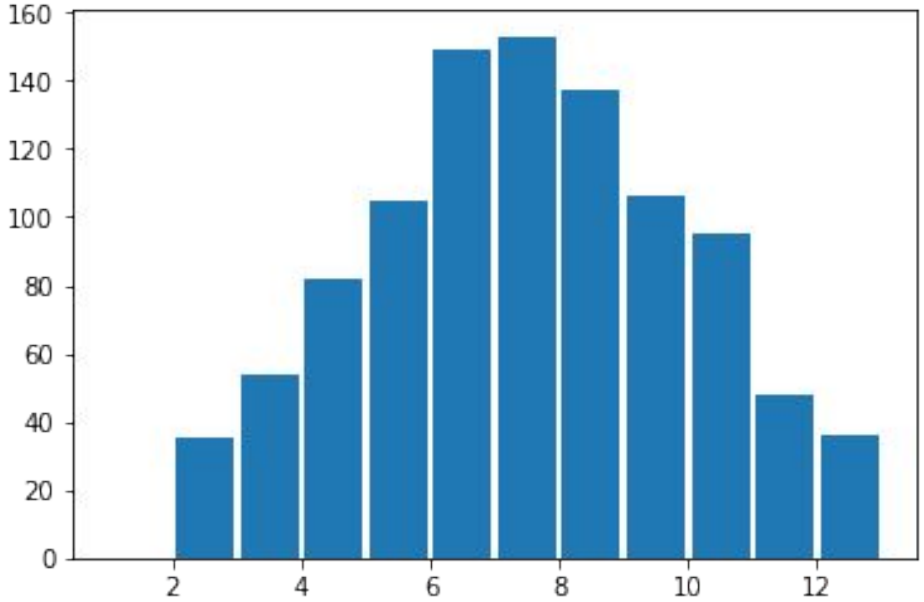
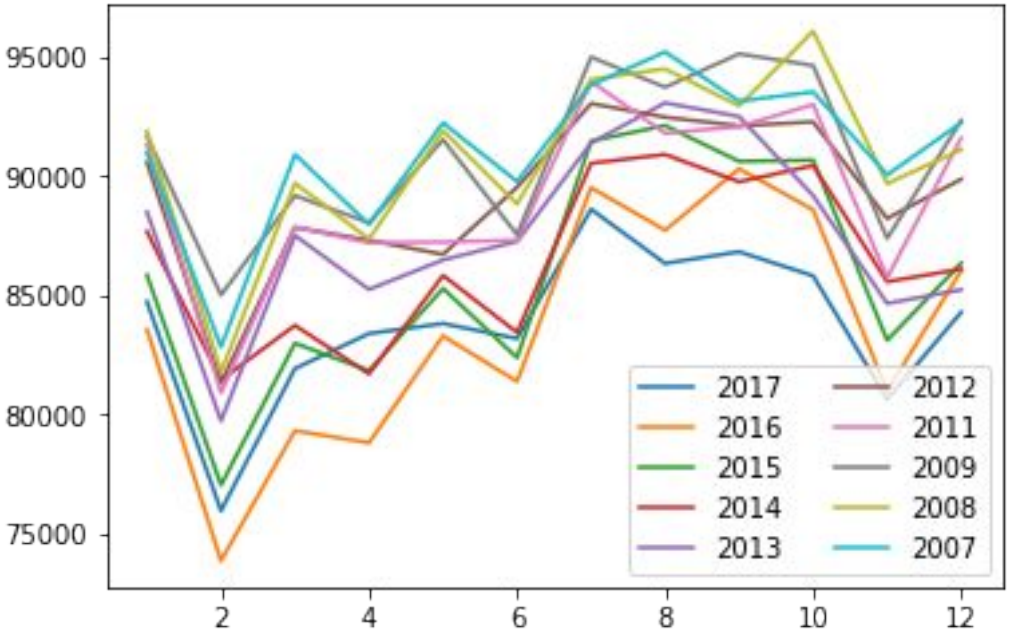
Questão 3



Questão 1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Referência

Página oficial do Matplotlib:

- https://matplotlib.org/index.html

Exemplos de gráficos do Matplotlib:

- https://matplotlib.org/tutorials/introductory/sample_plots.html#sphx-glr-tutorials-introductory-sample-plots-py

Tutoriais interessantes:

- http://pbpython.com/effective-matplotlib.html
- https://pythonforundergradengineers.com/python-matplotlib-error-bars.html