

# plot-examples

June 9, 2019

## 1 Plotting in xkcd Style

Matplotlib offers an xkcd sketch style drawing option. If you don't know the xkcd web comic, you can check it out here:

<https://xkcd.com>

Matplotlib also has a gallery of examples here.

<https://matplotlib.org/xkcd/gallery.html>

Although this functionality has been available for [quite a while](#), I wanted to experiment with it myself! Below, I plot how the 800 meter world record has improved over time.

### Load data

```
In [1]: import datetime
```

```
import IPython.display
import matplotlib as mpl
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
```

```
pd.plotting.register_matplotlib_converters()
```

```
inp_excel_fp = "800m_world_record_progression.xlsx"
```

```
def time_converter(inp_time):
    if type(inp_time) == str:
        d = datetime.datetime.strptime(inp_time.strip("y+"), "%M:%S.%f")
        return datetime.time(hour=d.hour, minute=d.minute, second=d.second, microsecond=d.microsecond)
    else:
        return inp_time
```

```
df_men = pd.read_excel(inp_excel_fp, sheet_name="Men 800m WR Progression", converters=
df_women = pd.read_excel(inp_excel_fp, sheet_name="Women 800m WR Progression", convert
```

### Men's 800m World Record progression

```
In [2]: IPython.display.display(df_men)
```

	Time	Auto	Athlete	Date \
0	00:01:51.900000	NaN	āTed Meredithā(USA)	1912-07-08
1	00:01:51.600000	NaN	āOtto Peltzerā(GER)	1926-07-03
2	00:01:50.600000	NaN	āSera Martinā(FRA)	1928-07-14
3	00:01:49.800000	00:01:49.700000	āTommy Hampsonā(GBR)	1932-08-02
4	00:01:49.800000	NaN	āBen Eastmanā(USA)	1934-06-16
5	00:01:49.700000	NaN	āGlenn Cunninghamā(USA)	1936-08-20
6	00:01:49.600000	NaN	āElroy Robinsonā(USA)	1937-07-11
7	00:01:48.400000	NaN	āSydney Woodersonā(GBR)	1938-08-20
8	00:01:46.600000	NaN	āRudolf Harbigā(GER)	1939-07-15
9	00:01:45.700000	NaN	āRoger Moensā(BEL)	1955-08-03
10	00:01:44.300000	NaN	āPeter Snellā(NZL)	1962-02-02
11	00:01:44.300000	00:01:44.400000	āRalph Doubellā(AUS)	1968-10-15
12	00:01:44.300000	NaN	āDave Wottleā(USA)	1972-07-01
13	00:01:43.700000	NaN	āMarcello Fiasconaroā(ITA)	1973-06-27
14	00:01:43.500000	00:01:43.500000	āAlberto Juantorenaā(CUB)	1976-07-25
15	00:01:43.400000	00:01:43.440000	āAlberto Juantorenaā(CUB)	1977-08-21
16	00:01:42.400000	00:01:42.330000	āSebastian Coeā(GBR)	1979-07-05
17	00:01:41.730000	NaN	āSebastian Coeā(GBR)	1981-06-10
18	00:01:41.730000	NaN	āWilson Kipketerā(DEN)	1997-07-07
19	00:01:41.240000	NaN	āWilson Kipketerā(DEN)	1997-08-13
20	00:01:41.110000	NaN	āWilson Kipketerā(DEN)	1997-08-24
21	00:01:41.090000	NaN	āDavid Rudishaā(KEN)	2010-08-22
22	00:01:41.010000	NaN	āDavid Rudishaā(KEN)	2010-08-29
23	00:01:40.910000	NaN	āDavid Rudishaā(KEN)	2012-08-09

	Location
0	Stockholm, Sweden[1]
1	London, United Kingdom[1]
2	Paris, France[1]
3	Los Angeles, United States[1]
4	Princeton, United States[1]
5	Stockholm, Sweden[1]
6	New York, United States[1]
7	London, United Kingdom[1]
8	Milan, Italy[1]
9	Oslo, Norway[1]
10	Christchurch, New Zealand[1]
11	Mexico City, Mexico[1]
12	Eugene, United States[1]
13	Milan, Italy[1]
14	Montreal, Canada[1]
15	Sofia, Bulgaria[1]
16	Oslo, Norway[1]
17	Florence, Italy[1]
18	Stockholm, Sweden[1]
19	Zürich, Switzerland[1]
20	Cologne, Germany[1]

```

21         Berlin, Germany[2]
22         Rieti, Italy[2]
23         London, United Kingdom[3]

```

```
In [3]: IPython.display.display(df_women)
```

	Time	Auto	Athlete	Date \
0	00:02:30.400000	NaN	ãGeorgette Lenoirã(FRA)	1922-08-20
1	00:02:26.600000	NaN	ãMary Linesã(GBR)	1922-08-30
2	00:02:23.800000	NaN	ãLina Radkeã(GER)	1927-08-07
3	00:02:20.400000	NaN	ãInga Gentzelã(SWE)	1928-06-16
4	00:02:19.600000	NaN	ãLina Radkeã(GER)	1928-07-01
5	00:02:16.800000	NaN	ãLina Radkeã(GER)	1928-08-02
6	00:02:15.900000	NaN	ãAnna Larssonã(SWE)	1944-08-28
7	00:02:14.800000	NaN	ãAnna Larssonã(SWE)	1945-08-19
8	00:02:13.800000	NaN	ãAnna Larssonã(SWE)	1945-08-30
9	00:02:13	NaN	ãYevdokia Vasilyevaã(URS)	1950-07-17
10	00:02:12.200000	NaN	ãValentina Pomogayevaã(URS)	1951-07-26
11	00:02:12	NaN	ãNina Otkalenkoã(URS)	1951-08-26
12	00:02:08.500000	NaN	ãNina Otkalenkoã(URS)	1952-06-15
13	00:02:07.300000	NaN	ãNina Otkalenkoã(URS)	1953-08-27
14	00:02:06.600000	NaN	ãNina Otkalenkoã(URS)	1954-09-16
15	00:02:05	NaN	ãNina Otkalenkoã(URS)	1955-09-24
16	00:02:04.300000	NaN	ãLyudmila Shevtsovaã(URS)	1960-07-03
17	00:02:04.300000	00:02:04.500000	ãLyudmila Shevtsovaã(URS)	1960-09-07
18	00:02:01.200000	NaN	ãDixie Willisã(AUS)	1962-03-03
19	00:02:01.100000	NaN	ãAnn Packerã(GBR)	1964-10-20
20	00:02:01	NaN	ãJudy Pollockã(AUS)	1967-06-28
21	00:02:00.500000	NaN	ãVera Nikolicã(YUG)	1968-07-20
22	00:01:58.500000	00:01:58.450000	ãHildegard Falckã(FRG)	1971-07-11
23	00:01:57.500000	00:01:57.480000	ãSvetla Zlatevaã(BUL)	1973-08-24
24	00:01:56	NaN	ãValentina Gerasimovaã(URS)	1976-06-12
25	00:01:54.900000	00:01:54.940000	ãTatyana Kazankinaã(URS)	1976-07-26
26	00:01:54.900000	00:01:54.850000	ãNadezhda Olizarenkoã(URS)	1980-06-12
27	00:01:53.500000	00:01:53.430000	ãNadezhda Olizarenkoã(URS)	1980-07-27
28	00:01:53.280000	NaN	ãJarmila Kratochvílováã(TCH)	1983-07-26

	Location
0	Paris, France[4]
1	London, United Kingdom[4]
2	Breslau, Germany[4]
3	Stockholm, Sweden[4]
4	Brzeg,ãPoland[4]
5	Amsterdam, Netherlands[4]
6	Stockholm, Sweden[4]
7	Hälsingborg, Sweden[4]
8	Stockholm, Sweden[4]

```

9      Moscow,ãSoviet Union[4]
10     Moscow,ãSoviet Union[4]
11      Minsk,ãSoviet Union[4]
12      Kiev,ãSoviet Union[4]
13     Moscow,ãSoviet Union[4]
14      Kiev,ãSoviet Union[4]
15      Zagreb,ãYugoslavia[4]
16     Moscow,ãSoviet Union[4]
17          Rome, Italy[4]
18      Perth, Australia[4]
19      Tokyo, Japan[4]
20      Helsinki, Finland[4]
21 London, United Kingdom[4]
22      Stuttgart, Germany[4]
23      Athens, Greece[4]
24      Kiev,ãSoviet Union[4]
25      Montreal, Canada[4]
26     Moscow,ãSoviet Union[4]
27     Moscow,ãSoviet Union[4]
28     Munich,ãWest Germany[4]

```

## Plot the normal way

```

In [4]: # Men
        out_file_path = "men_800m_world_record_progression.png"

        fig, ax = plt.subplots()

        wr_times = df_men["Time"].to_list()
        wr_dates = df_men["Date"].to_list()
        ax.plot(wr_dates, wr_times, "-")

        ax.set_title("Men's 800m World Record Progression", fontsize=18)
        ax.set_xlabel("Year", fontsize=14)
        ax.set_ylabel("World Record Time", fontsize=14)

        plt.tight_layout()
        plt.savefig(out_file_path, dpi=300)

        # Women
        out_file_path = "women_800m_world_record_progression.png"

        fig, ax = plt.subplots()

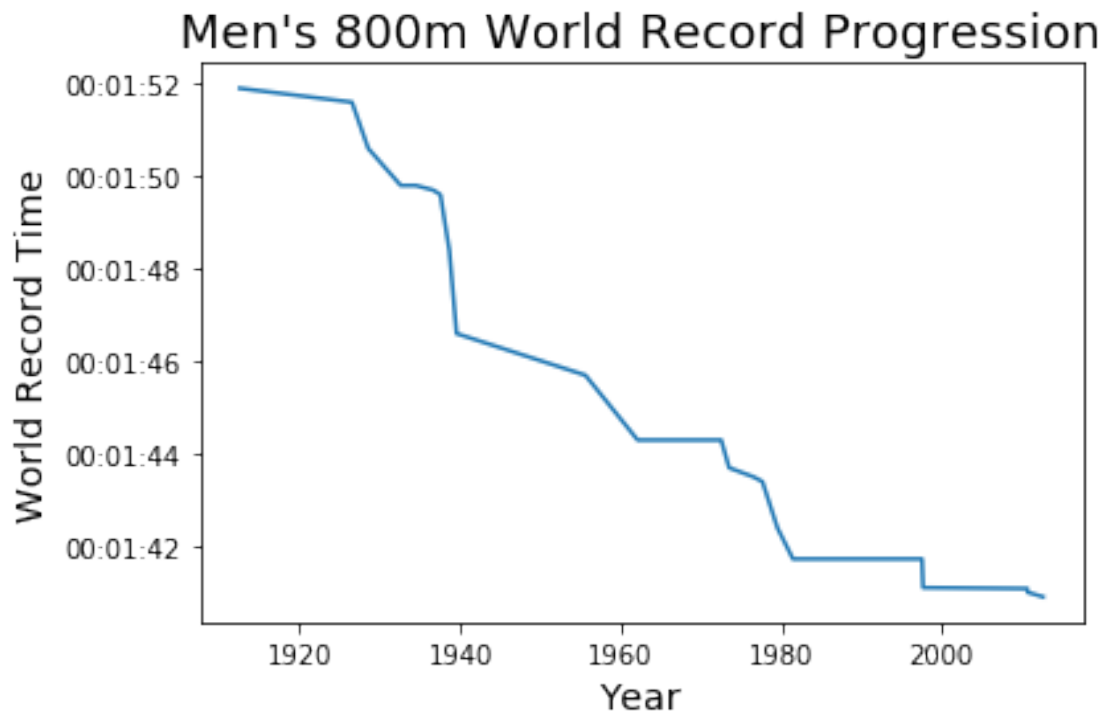
        wr_times = df_women["Time"].to_list()
        wr_dates = df_women["Date"].to_list()

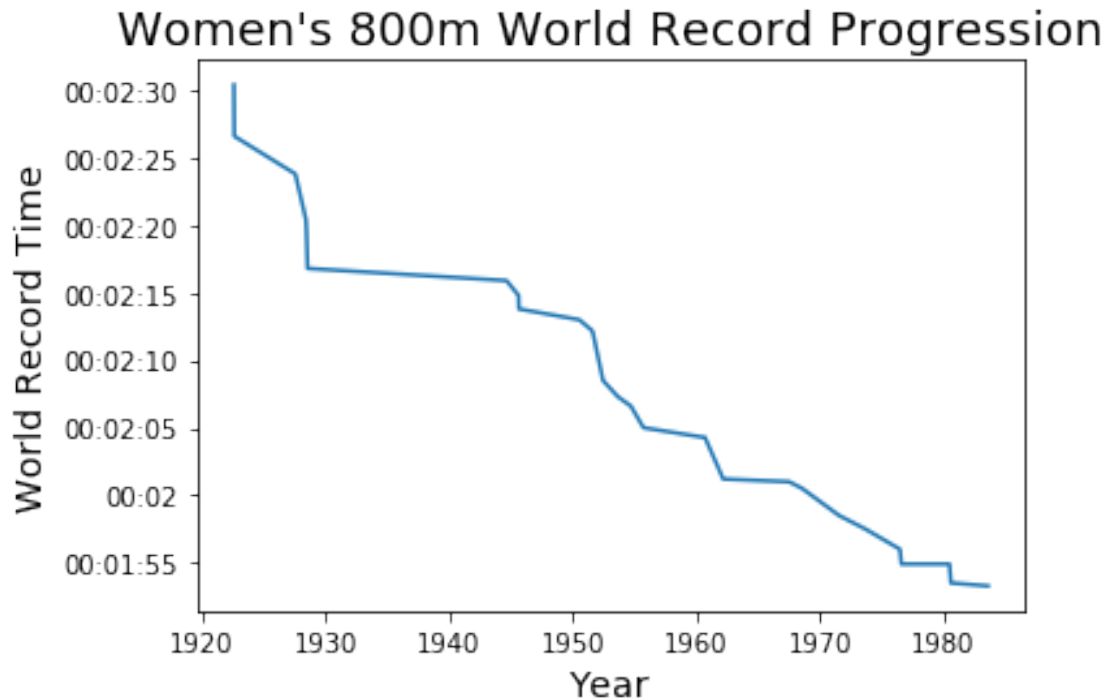
```

```
ax.plot(wr_dates, wr_times, "-")

ax.set_title("Women's 800m World Record Progression", fontsize=18)
ax.set_xlabel("Year", fontsize=14)
ax.set_ylabel("World Record Time", fontsize=14)

plt.tight_layout()
plt.savefig(out_file_path, dpi=300)
```





**Plot using xkcd Theme** The only change required is adding a "plt.xkcd()" to change the context manager settings!

#### Notes

- 1) Make sure you have "Comic Sans" installed. If you don't, you will want to install it

```
sudo apt-get update
sudo apt-get install fonts-humor-sans
```

After installing a new font, you will likely need to refresh the font cache.

```
>>> import matplotlib.font_manager
>>> matplotlib.font_manager._rebuild()
```

- 2) Note that I use plt.xkcd() in a with block. This ensures that your current context manager settings are not overridden and only these plots appear in the xkcd style. If you don't use a with block, you can reset to default using plt.rcParamsDefaults().

<https://stackoverflow.com/questions/22284843/how-to-disable-xkcd-in-a-matplotlib-figure>

```
In [15]: # Men
         out_file_path = "xkcd_theme-men_800m_world_record_progression.png"
         with plt.xkcd():
```

```

fig, ax = plt.subplots()

wr_times = df_men["Time"].to_list()
wr_dates = df_men["Date"].to_list()
ax.plot(wr_dates, wr_times, "-")

ax.set_title("Men's 800m World Record Progression", fontsize=18)
ax.set_xlabel("Year", fontsize=14)
ax.set_ylabel("World Record Time", fontsize=14)

plt.tight_layout()
plt.savefig(out_file_path, dpi=300)

# women
out_file_path = "xkcd_theme-women_800m_world_record_progression.png"
with plt.xkcd():
    fig, ax = plt.subplots()

    wr_times = df_women["Time"].to_list()
    wr_dates = df_women["Date"].to_list()
    ax.plot(wr_dates, wr_times, "-")

    ax.set_title("Women's 800m World Record Progression", fontsize=17)
    ax.set_xlabel("Year", fontsize=14)
    ax.set_ylabel("World Record Time", fontsize=14)

    plt.tight_layout()
    plt.savefig(out_file_path, dpi=300)

```

