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
            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	Location
0	00:01:51.900000	NaN	ăTed Meredithă(USA)	1912-07-08	Stockholm, Sweden[1]
1	00:01:51.600000	NaN	ăOtto Peltzeră(GER)	1926-07-03	London, United Kingdom[1]
2	00:01:50.600000	NaN	ăSera Martinăă(FRA)	1928-07-14	Paris, France[1]
3	00:01:49.800000	00:01:49.700000	ăTommy Hampsonă(GBR)	1932-08-02	Los Angeles, United States[1]
4	00:01:49.800000	NaN	ăBen Eastmanăă(USA)	1934-06-16	Princeton, United States[1]
5	00:01:49.700000	NaN	ăGlenn Cunninghamă(USA)	1936-08-20	Stockholm, Sweden[1]
6	00:01:49.600000	NaN	ăElroy Robinsonă(USA)	1937-07-11	New York, United States[1]
7	00:01:48.400000	NaN	ăSydney Woodersonă(GBR)	1938-08-20	London, United Kingdom[1]
8	00:01:46.600000	NaN	ăRudolf Harbigă(GER)	1939-07-15	Milan, Italy[1]
9	00:01:45.700000	NaN	ăRoger Moensă(BEL)	1955-08-03	Oslo, Norway[1]
10	00:01:44.300000	NaN	ăPeter Snellă(NZL)	1962-02-02	Christchurch, New Zealand[1]
11	00:01:44.300000	00:01:44.400000	ăRalph Doubellă(AUS)	1968-10-15	Mexico City, Mexico[1]
12	00:01:44.300000	NaN	ăDave Wottleă(USA)	1972-07-01	Eugene, United States[1]
13	00:01:43.700000	NaN	ăMarcello Fiasconaroă(ITA)	1973-06-27	Milan, Italy[1]
14	00:01:43.500000	00:01:43.500000	ăAlberto Juantorenaă(CUB)	1976-07-25	Montreal, Canada[1]
15	00:01:43.400000	00:01:43.440000	ăAlberto Juantorenaă(CUB)	1977-08-21	Sofia, Bulgaria[1]
16	00:01:42.400000	00:01:42.330000	ăSebastian Coeă(GBR)	1979-07-05	Oslo, Norway[1]
17	00:01:41.730000	NaN	ăSebastian Coeă(GBR)	1981-06-10	Florence, Italy[1]
18	00:01:41.730000	NaN	ăWilson Kipketerăă(DEN)	1997-07-07	Stockholm, Sweden[1]
19	00:01:41.240000	NaN	ăWilson Kipketerăă(DEN)	1997-08-13	Zürich, Switzerland[1]
20	00:01:41.110000	NaN	ăWilson Kipketerăă(DEN)	1997-08-24	Cologne, Germany[1]
21	00:01:41.090000	NaN	ăDavid Rudishaă(KEN)	2010-08-22	
22	00:01:41.010000	NaN	ăDavid Rudishaă(KEN)	2010-08-29	
23	00:01:40.910000	NaN	ăDavid Rudishaă(KEN)	2012-08-09	

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

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

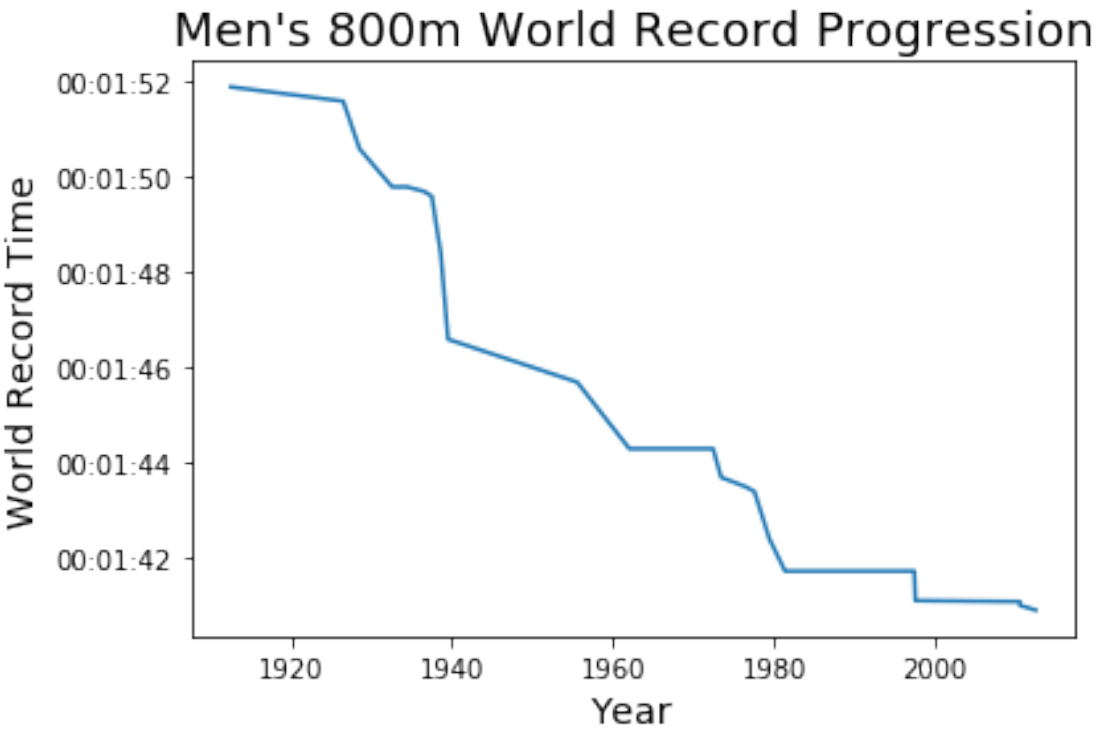
	Time	Auto	Athlete	Date	Location
0	00:02:30.400000	NaN	ãGeorgette Lenoirã(FRA)	1922-08-20	Paris, France[4]
1	00:02:26.600000	NaN	ãMary Linesã(GBR)	1922-08-30	London, United Kingdom[4]
2	00:02:23.800000	NaN	ãLina Radkeã(GER)	1927-08-07	Breslau, Germany[4]
3	00:02:20.400000	NaN	ãInga Gentzelã(SWE)	1928-06-16	Stockholm, Sweden[4]
4	00:02:19.600000	NaN	ãLina Radkeã(GER)	1928-07-01	Brzeg,ãPoland[4]
5	00:02:16.800000	NaN	ãLina Radkeã(GER)	1928-08-02	Amsterdam, Netherlands[4]
6	00:02:15.900000	NaN	ãAnna Larssonã(SWE)	1944-08-28	Stockholm, Sweden[4]
7	00:02:14.800000	NaN	ãAnna Larssonã(SWE)	1945-08-19	Hälsingborg, Sweden[4]
8	00:02:13.800000	NaN	ãAnna Larssonã(SWE)	1945-08-30	Stockholm, Sweden[4]
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	

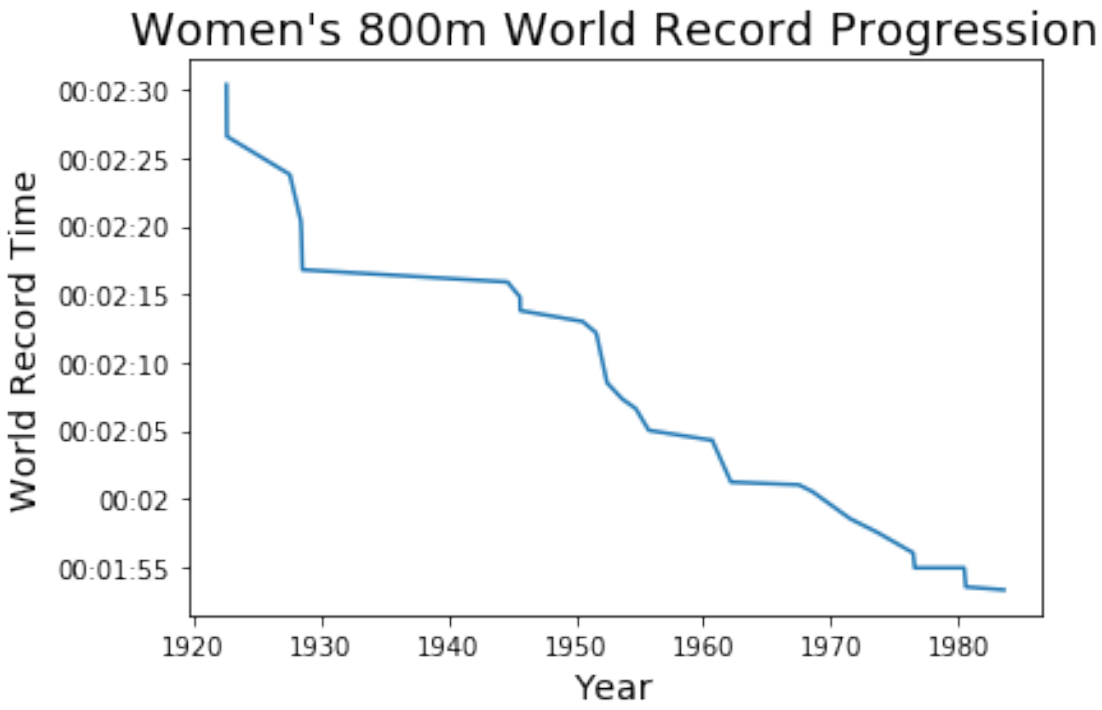
```
9     Moscow,ãSoviet Union[4]
10    Moscow,ãSoviet Union[4]
11     Minsk,ãSoviet Union[4]
12      Kiev,ãSoviet Union[4]
13    Moscow,ãSoviet Union[4]
14      Kiev,ãSoviet Union[4]
15      Zagreb,ãYugoslavia[4]
16    Moscow,ãSoviet Union[4]
17              Rome, Italy[4]
18        Perth, Australia[4]
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.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.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.

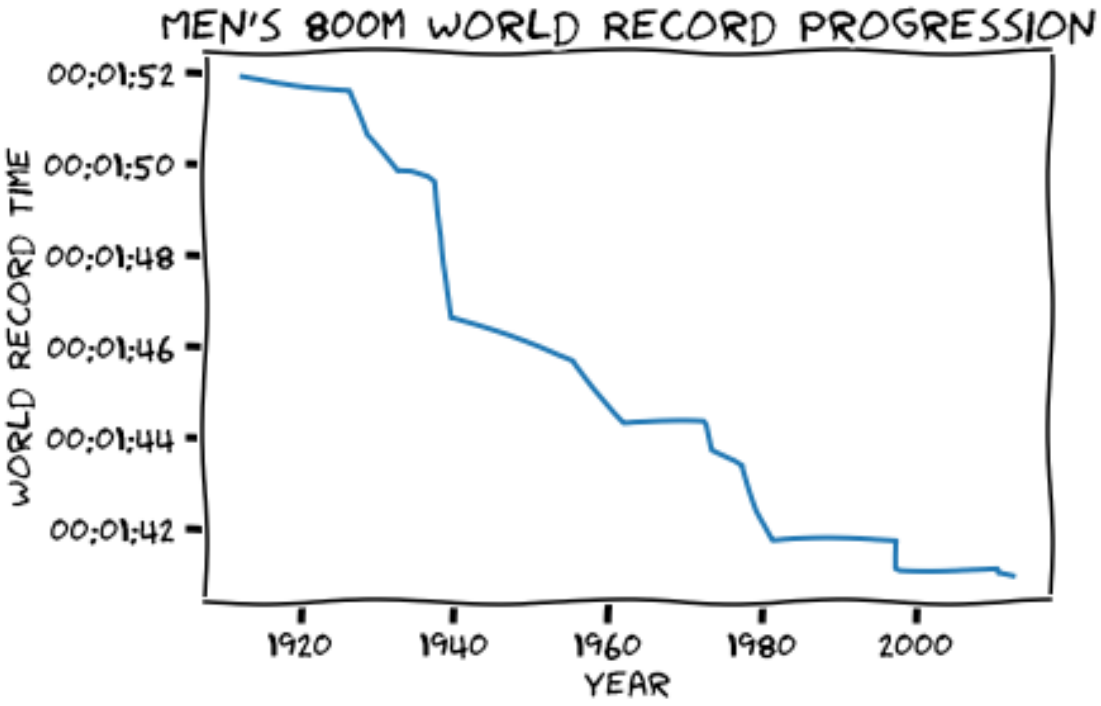
```
>>> import matplotlib.font_manager
>>> matplotlib.font_manager._rebuild()
```

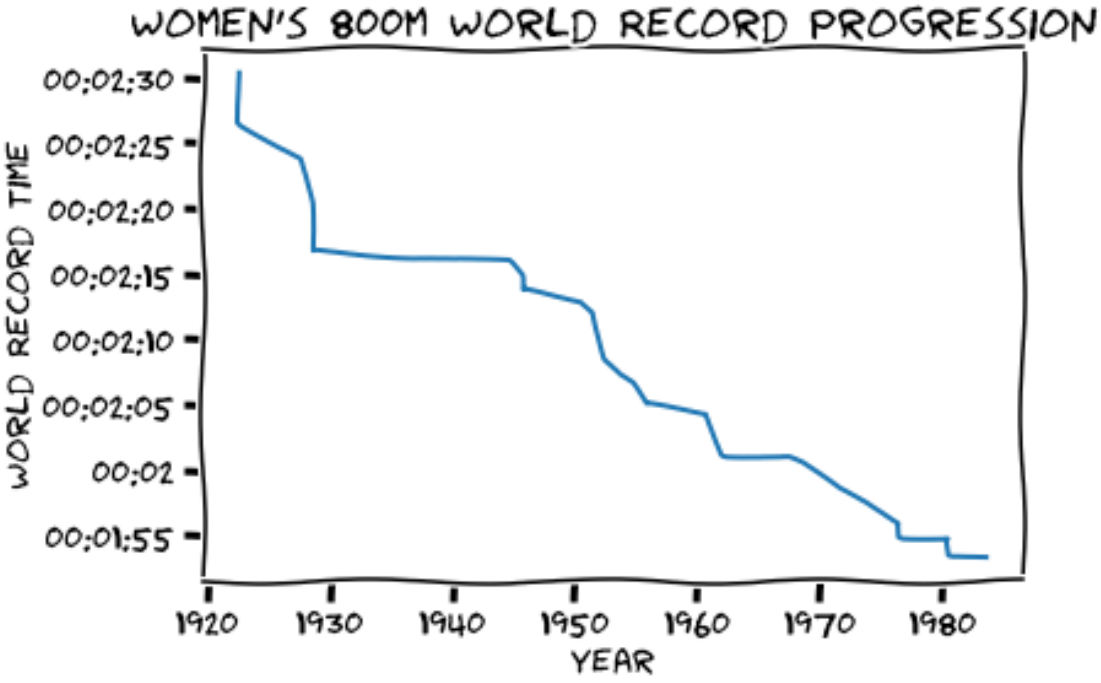
2) Note that I use `plt.xkcd()` in a `with` block. This ensures that your current context manager settings are not overridden and only these plots appear in the xkcd style. If you don't use a with block, you can reset to default using `plt.rcdefaults()`.

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

```
In [5]: # 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.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=18)
    ax.set_xlabel("Year", fontsize=14)
    ax.set_ylabel("World Record Time", fontsize=14)

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


MEN'S 800M WORLD RECORD PROGRESSION
WORLD RECORD TIME
00:01:52
00:01:50
00:01:48
00:01:46
00:01:44
00:01:42
1920
1940
1960
1980
2000
YEAR


WOMEN'S 800M WORLD RECORD PROGRESSION
WORLD RECORD TIME
00:02:30
00:02:25
00:02:20
00:02:15
00:02:10
00:02:05
00:02
00:01:55
1920
1930
1940
1950
1960
1970
1980
YEAR