

Marathon Results and Weather Conditions

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David Wagenhurst | Data Scientist

Project objective:

Estimate the average time it will take a division to complete a marathon based on the day's weather conditions.

The Events



ABBOTT WORLD MARATHON MAJORS MEMBER CITIES:



**TOKYO
MARATHON**



**VIRGIN
MONEY
LONDON
MARATHON**



**B.A.A.
BOSTON
MARATHON**



**BMW
BERLIN
MARATHON**

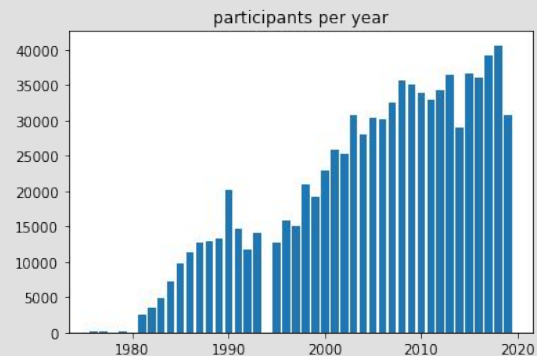
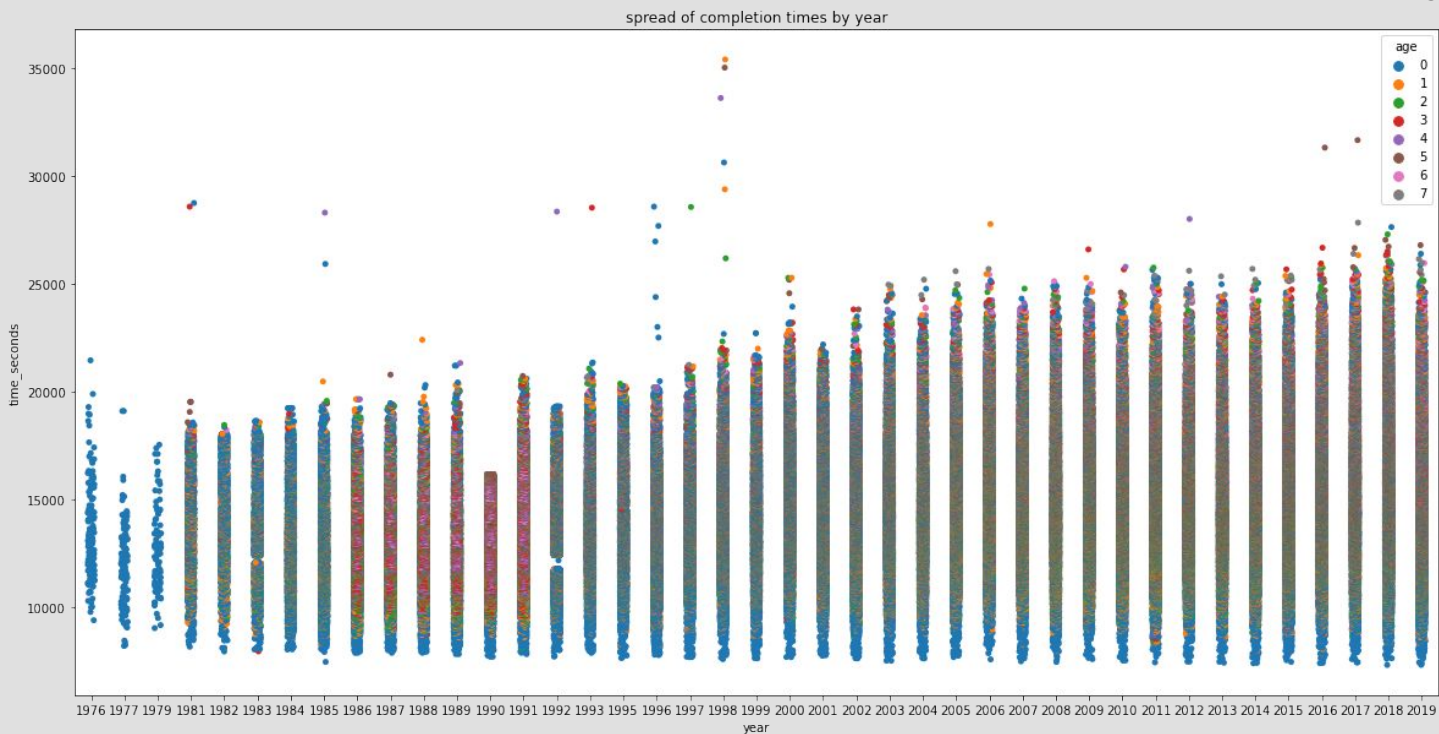


**BANK
OF AMERICA
CHICAGO
MARATHON**

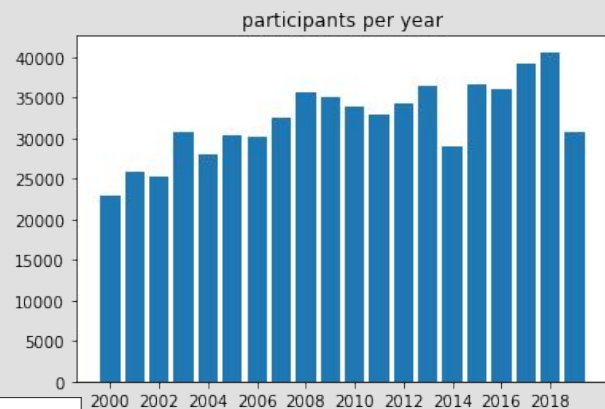
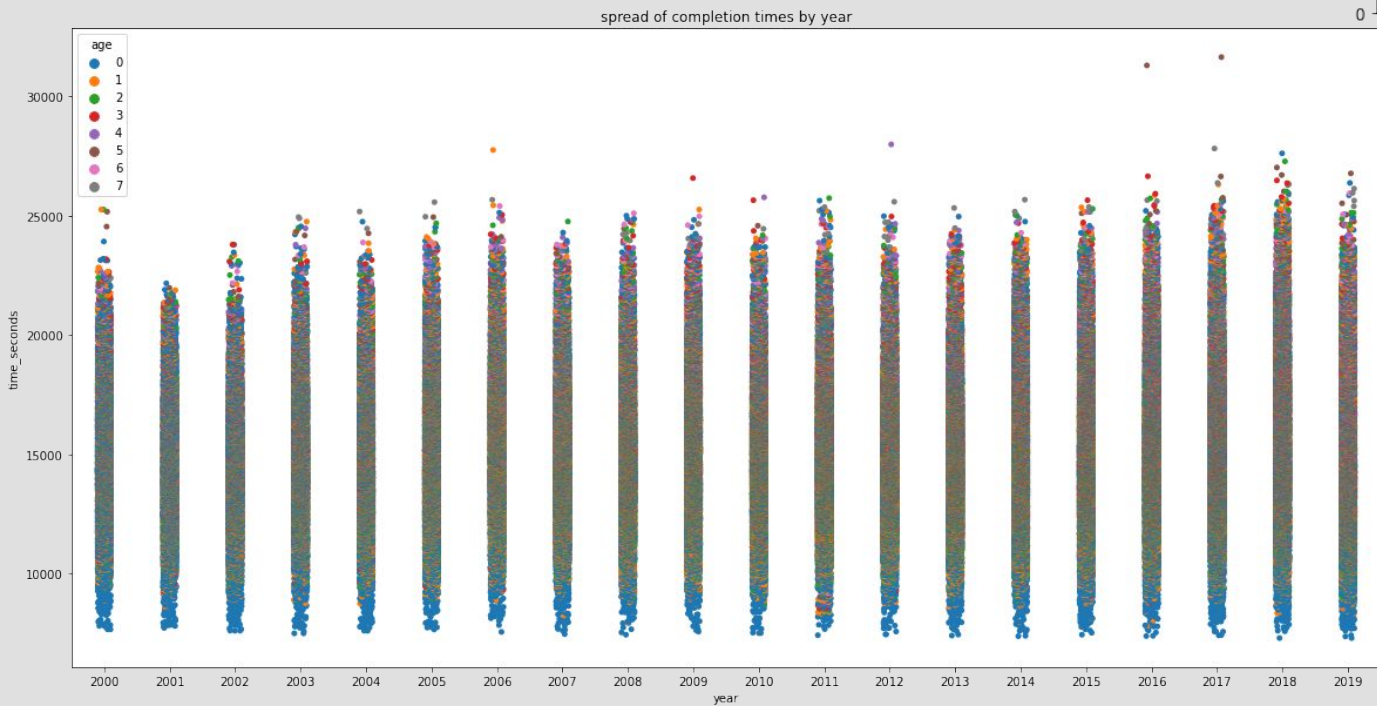


**TCS
NEW YORK
CITY
MARATHON**

Berlin Marathon (All Years)



Berlin Marathon (2000 Onward)



Features

Athlete

- Male or Female
- Age Group
 - 18-39
 - 40-44
 - 45-49
 - 50-54
 - 55-59
 - 60-64
 - 65-69
 - 70+

Weather Numerical

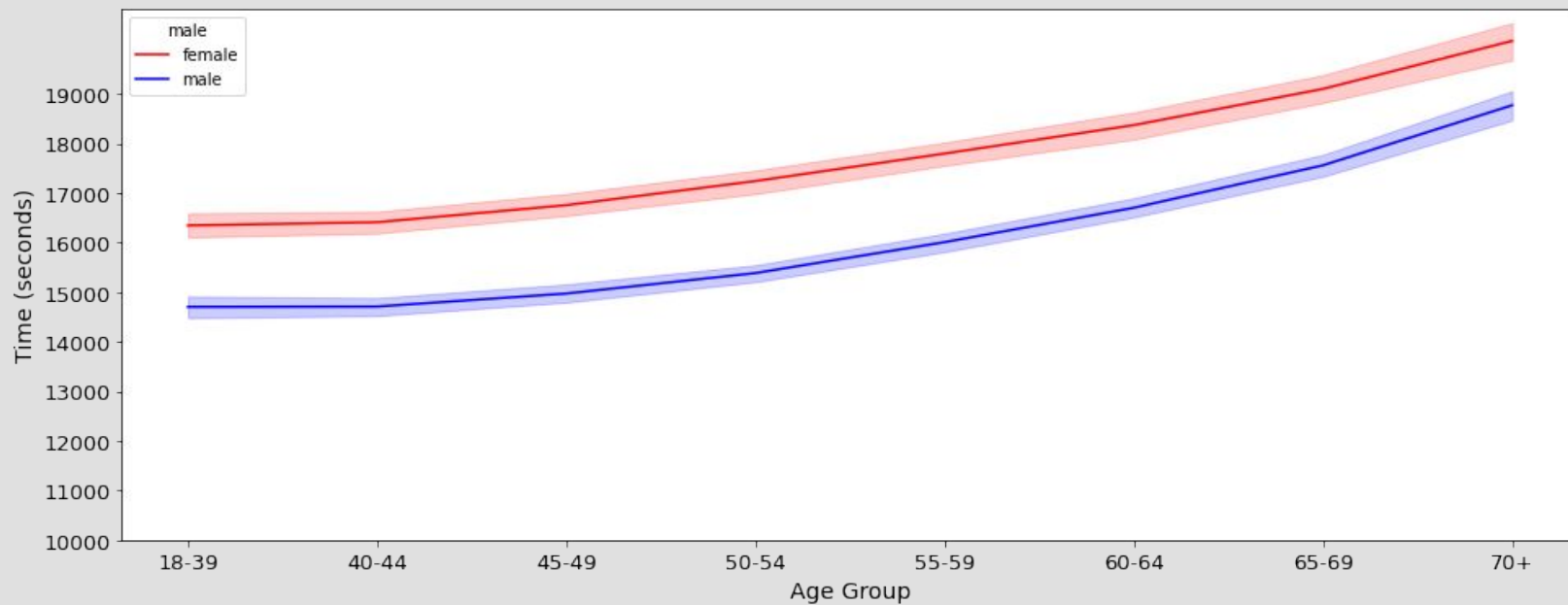
- Temperature
- Relative Humidity
- Wind Speed
- Precipitation
- Precipitation Cover
- Cloud Cover

Weather Categorical

- Clear
- Partially Cloudy
- Overcast
- Rain

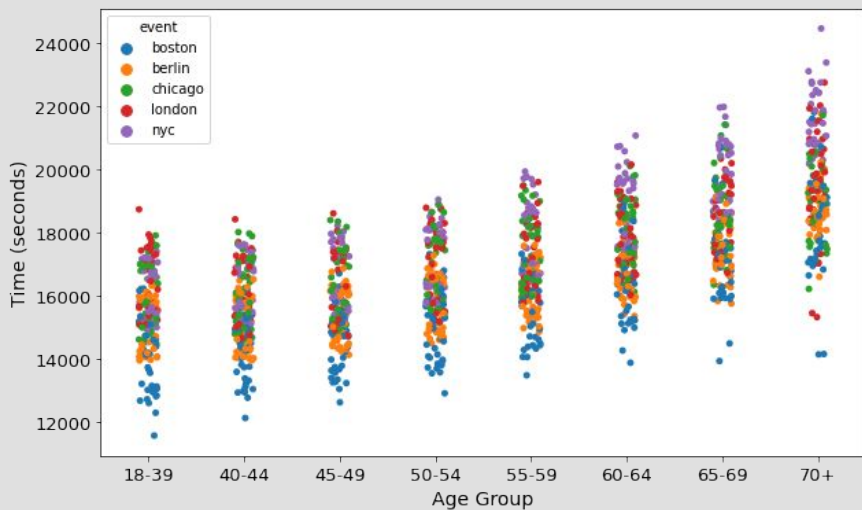
Gender

Distribution of marathon finish times (in seconds) by age group and gender

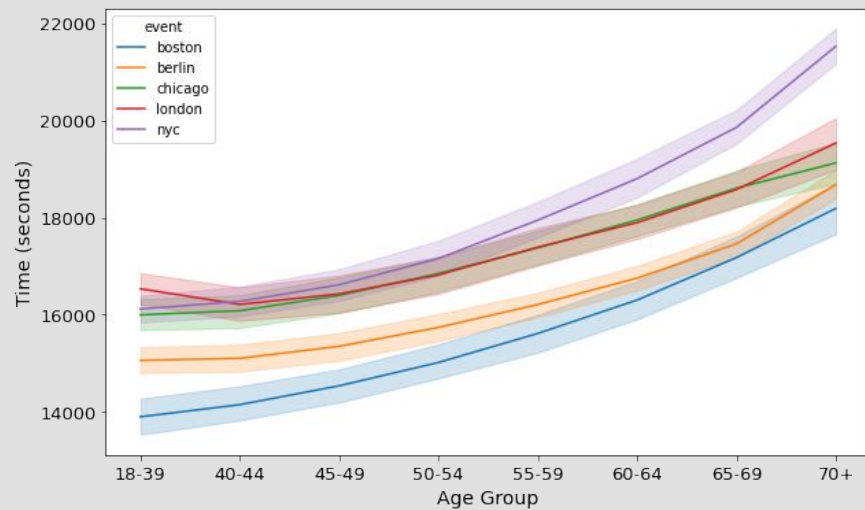


Age Groups

Distribution of marathon finish times (in seconds) by age group and event



Distribution of marathon finish times (in seconds) by age group and event



Model Performances (MAE)

	Linear	Ridge	Lasso	Elastic Net	XGBoost	GLM
Berlin	334	376	356	336	349	366
Boston	626	1072	1143	1048	1087	1024
Chicago	530	592	675	522	373	578
London	414	503	513	399	409	412
NYC	265	579	284	256	304	331
Combined	556	971	978	493	897	1146

What do the models actually tell us?

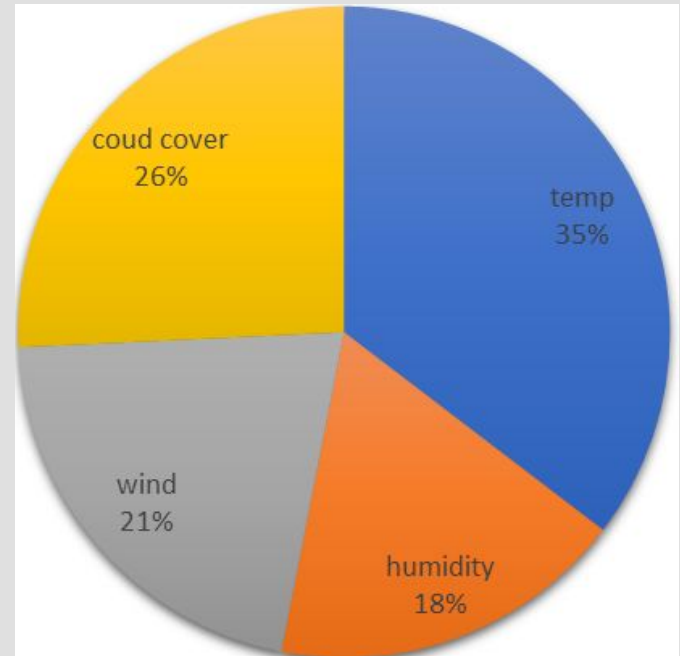
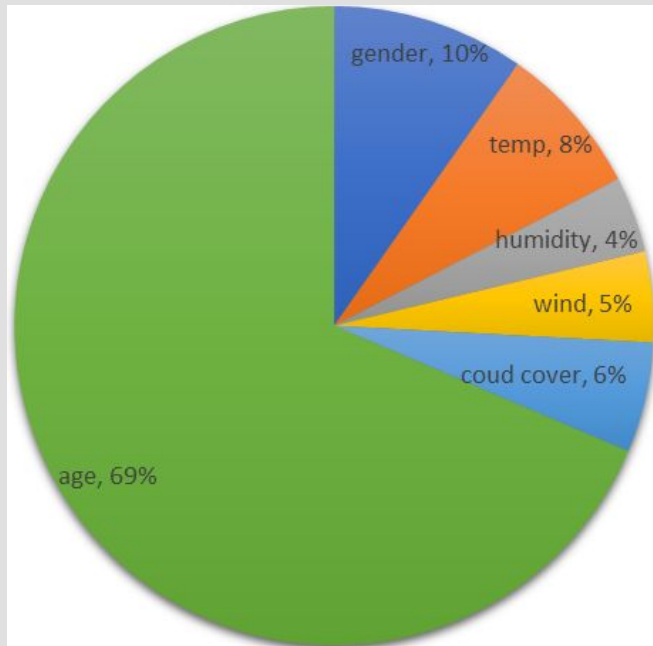
Athlete Coefficients

	Male	40-44	45-49	50-54	55-59	60-64	65-69	70+
Berlin	-1480	21	261	648	1104	1634	2309	3569
Boston	-1436	245	634	1121	1727	2379	3233	4174
London	-1880	-506	-285	0	558	1108	1729	2721
NYC	-1899	-89	299	827	1645	2496	3537	5090
Combined	-1643	-4	291	756	1355	1987	2753	3784

Weather Coefficients

	Temp (F)	Humidity (%)	Wind (mph)	Precipitation (in)	Cloud Cover (%)
Berlin	24	-6.57	7.43	0	-5.13
Boston	86	10.39	2.47	1795	-14.87
London	27	-12.46	38.3	0	-6.42
NYC	34	-3.38	6.18	0	12.74
Combined	49	-8.21	17.39	0	3.5

Chicago



What's Next?

1. Account for changes in elevation / altitude
2. Additional years for greater variety in weather conditions
3. Find the curve that temperature follows

World Marathon Majors: Course Profiles



**All values are approximate and based off a sample of barometric data taken from Strava*

Streamlit