Weather in Chicago

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Capstone Technical Report

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Data science objectives:

i. Does Rain have an effect on the average daily water temperature?

ii. What effect does rain have on the average daily temperature near the water?

iii. What effect does rain have on the average daily temperature far from the water?

iv. When it rains, is there a statistically significant difference between the amount of rain that falls in downtown Chicago compared to the Ohare airport?

v. How much correlation exists between the average daily temperature of Lake Michigan and the temperature difference between the downtown Chicago area and the Ohare airport?

vi. Can we build a model that predicts with at least 80% accuracy the difference in total precipitation between Ohare airport and the the Botanical gardens?

vii. Is there any statistically significant difference between the daily temperature near the water as apposed to far from the water?

Data:

Links

Data Dictionary

Bouy Data Dictionary

O'Hare Airport Data Dictionary

Botanical Garden Data Dictionary

"The five core values are:"

ohare_prcp - Precipitation (PRCP) (inches)

ohare_snfall - Snowfall (SNOW) (inches)

ohare_sndpth - Snow depth (SNWD) (inches)

ohare_maxtmp - Maximum temperature (TMAX) (Fahrenheit)

ohare_mintmp - Minimum temperature (TMIN) (Fahrenheit)

Other Features

lake-temp - Average Daily Surface Water Temperature for Lake Michigan (Fahrenheit)

garden_prcp - Precipitation (PRCP) (inches)

garden_maxtmp - Maximum temperature (TMAX) (Fahrenheit)

garden_mintmp - Minimum temperature (TMIN) (Fahrenheit)

garden_tobs - Temperature at time of observation (TOBS) (Fahrenheit)

ohare_wspd - Average daily wind speed (AWND) (miles per hour)

ohare_atmp - Average Temperature (TAVG) (Fahrenheit)

ohare_w2dir - Direction of fastest 2-minute wind (WDF2) (the direction the wind is coming from in degrees clockwise from true N)

ohare_w2spd - Fastest 2-minute wind speed (WSF2) (miles per hour)

Feature Engineering

target - absolute difference between the precipitation measurements at Ohare and the garden (ohare_prcp - garden_prcp)

garden_didrain - categorical, 1 for yes, 0 for no

ohare_didrain - categorical, 1 for yes, 0 for no

garden_medtmp - Median daily temperature at the Garden/ midpoint between the max and min temperatures ((garden_maxtmp + garden_mintmp)/2)

ohare_medtmp - Median daily temperature at ohare/ midpoint between the max and min temperatures ((ohare_maxtmp + ohare_mintmp)/2)

tmpdiff - difference between the median temperatures at ohare and the garden (ohare_medtmp - garden_medtmp)

Data Cleaning/Data Manipulation/EDA:

Models and Evaluation:

Model	Training score	Testing score	Training MSE	Testing MSE	cross validation
Linear no poly	0.0825	0.1052	0.0933	0.0683	0.0785
Linear gs	0.1222	0.1329	0.0893	0.0662	0.0984
Decision Tree	0.1139	0.0691	0.0901	0.0711	0.0429
Decision Tree gs	0.0937	0.0584	0.0922	0.0719	0.0450
Random Forest	0.8614	0.0517	0.0134	0.0724	0.0554
Random Forest	0.8711	0.1078	0.0131	0.0681	0.0770
Random Forest gs	0.8658	0.0905	0.0136	0.0694	0.0651
Random Forest	0.8677	0.0682	0.0135	0.0711	0.0660
Random Forest	0.8704	0.1153	0.0132	0.0676	0.0767
Random Forest	0.8080	0.0957	0.0195	0.0690	0.0787
Random Forest ada	0.9547	0.0549	0.0331	0.0722	0.0331
Random Forest ada	0.9445	0.0525	0.0056	0.0723	0.0283
Random Forest bag	0.6735	0.1130	0.0332	0.0677	0.0928
Random Forest bag	0.6705	0.1239	0.0335	0.0669	0.0943