

Iron Insight

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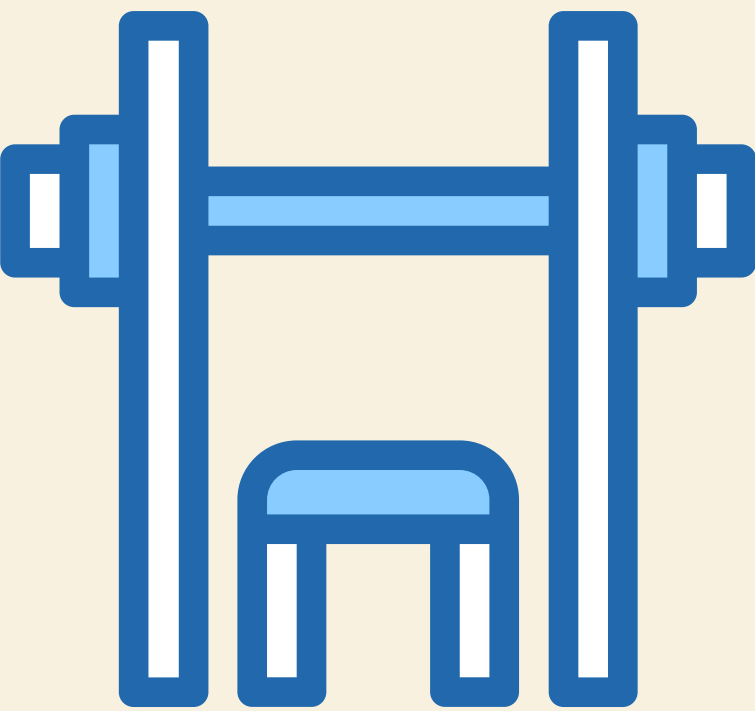
Problem Space

The Problem

- Lifters' perceptions are distorted from social media and performance enhancing drugs (PEDs)
- Lifters often feel discouraged with progress
- We aim to provide realistic predictions of progression

How does our approach differ from others?

- Most predict 1 rep max and assign a percentile
 - We predict an increase in bench over an interval
- Most use user-entered data, allowing for PEDs and false data
 - Our model uses official competition data with a tested/untested feature



Approach

Main approach

- KNN with regression
 - Fit a regression for each lifter
 - Scale / OHE features
 - Fit ball tree
 - Find k nearest lifters, average the results of their regressions

Other approaches

- Plain regression
 - Worked decent for smaller time frames, but struggled long term (under predicting)
 - Failed to capture variance in lifters
- Neural Network
 - Worked ok for smaller values but as the predicted values increased the model had higher variance and usually underestimated higher values

Raw Data						
	BestBench	Sex	StartBench	StartAge	StartWeight	DaysAfterStart
0	[130.0, 145.0]	M	130.0	27.5	72.50	[0, 184]
1	[165.0, 185.97, 155.0, 195.0, 195.0]	M	165.0	21.5	92.00	[0, 266, 441, 749, 749]
2	[170.0, 182.5]	M	170.0	22.5	116.40	[0, 182]
3	[65.0, 75.0]	F	65.0	22.5	62.40	[0, 364]
4	[100.0, 105.0, 112.5, 125.0]	M	100.0	18.5	71.50	[0, 180, 364, 878]
...
161540	[162.5, 182.5, 182.5]	M	162.5	20.5	122.95	[0, 714, 714]
161541	[95.0, 95.0]	M	95.0	19.5	61.55	[0, 183]
161542	[140.0, 135.0]	M	140.0	19.5	83.00	[0, 364]
161543	[120.0, 152.5, 160.0]	M	120.0	44.0	86.90	[0, 1294, 1609]
161544	[100.0, 95.0, 100.0, 100.0]	M	100.0	68.5	73.15	[0, 364, 728, 1078]

KNN Data

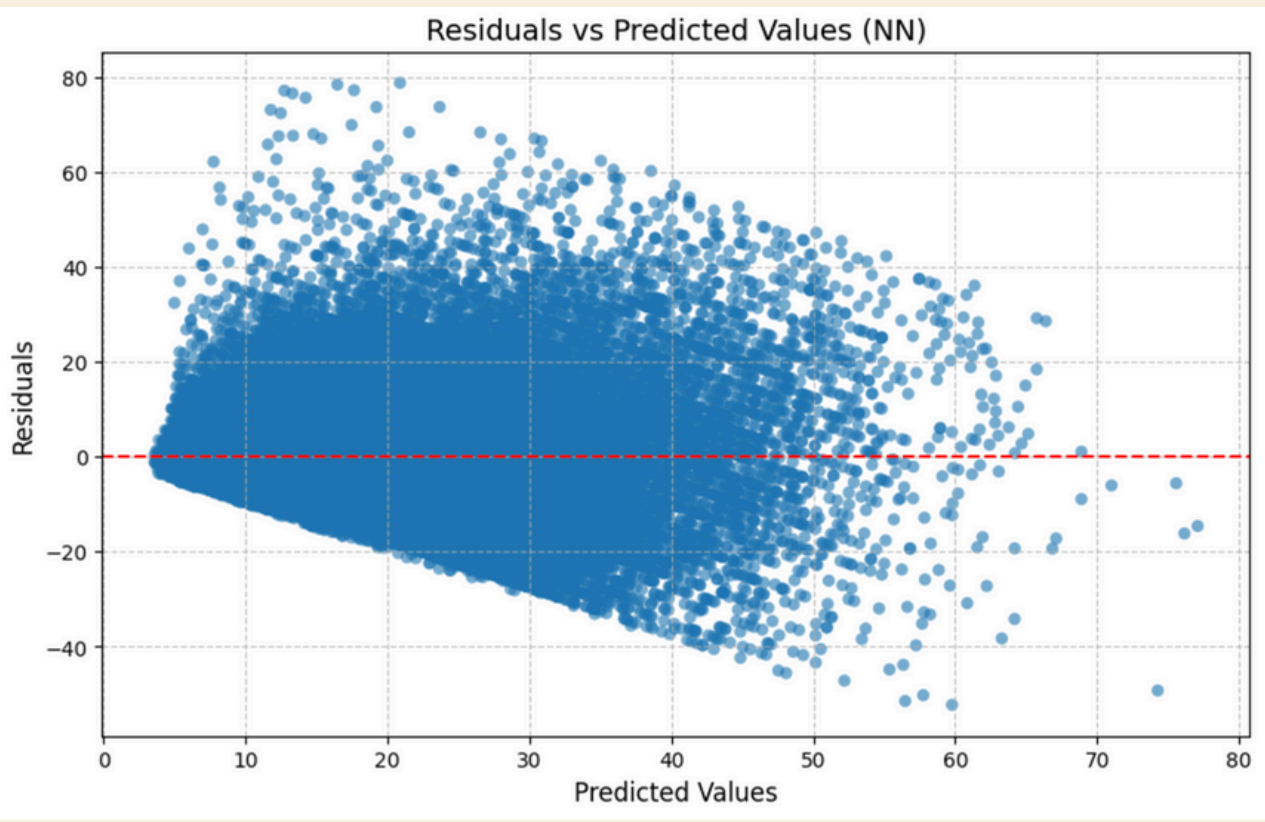
Raw Data						
	Name	Sex	Event	...	MeetTown	MeetName
0	E.S. Denisenko	F	B	...	Luninets	Bison Power Cup
1	I.S. Lebetzkaya	F	B	...	Luninets	Bison Power Cup
2	K. Yakimovich	F	B	...	Luninets	
3	A.G. Golneva	F	B	...	Luninets	
4	E.V. Marunevskaya	F	B	...	Luninets	
...	
3290030	Ibrahim Sandogji	M	SBD	...	Riyadh	The Kingdom Classi
3290031	Feras Alwahhabi	M	SBD	...	Riyadh	The Kingdom Classi
3290032	Musab Alessa	M	SBD	...	Riyadh	The Kingdom Classi
3290033	Ali Alholan	M	SBD	...	Riyadh	The Kingdom Classi
3290034	Alfarooq Eissa	M	SBD	...	Riyadh	The Kingdom Classi
...
726477	Mostafa Ali Alfaky	M	35.0	146.3	120.0	155.0
726478	Ibrahim Sandogji	M	17.0	64.4	66.0	120.0
726479	Feras Alwahhabi	M	17.0	82.9	83.0	112.5
726480	Musab Alessa	M	17.0	91.3	93.0	130.0
726481	Alfarooq Eissa	M	18.0	157.3	120.0	130.0

Cleaned Data

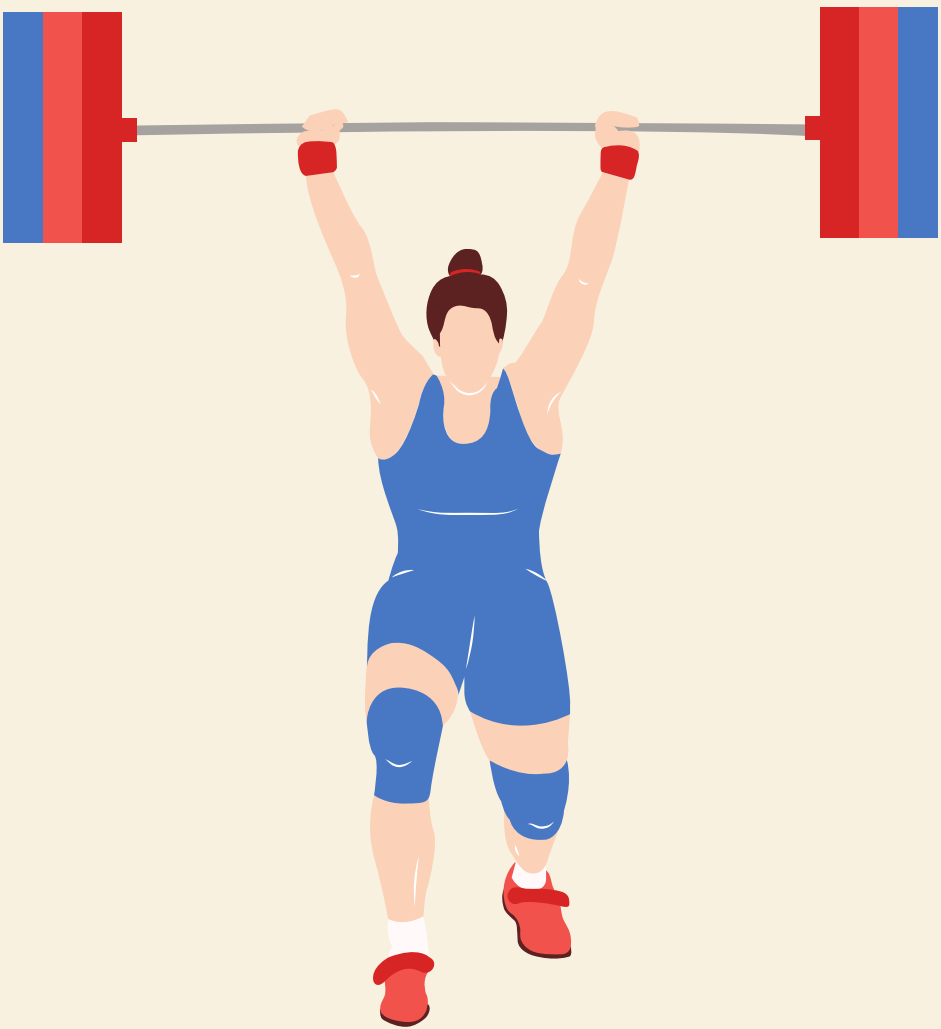
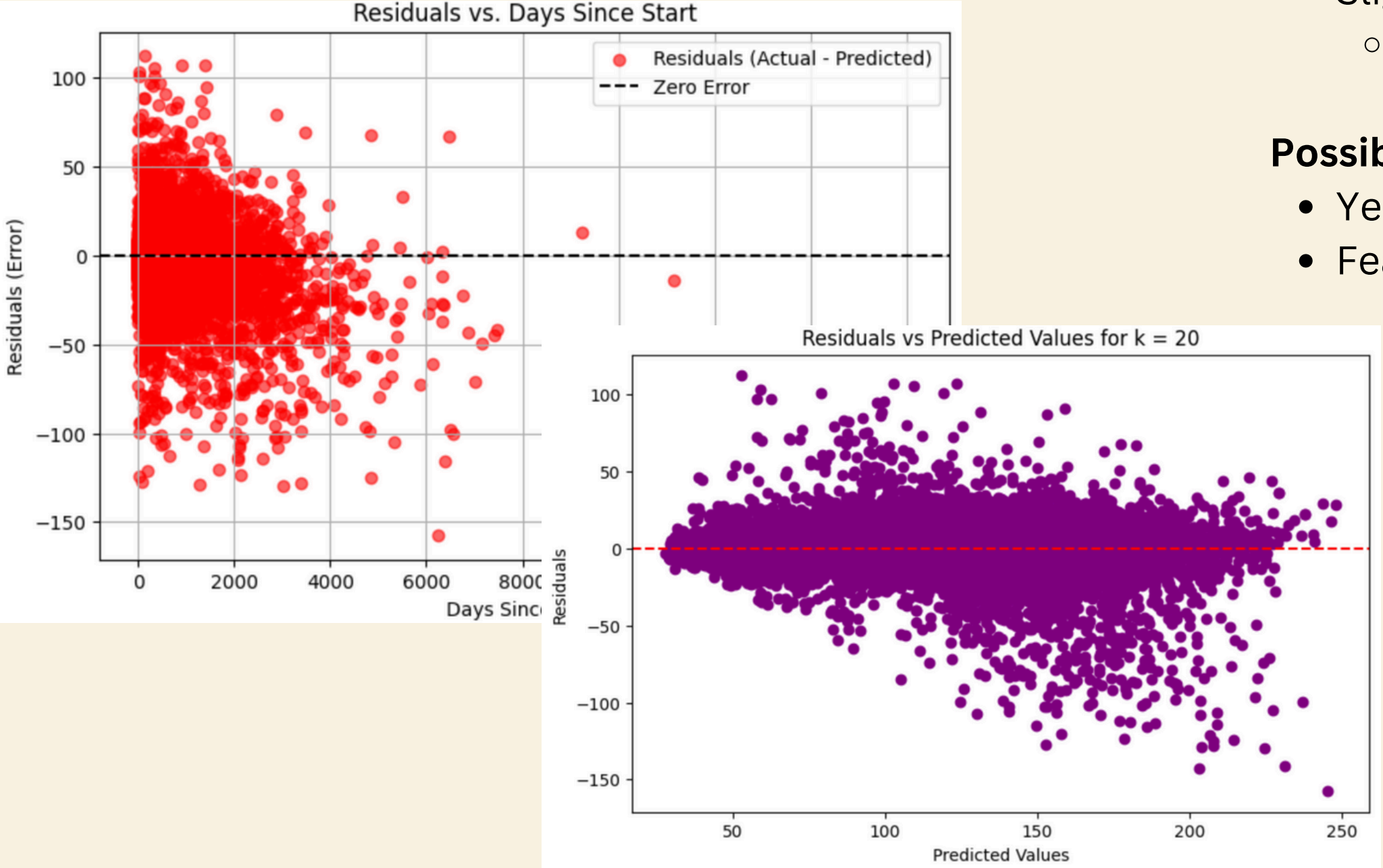
Results

KNN

- RMSE: 11.6756
- MAPE: 6.81%
- Average Error: 6.6611



NN Results



Discussion

How did our model do?

- Error of +/- 6.6611 kg exceeded our expectations
- The model performed best in the 0 to 2000 days (5.48 years) window

Issues

- Accuracy suffered after 4000 days (10.96 years)
- Slight negative linear trend in residuals vs predicted
 - Model tends to over predict

Possible improvements

- YearsTrained feature
- Features such as Diet, AverageSleep, TrainingProgram

