








Technical Interview

Interviewee: Nathan Phillips

https://github.com/nmp-dsci/aal_technical

A bit about me

- ~6 years experience with unique combination of skills in analytics, app development and data engineering.
- **Passionate** about data science, but what really excites me is using data/programming to add value for customers.
- In my **last couple of roles**, I've prioritised learning and challenging myself with the best opportunity regardless of difficulty.
- Hobbies: surfing/programming

Data Science Experience			
timeline	Analytics	Modelling	Engineering
 Neilsen	✓		
 Quantum	✓	✓	
 Allianz	✓	✓	
 Hyperanna	✓		✓
 Ubicar	✓		✓

Data exercise Questions to solve

The data exercise questions:

1. What are some important indicators of whether a patient will be readmitted?
2. What could the hospital system do with this information?

I have interpreted this as a solution for:

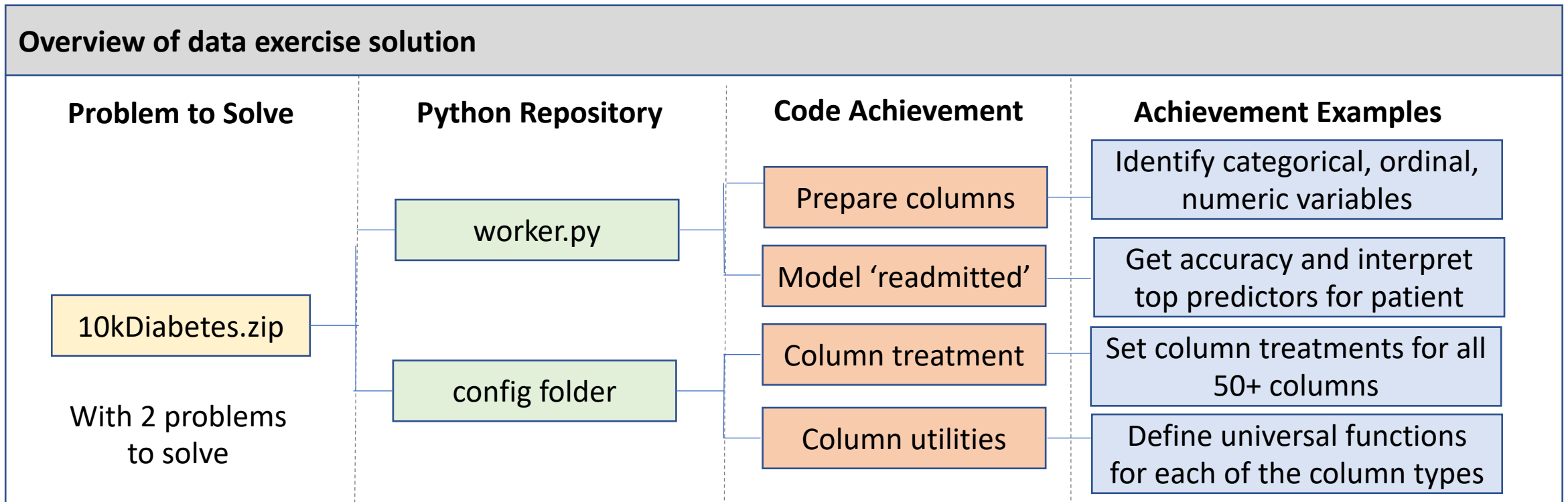
1. Identify the top indicators that a patient will be re-admitted
2. With the identified top indicators, build cases for how the hospital system could act on these insights to reduce 're-admission' rates in the future.

High Level Solution

All work can be reviewed/recreated on github: https://github.com/nmp-dsci/aal_technical

Feel free to review the entire solution in repository

Overview of data exercise solution



Question 1: Top Indicators

After processing all columns into numeric values for predictive power testing (including character open response), the top 4 are on the graphic to the left.

Using these 4 predictors to base a decision on we can account for **65.5%** of all patients that were re-admitted.

Dictionary:

Rule: rule applied to field to isolate effect.

Re-admission: rate of readmission based on rule for this column.

Lift: Comparing the column rule re-admission rate to overall 39.7%

Top Indicators for 'readmission' rate	
number_inpatient Rule: values ≥ 1 Re-admission: 55.8% Lift: 1.4x more likely to return to hospital	number_diagnoses Rule: values ≤ 5 Re-admission: 27.8% Lift: 0.7x less likely to return to hospital
num_lab_procedures Rule: > 60 Re-admission: 47.9% Lift: 1.2x more likely to return	num_medications Rule: ≤ 7 Re-admission: 31.0% Lift: 0.78x

39.7%

Question 2: Use Case for Hospital

With these 4 predictors alone we can guide the Hospital System with a rule based system to significantly reduce patient re-admissions down from 39.7%.

However to fully estimate the value add from this, we need:

- **Days stayed upon readmission**
- Recommended **additional days** to keep patient.

lab	inpatient	diagnoses	meds	re-admission	patients	rule
0	0	0	0	37.6%	3641	
0	0	0	1	34.6%	459	
0	0	1	0	23.7%	1413	release
0	0	1	1	21.4%	547	release
0	1	0	0	55.7%	1361	keep
0	1	0	1	52.9%	121	keep
0	1	1	0	45.0%	307	keep
0	1	1	1	37.9%	66	
1	0	0	0	44.5%	1124	keep
1	0	0	1	31.4%	51	release
1	0	1	0	30.4%	247	release
1	0	1	1	32.2%	59	release
1	1	0	0	65.9%	510	keep
1	1	0	1	50.0%	16	keep
1	1	1	0	59.2%	71	keep
1	1	1	1	42.9%	7	



Thank you

Technical details here:

https://github.com/nmp-dsci/aal_technical