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 and programming

Data Science Experience

timeline	Analytics	Modelling	Engineering
Neilsen	✓		
Quantium	✓	✓	
Allianz	✓	✓	
Hyperanna	✓		✓
Ubicar	✓		✓

‘Data Exercise’

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?

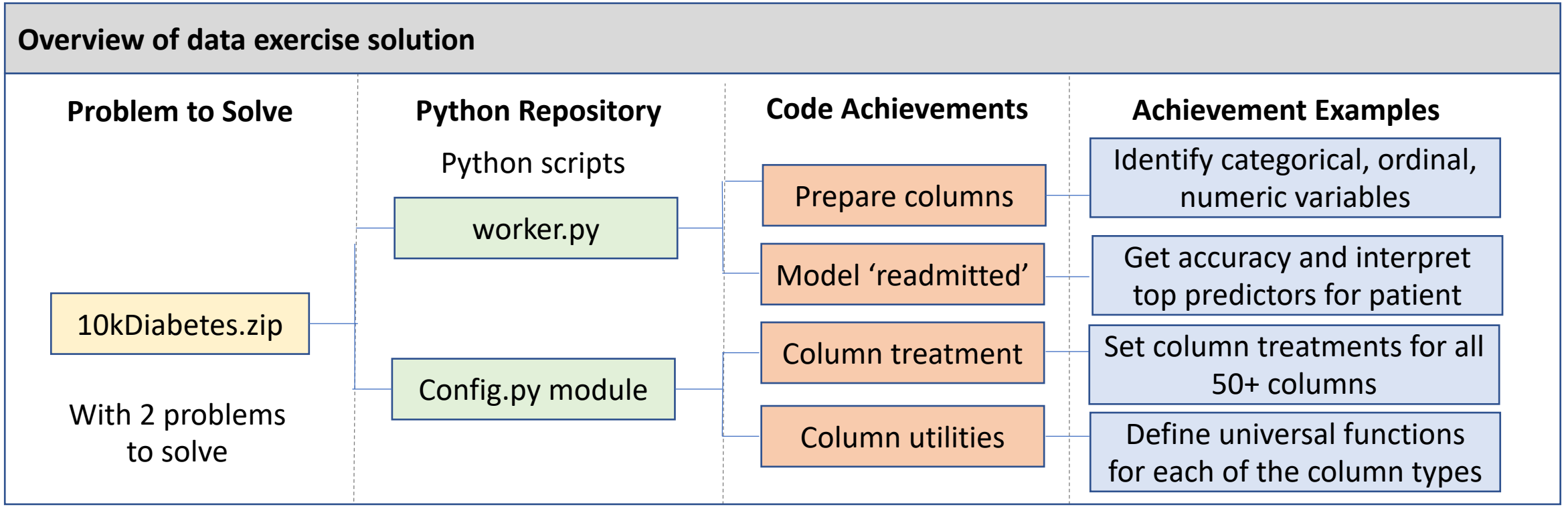
I have interpreted this as a solution for:

1. Identify the top indicators that we identify a patient that will be re-admitted hospital
2. With the identified top indictors, build a use case 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



Question 1: Top Indicators for re-admission

After processing all columns into numeric values for predictive power testing (including character open response), the graphic to the right shows the top indictors for patient re-admission.

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
Current re-admission rate **39.7%**	
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

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 below 39.7%.

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

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

Table dictionary

- **Rule**: recommendation for Hospital to keep/release a patient given information

lab	inpatient	diagnoses	meds	re-admission	patients	rule
0	0	0	0	37.6%	3,641	
0	0	0	1	34.6%	459	
0	0	1	0	23.7%	1,413	release
0	0	1	1	21.4%	547	release
0	1	0	0	55.7%	1,361	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%	1,124	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:

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