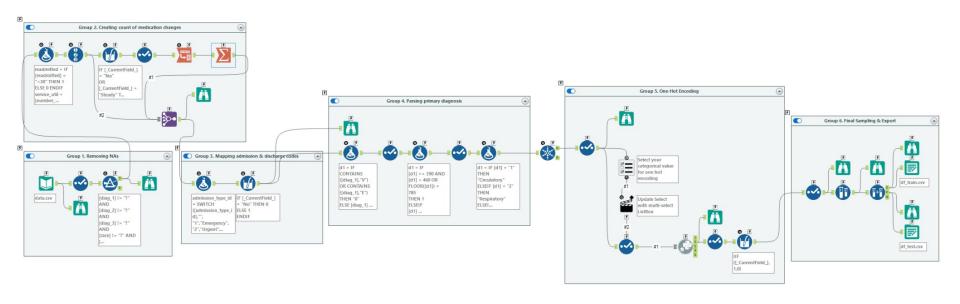
Analytics with **Alteryx**: (Failing at) Classifying **Diabetes Readmission**

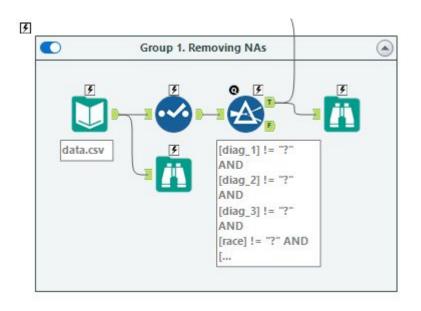
Executive Summary

- While can perform ingestion, engineering, and preliminary modeling using **Alteryx** to classify **diabetes** patients' **readmission** under **30** days, due to technical limitations we cannot assess any model performance. Additionally, model training is extremely slow.
- Candidate models:
 - Logistic Regression (built)
 - Gradient Boosted Model (built)
 - Random Forest (built)
 - L/M/R/S Support Vector Machine (failure)
 - Single Layer Perceptron (failure)
- Final models at-a-glance:
 - Performance unassessed. Model Comparison Tool has non-zero exit code.

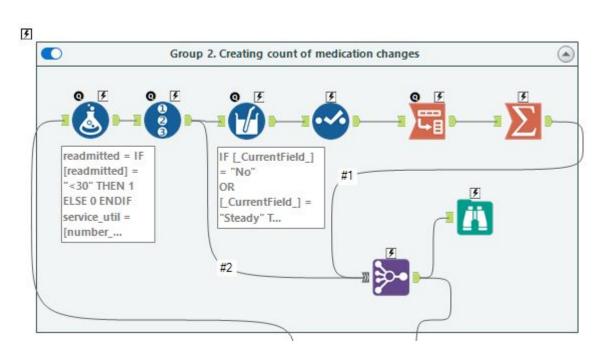
Research Mission

- To develop a model that:
 - Uses aggregated claims data from medical providers to:
 - Classify patients at risk of readmission under 30 days of discharge.

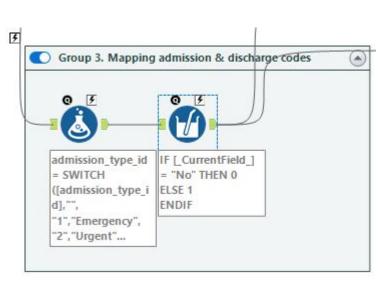




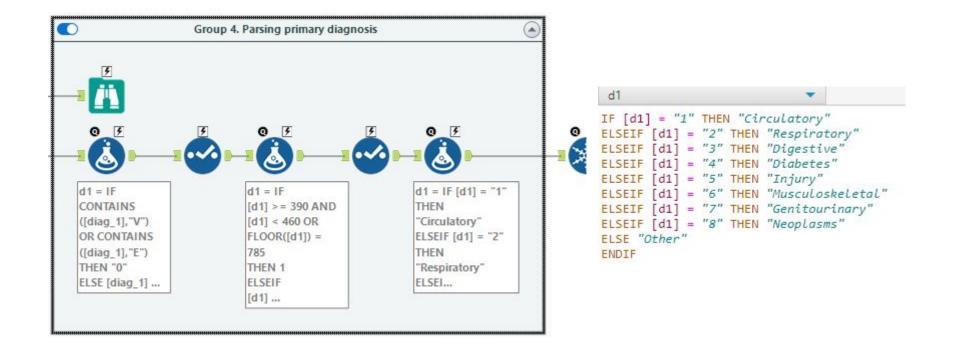
```
[diag_1] != "?" AND
[diag_2] != "?" AND
[diag_3] != "?" AND
[race] != "?" AND
[gender] != "Unknown/Invalid" AND
[discharge_disposition_id] != "11" AND
[discharge_disposition_id] != "19" AND
[discharge_disposition_id] != "20" AND
[discharge_disposition_id] != "21"
```

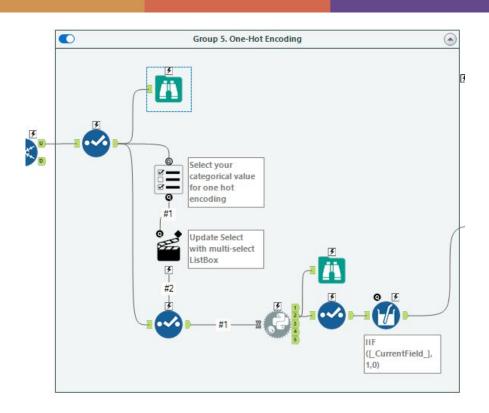


TE Inead	d mitted] = '	1/20"	THEN 1	ELSE O	ENDTE	
II [I eau	mirced] -	130	ITIEN I	LLSL 0	LNDI	
Data type:	V_String	~	Size:	254	100	
service_ut			€			
_	10 Veleno - 1410	Wey To V				
number_	outpatient]	+[num	ber_em	ergency]	+[number_i	npatier
	116			5	-	
Data type:	Int16	_	Size:	2	-	
age						
	- "[70-80]	" THE				
	= "[70-80)	" THE	N "70	and up		
[F [age]				and up"		
[F [age]	age] = "[50	9-60)"				
[F [age]		9-60)"				
IF [age] ELSEIF [DR [age]	age] = "[56 = "[60-70)	9-60)" I" THE				
[F [age] ELSEIF [OR [age]	age] = "[50	9-60)" I" THE				
[F [age] ELSEIF [DR [age] ELSE "50	age] = "[56 = "[60-70)	9-60)" I" THE				
IF [age] ELSEIF [OR [age] ELSE "50 ENDIF	age] = "[50 = "[60-70) and under'	9-60)" I" THE	N "50	to 70"		
IF [age] ELSEIF [OR [age] ELSE "50 ENDIF Data type:	age] = "[50 = "[60-70) and under' V_String	9-60)" I" THE	N "50			
IF [age] ELSEIF [OR [age] ELSE "50 ENDIF	age] = "[50 = "[60-70) and under' V_String	9-60)" I" THE	N "50	to 70"	-	
ELSEIF [DR [age] ELSE "50 ENDIF Data type: max_glu_s	age] = "[56 = "[60-70) and under' V_String	9-60)" " THE	Size:	to 70"	and un"	
IF [age] ELSEIF [OR [age] ELSE "50 ENDIF Data type: max_glu_s IF [max_	age] = "[56 = "[60-70) and under' V_String serum glu_serum]	9-60)" " THE	N "50 Size:	254 HEN "200		m#.
IF [age] ELSEIF [DR [age] ELSE "50 ENDIF Data type: max_glu_s IF [max_ ELSEIF [age] = "[50 = "[60-70] and under" V_String serum glu_serum] max_glu_ser	9-60)" THE	N "50 Size:	254 HEN "200		p"
IF [age] ELSEIF [DR [age] ELSE "50 ENDIF Data type: max_glu_s IF [max_ ELSEIF [ELSE [max]	age] = "[56 = "[60-70) and under' V_String serum glu_serum]	9-60)" THE	N "50 Size:	254 HEN "200		p"
IF [age] ELSEIF [DR [age] ELSE "50 ENDIF Data type: max_glu_s IF [max_ ELSEIF [ELSE [max]	age] = "[50 = "[60-70] and under" V_String serum glu_serum] max_glu_ser	9-60)" THE	N "50 Size:	254 HEN "200		p"
IF [age] ELSEIF [DR [age] ELSE "50 ENDIF Data type: max_glu_s IF [max_ ELSEIF [ELSE [max]	age] = "[50 = "[60-70] and under" V_String serum glu_serum] max_glu_ser	9-60)" THE	N "50 Size:	254 HEN "200		p"
IF [age] ELSEIF [DR [age] ELSE "50 ENDIF Data type: max_glu_s IF [max_ ELSEIF [age] = "[50 = "[60-70] and under" V_String serum glu_serum] max_glu_ser	9-60)" THE	N "50 Size:	254 HEN "200		р"
LSEIF [age] LSEIF [age] LSE "50" NDIF Data type: max_glu_s F [max LSEIF [max_ LSEIF [max_ LSEIF [max_ LSEIF [max_ LSEIF] LSEIF [max_ LSEIF [max_ LSEIF] LSEIF [max_ LSEIF] LSEIF [max_ LSEIF]	age] = "[56 = "[60-70] and under' V_String serum glu_serum] max_glu_ser x_glu_serum	9-60)" THE	Size: 200" TI = ">30	254 HEN "200 0" THEN		p"
ELSE "50 ENDIF Data type: max_glu_s ELSE [max_glu_s ELSEIF [max_glu_	age] = "[56 = "[60-70] and under' V_String serum glu_serum] max_glu_ser x_glu_serum	9-60)" THE	Size: 200" TI = ">30	254 HEN "200		p"



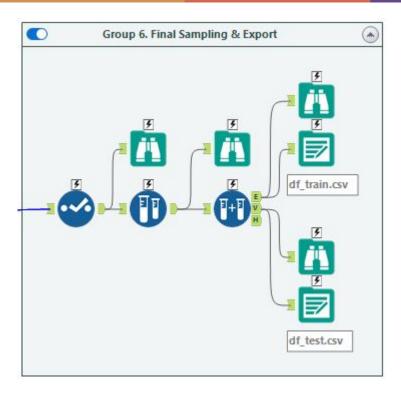
```
admission_type_id
                                      admission source id
                                                                              change
SWITCH([admission_type_id],"",
                                      SWITCH([admission_source_id],"",
"1", "Emergency",
                                                                            IF [change] = "No" THEN 0
                                      "1", "Referral",
"2","Urgent",
                                      "2", "Referral",
                                                                            ELSE 1
"3", "Elective",
"4", "Other",
                                      "3", "Referral",
                                                                            ENDIF
"5", "Other",
                                      "4", "Transfer",
"6", "Other",
                                      "5", "Transfer",
"7", "Other",
                                      "6", "Transfer",
"8", "Other")
                                      "7". "ER or Trauma".
Data type: V_String
                                      "8"."Other".
                     ▼ Size: 254
                                     "9", "Other",
                                                                                         V String
                                                                                                              Size:
                                                                             Data type:
 discharge_disposition_id
                                      "10", "Transfer",
SWITCH([discharge disposition id], "",
                                     "11", "Other",
                                                                              diabetesMed
"1", "Home",
                                      "12", "Other",
"2", "Another Facility",
                                      "13", "Other",
                                                                            IF [diabetesMed] = "No" THEN 0
"3", "Another Facility",
                                      "14", "Other",
"4", "Another Facility",
                                                                            ELSE 1
                                     "15", "Other",
"5", "Another Facility",
                                                                            ENDIF
"6", "Home",
                                      "17", "Other",
                                      "18". "Transfer".
"7", "Other",
"8". "Nursing Home or Hospice".
                                      "19". "Readmission".
"9", "Other",
                                      "20", "Other",
"10", "Other",
                                      "21", "Other",
"12", "Other",
                                      "22", "Transfer",
"13", "Nursing Home or Hospice",
                                                                                         V String
                                                                                                               Size: 254
                                      "23", "Other",
                                                                             Data type:
"14" "Nursing Home or Hospice".
                                      "24", "Other",
"15", "Another Facility",
"16", "Another Facility",
                                      "25", "Transfer",
                                                                              A1Cresult
"17", "Another Facility",
                                     "26", "Transfer")
"18", "Unknown",
                                                                            SWITCH([A1Cresult], "None",
                                     Data type: V_String
"22", "Another Facility",
                                                                            ">7", "Pre-Diabetes",
"23", "Another Facility",
                                                                            ">8", "Diabetes",
"24", "Another Facility",
                                      gender
"25", "Unknown",
                                                                             "Norm", "Normal")
                                     IF [gender] = "Male" THEN 1
"26", "Unknown",
                                     ELSE 0
"27", "Another Facility",
"28", "Another Facility",
                                     ENDIF
"29", "Another Facility")
                                                                                        V String
                                                                                                              Size: 254
                                                                            Data type:
Data type: V_String
                    ▼ Size: 254
```

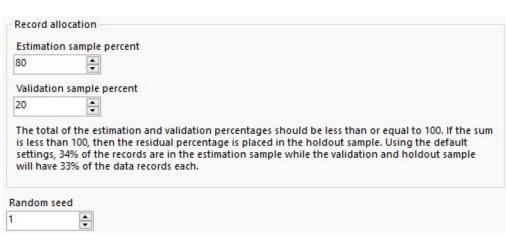




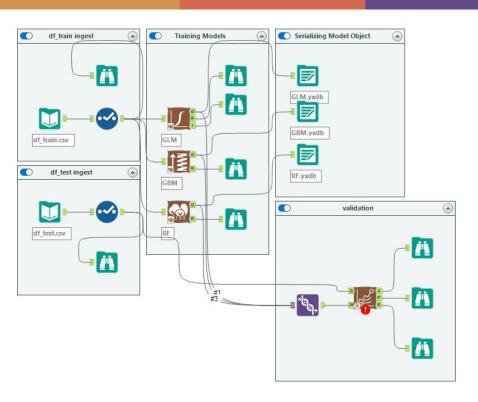
✓ race African American race_Asian race Hispanic race Other age 50 and under age 50 to 70 age 70 and up admission_type_id_Emergency admission_type_id_Other admission_type_id_Urgent discharge disposition id Another Facility discharge_disposition_id_Nursing Home or Hospice discharge disposition id Other discharge_disposition_id_Unknown admission source id ER or Trauma admission source id Other admission source id Transfer d1 Diabetes d1 Digestive d1 Genitourinary d1 Injury d1 Musculoskeletal d1 Neoplasms d1_Other d1 Respiratory max_glu_serum_200 and up max glu serum 300 and up max glu serum None A1Cresult Diabetes A1Cresult_None

A1Cresult_Pre-Diabetes
Dynamic or Unknown Fields



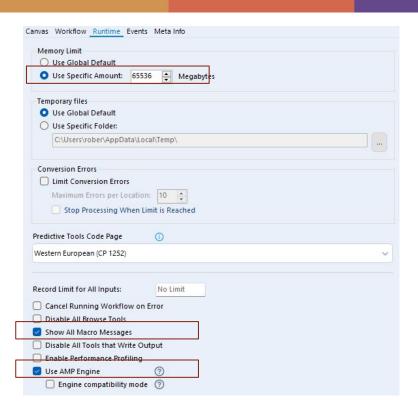


Models Workflow



	Errors ① 0 Conv Errors 🗥 5 Warnings 🔲 127 Messages 🗎 12 Files
	Tool #3: GEOS runtime version: 3.8.0-CAPI-1.13.1
	Tool #3: Linking to sp version: 1.4-5
	Tool #3: Polygon checking: TRUE
	Tool #3: Attaching package: 'AlteryxPredictive'
	Tool #3: The following objects are masked from 'package:AlteryxRDataX':
	Tool #3: unserializeObject, XMSG
	Tool #3: Loaded gbm 2.1.8
	Tool #3: randomForest 4.6-14
	Tool #3: Type rfNews() to see new features/changes/bug fixes.
① Mod	Tool #3: Error in (function (, row.names = NULL, check.rows = FALSE, check.names = TRUE, :
Mod Mod	Tool #3: arguments imply differing number of rows: 1, 0
Mod	Tool~#3:~Calls:~get Measure Classification~~as.data.frame~>~as.data.frame.list~>~do.call~>~ <anonymous>~as.data.frame~>~as</anonymous>
Mod Mod	Tool #3: In addition: Warning message:
	Tool #3: In predict.lm(object, newdata, se.fit, scale = 1, type = if (type == :
Mod Mod	Tool #3: prediction from a rank-deficient fit may be misleading
① Mod	Tool #3: Execution halted
① Mod	Tool #3: The R.exe exit code (1) indicated an error.
→ Mod	Tool #144: 0 records were summarized to 0 groups
Mod Mod	Tool #124: 0 records were True and 0 were False
_ Mod	Tool #125: 0 records were True and 0 were False
	Tool #136: 0 records were True and 0 were False
Mod Mod	Tool #69: 0 records were summarized to 0 groups
Mod Mod	Tool #154: 0 iterations were run
Bro Bro	<u>1 records</u>
① Des	Finished running model_training.yxmd in 3:07 minutes with 3 errors and 5 warnings

(Unsuccessful) Remedial Steps Taken



- Problem: Unclear Stacktrace
 - Ticked "Show All Macro Messages" to expand stack trace
 - **Result:** unclear what the error is, and cannot troubleshoot.
- Problem: Very Long Execution Time
 - Extended RAM allocation to maximum possible w/o pagefile.sys
 - Enabled AMP multithreading
 - Unparked all cores (set alteryx.exe and services to Priority 0 in Task Manager)
 - Elevating alteryx.exe to **Administrator** access
 - Result: sped up execution by x8.

LogReg coefs

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.928927	0.235625	-3.94240	8e-05 ***
gender	0.062626	0.047208	1.32659	0.18465
race_AfricanAmerican	-0.103997	0.062184	-1.67242	0.09444 .
race_Asian	0.117805	0.277625	0.42433	0.67132
race_Hispanic	-0.095965	0.163489	-0.58698	0.55722
race_Other	-0.506582	0.195630	-2.58949	0.00961 **
age_50.and.under	-0.191759	0.060323	-3.17889	0.00148 **
age_50.to.70	-0.128265	0.059126	-2.16935	0.03006 *
admission_type_id_Emergency	-0.067026	0.097094	-0.69032	0.48999
admission_type_id_Other	0.130843	0.124486	1.05107	0.29323
admission_type_id_Urgent	0.128103	0.084083	1.52354	0.12762
admission_source_id_ER.or.Trauma	0.125788	0.082055	1.53298	0.12528
admission_source_id_Other	-0.047455	0.130770	-0.36289	0.71669
admission_source_id_Transfer	-0.188312	0.105680	-1.78191	0.07476 .
discharge_disposition_id_Other	0.438975	0.263177	1.66798	0.09532.
discharge_disposition_id_Unknown	0.134033	0.115769	1.15777	0.24696
discharge_disposition_id_Another.Facility	0.654225	0.057881	11.30295	< 2.2e-16 ***
discharge_disposition_id_Nursing.Home.or.Hospice	-0.844400	0.288316	-2.92873	0.0034 **
d1_Diabetes	0.023127	0.098273	0.23533	0.81395
d1_Digestive	-0.276585	0.088621	-3.12100	0.0018 **
d1_Genitourinary	-0.064941	0.112817	-0.57563	0.56486
d1_Injury	0.006948	0.096092	0.07230	0.94236
d1_Musculoskeletal	-0.242063	0.115397	-2.09765	0.03594 *
d1_Neoplasms	-0.182996	0.128684	-1.42206	0.15501
d1_Other	-0.137587	0.072464	-1.89868	0.05761.

d1_Respiratory	-0.364451	0.080128	-4.54833	1e-05 ***
max_glu_serum_None	-0.088815	0.166775	-0.53254	0.59435
max_glu_serum_200.and.up	-0.086042	0.246019	-0.34974	0.72653
max_glu_serum_300.and.up	-0.119280	0.283829	-0.42025	0.6743
A1Cresult_Diabetes	0.006556	0.132391	0.04952	0.96051
A1Cresult_None	0.186636	0.106892	1.74602	0.08081.
A1Cresult_Pre.Diabetes	0.122825	0.153270	0.80137	0.42292
time_in_hospital	0.035970	0.009461	3.80204	0.00014 ***
num_lab_procedures	0.003221	0.001389	2.31818	0.02044 *
num_procedures	-0.022367	0.016071	-1.39181	0,16398
num_medications	0.003598	0.003771	0.95407	0.34005
number_diagnoses	0.024341	0.014072	1.72979	0.08367.
change	-0.086353	0.082217	-1.05031	0.29358
diabetesMed	0.175243	0.084627	2.07078	0.03838 *
service_util	0.201408	0.015122	13.31893	< 2.2e-16 ***
drug_change	-0.006650	0.064092	-0.10375	0.91737
metformin	-0.151448	0.068865	-2.19919	0.02786 *
glimepiride	-0.018273	0.109713	-0.16656	0.86772
glipizide	0.108829	0.078706	1.38273	0.16675
glyburide	-0.032787	0.086439	-0.37930	0.70446
pioglitazone	-0.112811	0.095058	-1.18676	0.23532
rosiglitazone	-0.021812	0.101619	-0.21464	0.83005
insulin	0.115178	0.075794	1.51961	0.12861
age_70.and.up	NA	NA	NA	NA

Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1