Acute Kidney Injury prediction in patient with Sepsis.

Team 4

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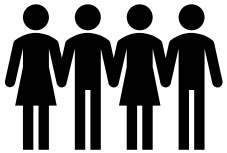
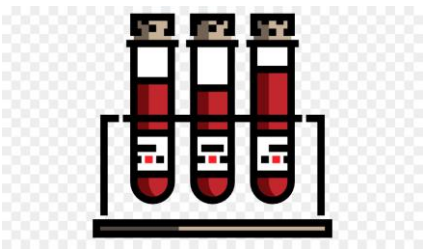
Exploring urine lab data patterns in renal failure during sepsis

INTRODUCTION:
There are no conclusive studies of the value of urinary biochemical patterns to predict outcome and RRT necessity (because of paucity of data) in the initial phase of sepsis

OBJECTIVE:
This project aims to review if conventional urine lab data in patients with sepsis predict which ones will develop AKI.

Overview





24h

48h

Observation window

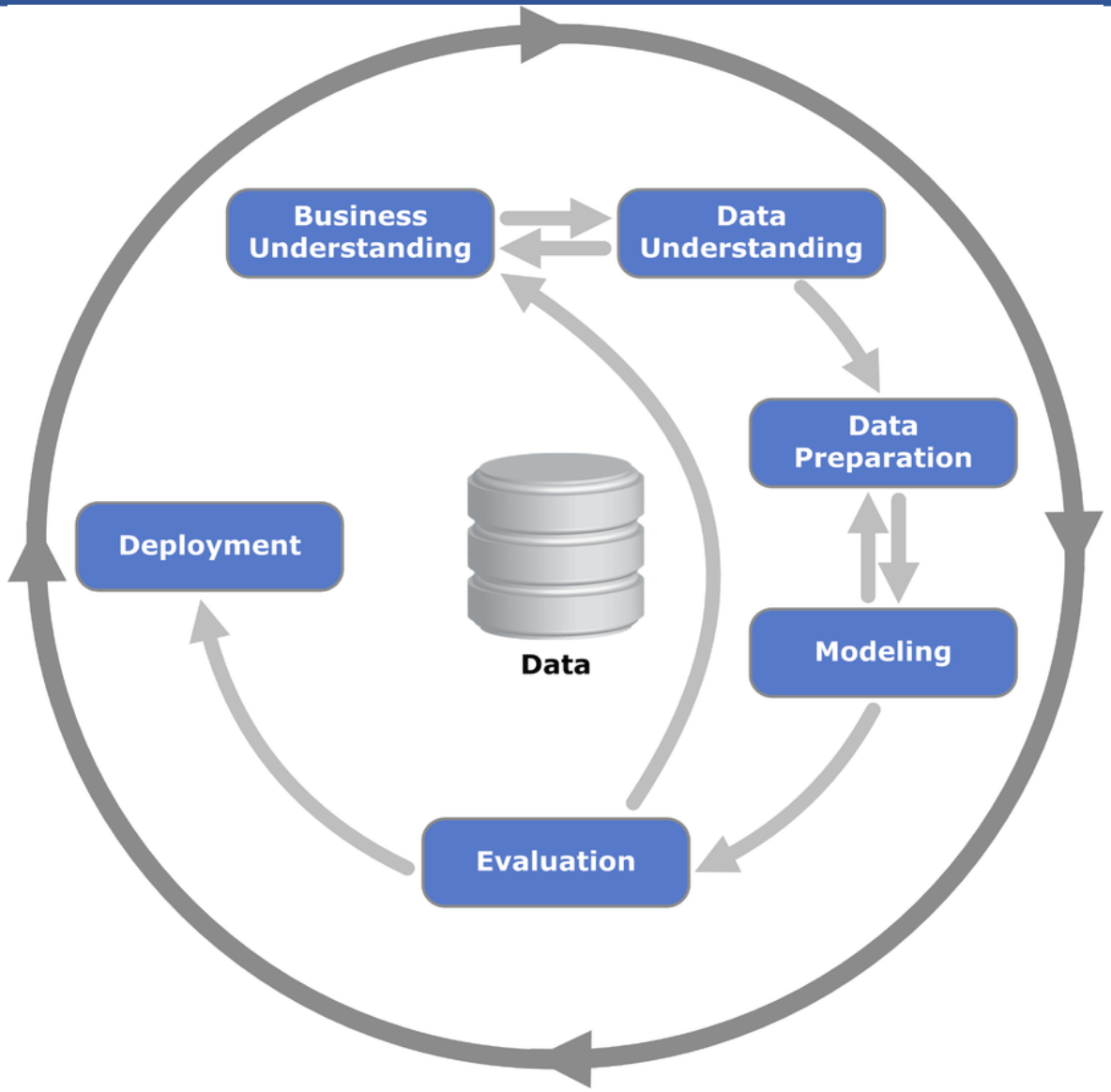
952

NOT AKI

AKI

10138

HOW - CRISP-DM METHODOLOGY



By **Kenneth Jensen** - Own work based on: ftp://public.dhe.ibm.com/software/analytics/spss/documentation/modeler/18.0/en/ModelerCRISPDM.pdf (Figure 1), CC BY-SA 3.0, **https://commons.wikimedia.org/w/index.php?curid=24930610**

DATA PREPARATION – THE GOAL!

To put data together is challenging

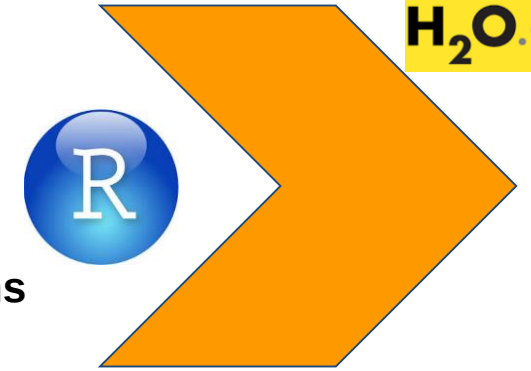
Laboratories

ICUs - Admissions

Demographics

Monitoring data

Feature engineering



Data engineering

Data points this is the key (N*M)! After a very expensive process

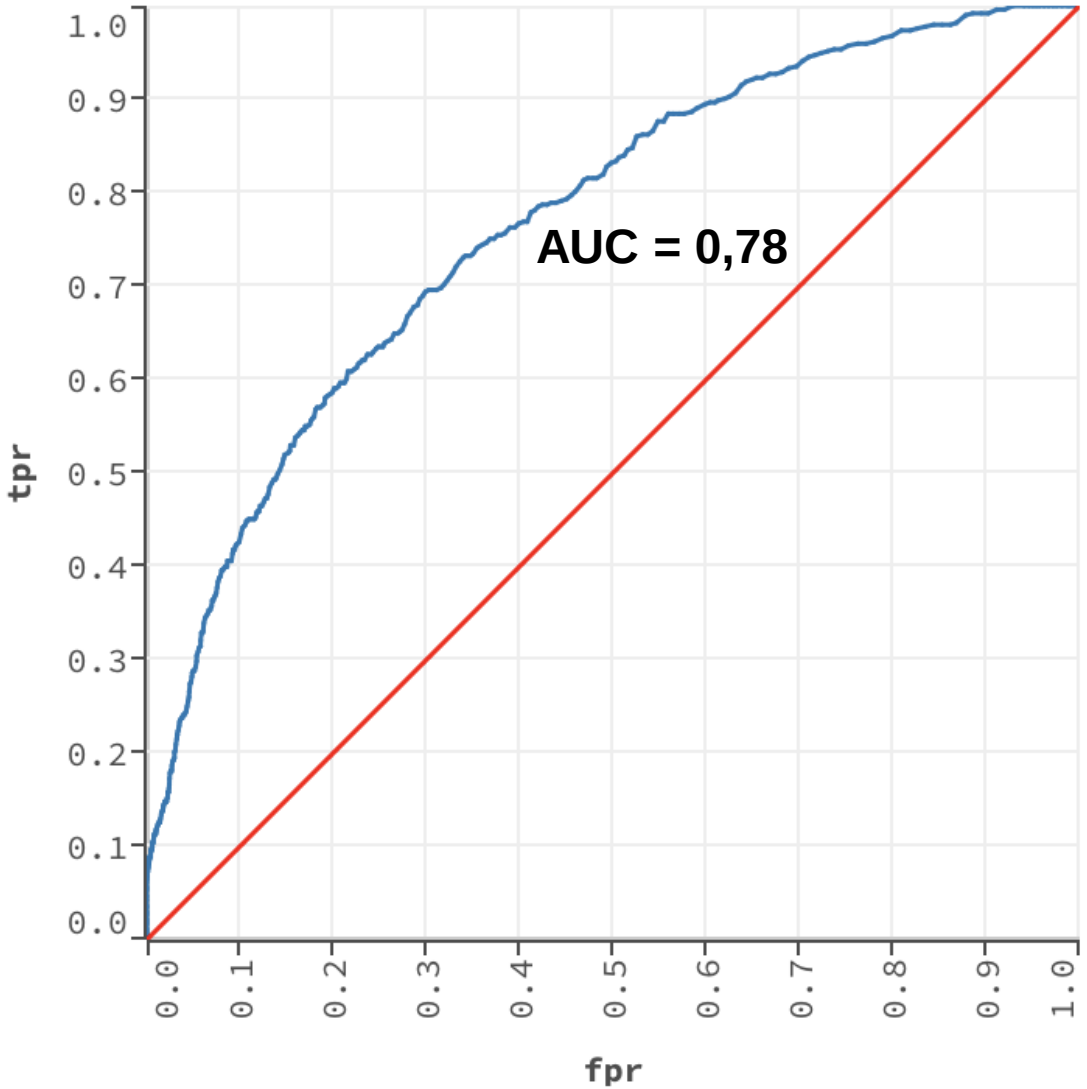
(N) features (39)
(M) features (11090)

ID	AL	AGE	HEM	LAC	CRE	AKI
1	15	Y	168	60	21.3	Y
2	20	Y	185	80	23.4	Y
3	65	N	192	90	24.4	N
4	48	N	172	85	28.7	N
5	45	Y	185	79	23.1	N
6	79	N	182	71	21.4	Y
7	22	Y	186	79	22.8	Y

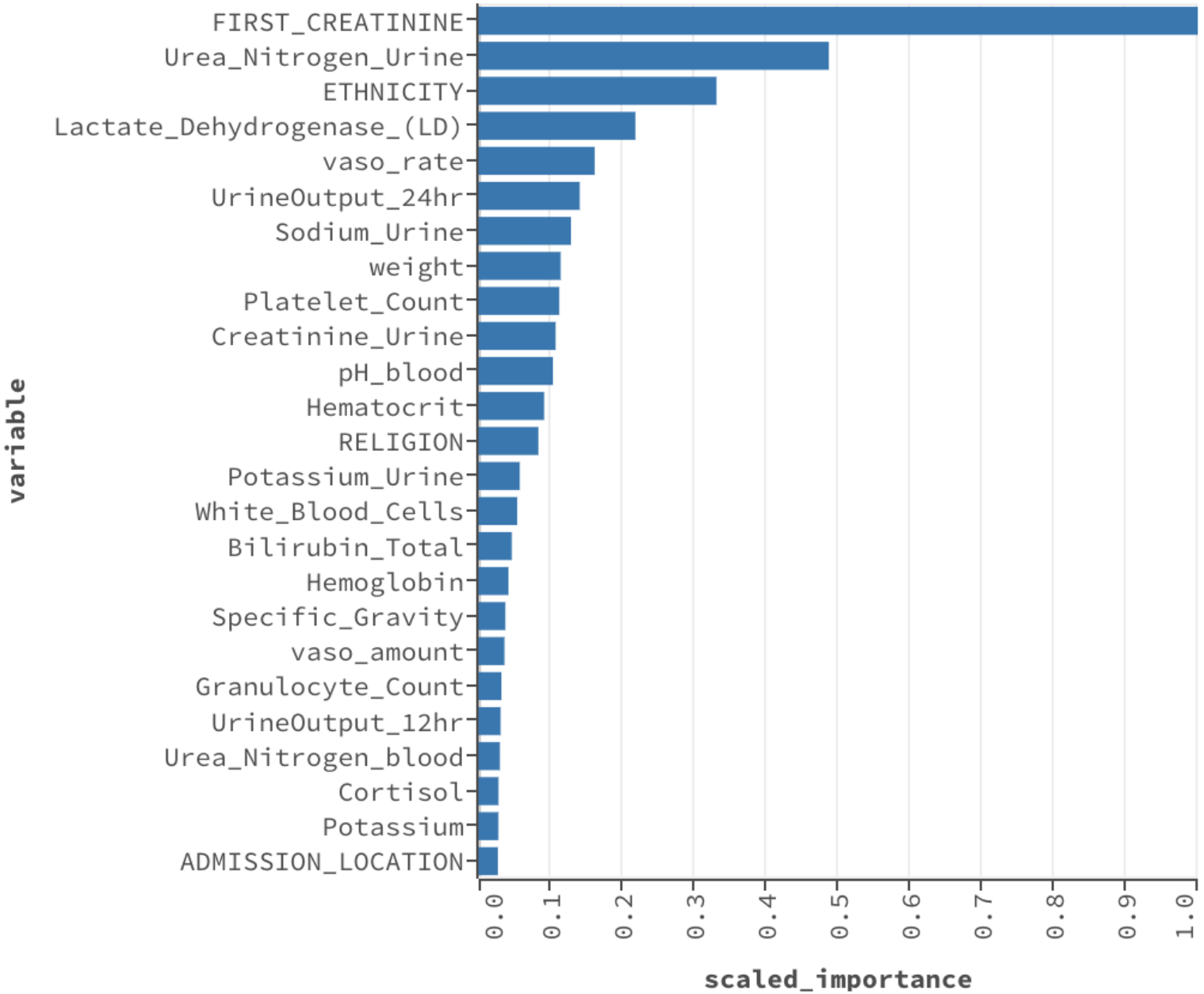
M observations

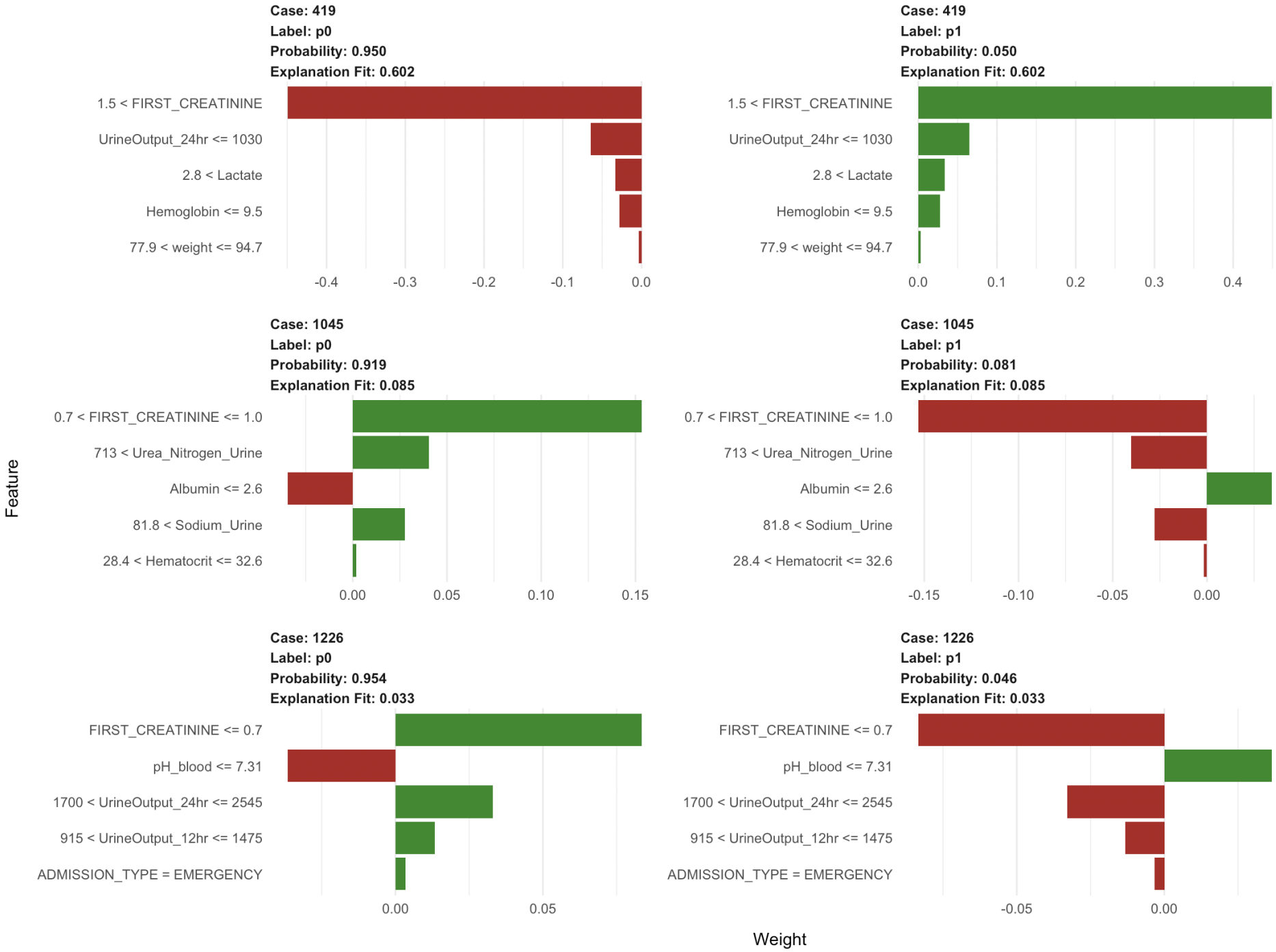
TARGET -> AKI_CREATININA

RESULTS - MODELING

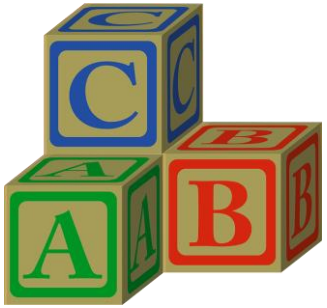


RESULTS - MODELING

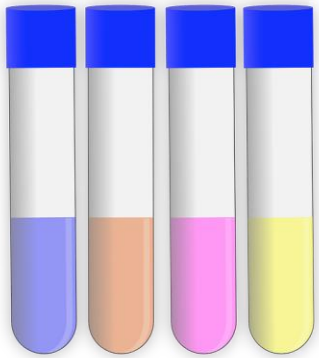



Case: 419
Label: p0
Probability: 0.950
Explanation Fit: 0.602
1.5 < FIRST_CREATININE
UrineOutput_24hr <= 1030
2.8 < Lactate
Hemoglobin <= 9.5
77.9 < weight <= 94.7
-0.4
-0.3
-0.2
-0.1
0.0
Case: 419
Label: p1
Probability: 0.050
Explanation Fit: 0.602
1.5 < FIRST_CREATININE
UrineOutput_24hr <= 1030
2.8 < Lactate
Hemoglobin <= 9.5
77.9 < weight <= 94.7
0.0
0.1
0.2
0.3
0.4
Case: 1045
Label: p0
Probability: 0.919
Explanation Fit: 0.085
0.7 < FIRST_CREATININE <= 1.0
713 < Urea_Nitrogen_Urine
Albumin <= 2.6
81.8 < Sodium_Urine
28.4 < Hematocrit <= 32.6
0.00
0.05
0.10
0.15
Case: 1045
Label: p1
Probability: 0.081
Explanation Fit: 0.085
0.7 < FIRST_CREATININE <= 1.0
713 < Urea_Nitrogen_Urine
Albumin <= 2.6
81.8 < Sodium_Urine
28.4 < Hematocrit <= 32.6
-0.15
-0.10
-0.05
0.00
Case: 1226
Label: p0
Probability: 0.954
Explanation Fit: 0.033
FIRST_CREATININE <= 0.7
pH_blood <= 7.31
1700 < UrineOutput_24hr <= 2545
915 < UrineOutput_12hr <= 1475
ADMISSION_TYPE = EMERGENCY
0.00
0.05
Case: 1226
Label: p1
Probability: 0.046
Explanation Fit: 0.033
FIRST_CREATININE <= 0.7
pH_blood <= 7.31
1700 < UrineOutput_24hr <= 2545
915 < UrineOutput_12hr <= 1475
ADMISSION_TYPE = EMERGENCY
-0.05
0.00
Feature
Weight

Conclusions



It is feasible to make a good model to predict AKI development (AUC 0,78).



We should take into account evaluate urinary urea nitrogen and lactate dehydrogenase