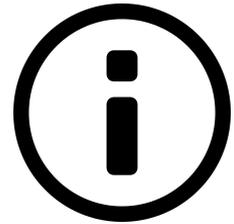


# Predicting survivability of waiting heart transplant patients



# Intro to UNOS Data Set



# Preparing the Data Set

- Choosing relevant features (available at  $t=0$ )
- Unwanted data - 18+, duplicate entries, uninteresting patient outcomes
- Outlier removal
- Imputation of missing data

# Preparing the Data Set

- Normalization
- Encoding - One-hot
- Undersampling
- Other feature engineering efforts

# Metric - F1 Macro Score

$$\text{precision} = \frac{\text{true positives}}{\text{positives}}$$

$$\text{recall} = \frac{\text{true positives}}{\text{true positives} + \text{false negatives}}$$

$$\text{f1\_score} = \frac{2}{\frac{1}{\text{precision}} + \frac{1}{\text{recall}}}$$

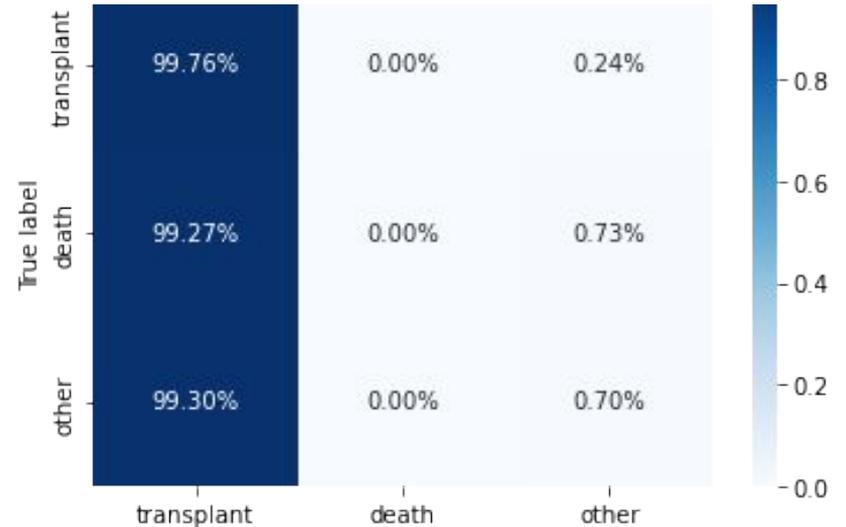
$$\text{f1\_macro} = \text{avg}(\text{f1\_score})$$

# First (very poor) model

	precision	recall	f1-score	support
Transplanted	0.66	1.00	0.79	37905
Died	0.00	0.00	0.00	7690
Other	0.36	0.01	0.02	12181

**F1 macro: 0,27**

# Logistic Regression



# Waitlist Model

## Single Layer Neural Network

	precision	recall	f1-score	support
Transplanted	0.89	0.97	0.92	13219
Died	0.79	0.58	0.67	607
Still Waiting	0.74	0.54	0.62	3667

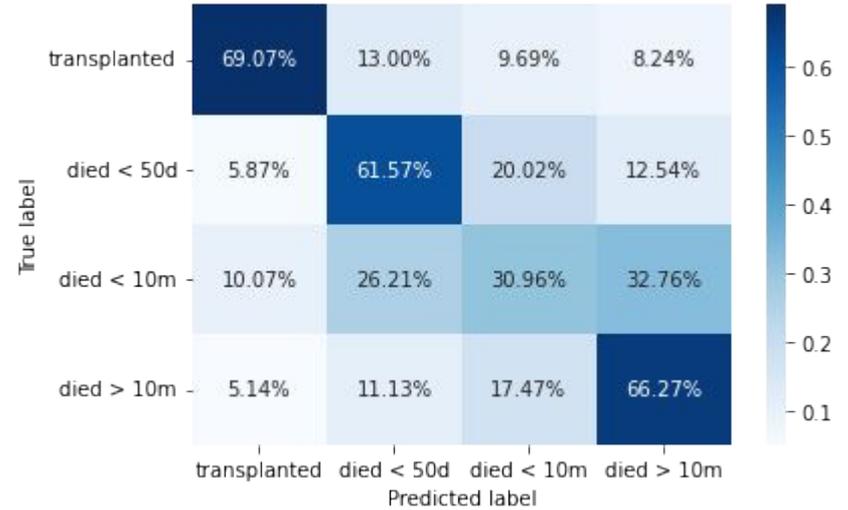
**F1 macro: 0,74**



# Death Interval Model Logistic Regression

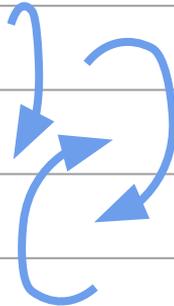
	precision	recall	f1-score	support
Transplanted	0.78	0.69	0.73	1177
Died < 50d	0.55	0.62	0.58	1124
Died < 10m	0.38	0.31	0.34	1053
Died > 10m	0.57	0.66	0.61	1168

**F1 macro: 0,57**

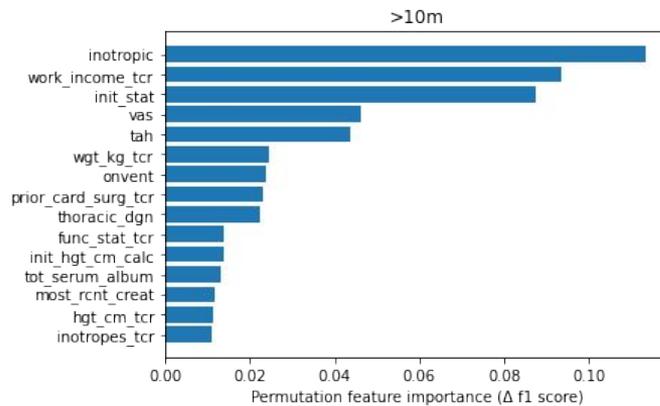
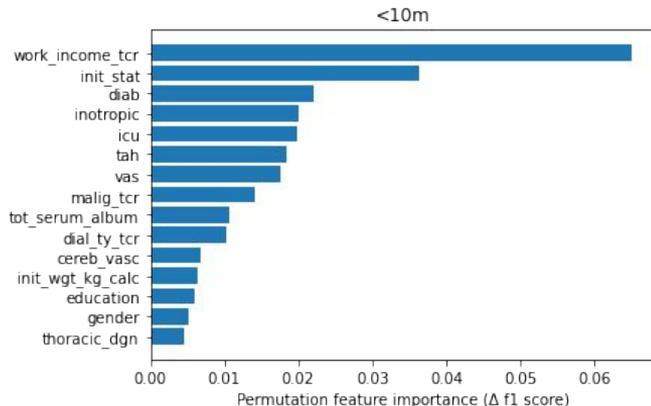
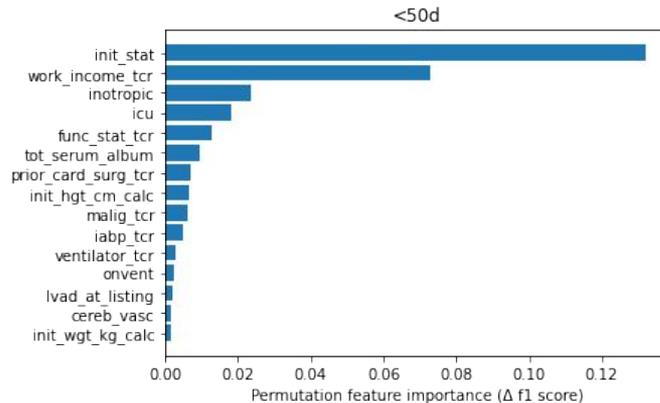
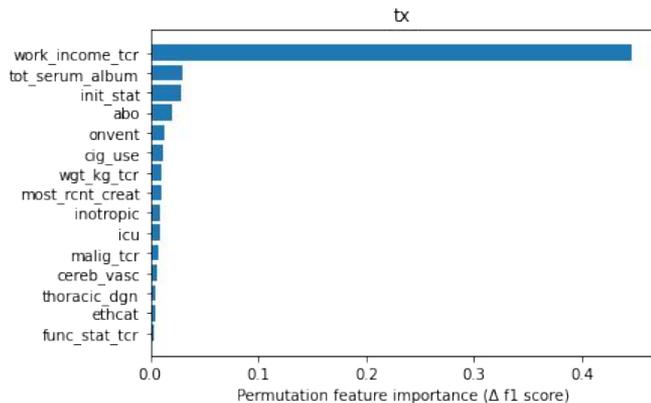


# Permutation Feature Importance

Weight (kg)	In Intensive Care?	...	# Bananas peeled (lifetime)
61	No	...	280
...	...	...	...
125	Yes	...	48
57	No	...	43

A diagram consisting of three blue curved arrows with arrowheads, forming a cycle between the rows of the table. One arrow starts at the 'In Intensive Care?' cell of the first row (No) and points to the 'In Intensive Care?' cell of the third row (...). A second arrow starts at the 'In Intensive Care?' cell of the third row and points to the 'In Intensive Care?' cell of the fourth row (Yes). A third arrow starts at the 'In Intensive Care?' cell of the fourth row and points back to the 'In Intensive Care?' cell of the first row.

# Permutation Feature Importance



**Thank you**