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T.A.R.P.S.

Time-Adaptive Risk Prediction System using ML

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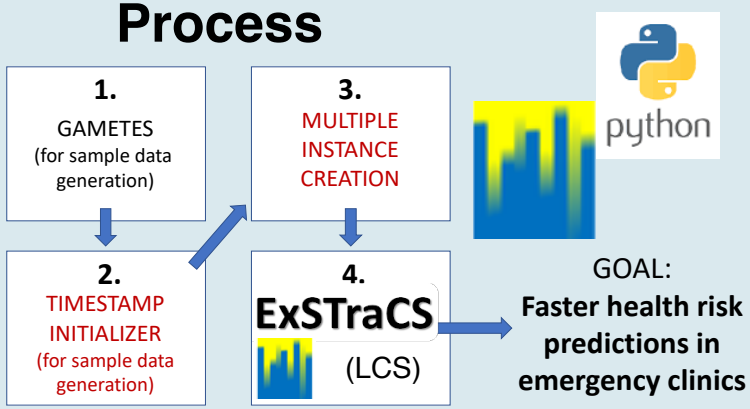
Abstract:
To develop a dynamic model that instantaneously predicts patient risk as new data becomes available.
Background:
Currently, risk is predicted via multiple static models, which produce prediction time-gaps and delayed patient care.
Methods:
Learning Classifier System (LCS) machine learning algorithm

Process



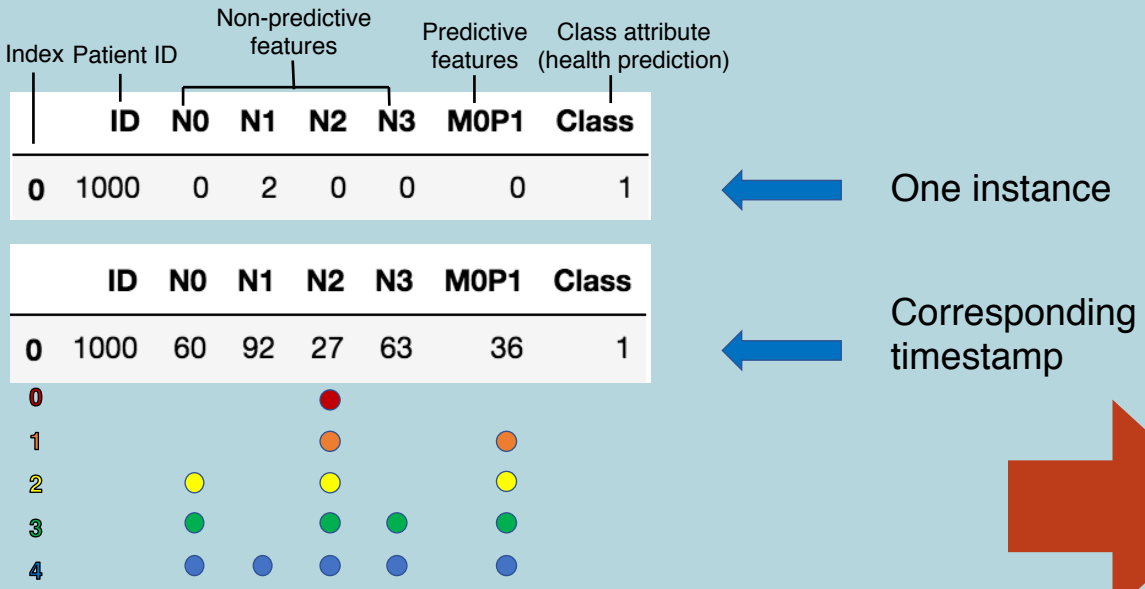
New Idea

Break up learning instances by **timestamp** so that LCS learns even when not all features are present.

Question

Given data with high **missingness**, can LCS still make accurate predictions?

Multiple Instance Creation



Findings

LCS learns and predicts class attributes on both original and time-separated instances with notable accuracy.

LCS output statistics	Training Accuracy	Testing Accuracy
2 predictive features	87.29%	83.1%
Time-separated 2 predictive features	83.72%	79.88%
4 predictive features	95.44%	93.13%
Time-separated 4 predictive features	86.63%	84.82%

Next Steps

- Can the time-trained LCS predict class attributes **earlier** than before?
- Can the LCS use its **memory** of **continuous features** that were collected then discarded, such as heart rate, to make risk predictions?

Time-separated output

	ID	N0	N1	N2	N3	M0P1	Class
0	1000.0	NaN	NaN	0.0	NaN	NaN	1.0
1	1000.0	NaN	NaN	0.0	NaN	0.0	1.0
2	1000.0	0.0	NaN	0.0	NaN	0.0	1.0
3	1000.0	0.0	NaN	0.0	0.0	0.0	1.0
4	1000.0	0.0	2.0	0.0	0.0	0.0	1.0

Multiple instances