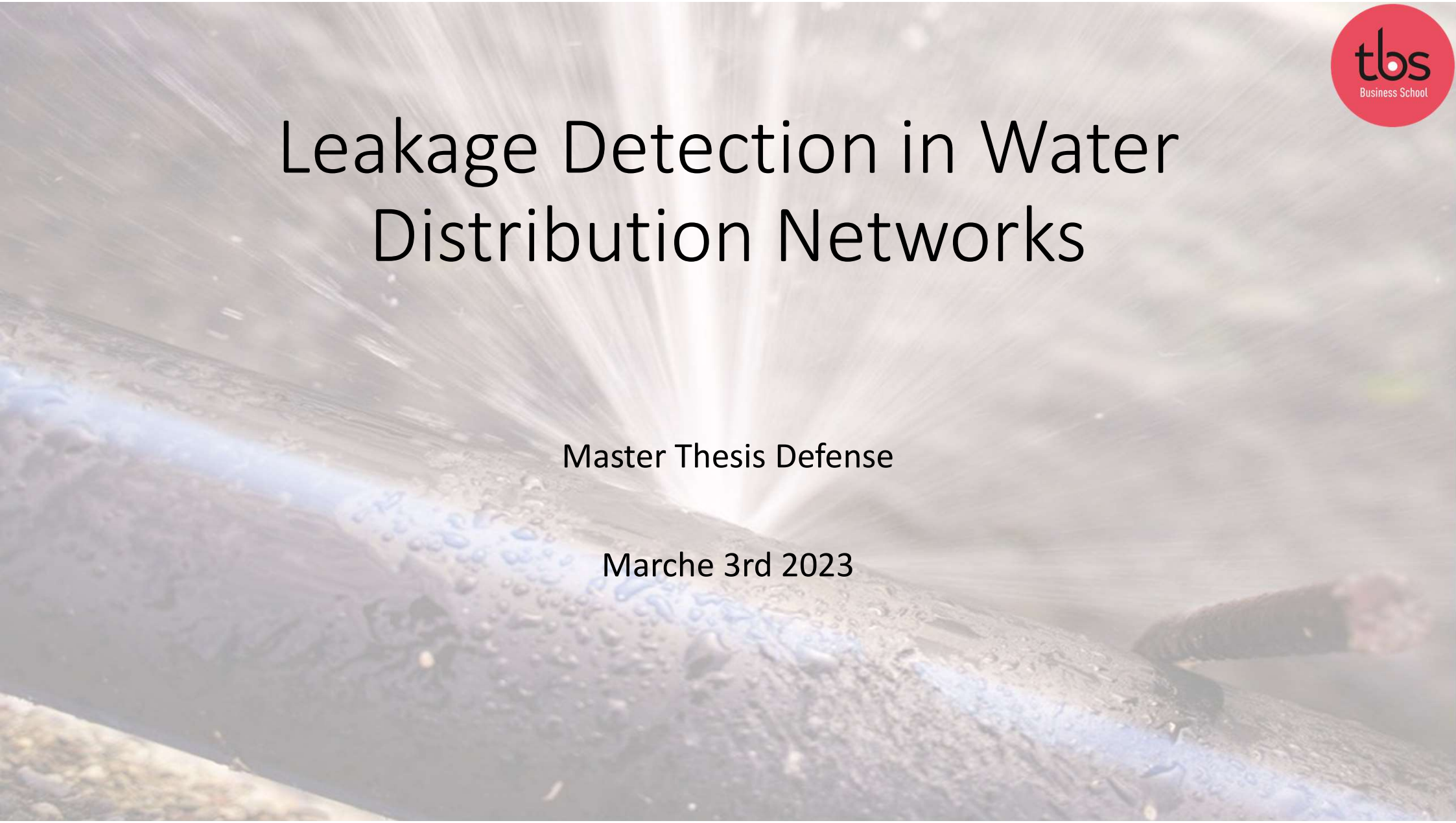


Leakage Detection in Water Distribution Networks

Master Thesis Defense

Marche 3rd 2023

Summary

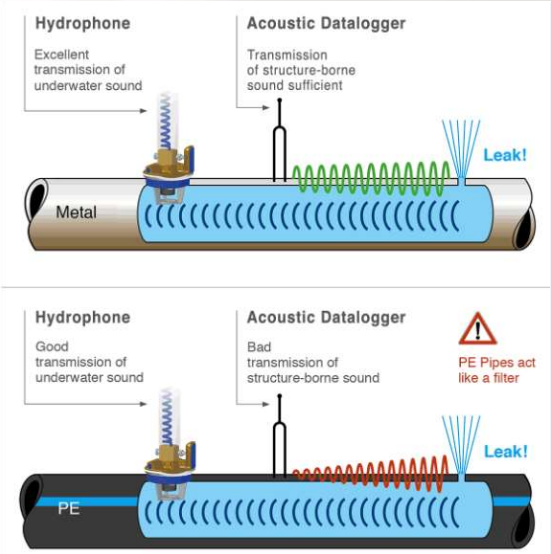
- Water leakge detection methods

- Results

- Business Recommendations

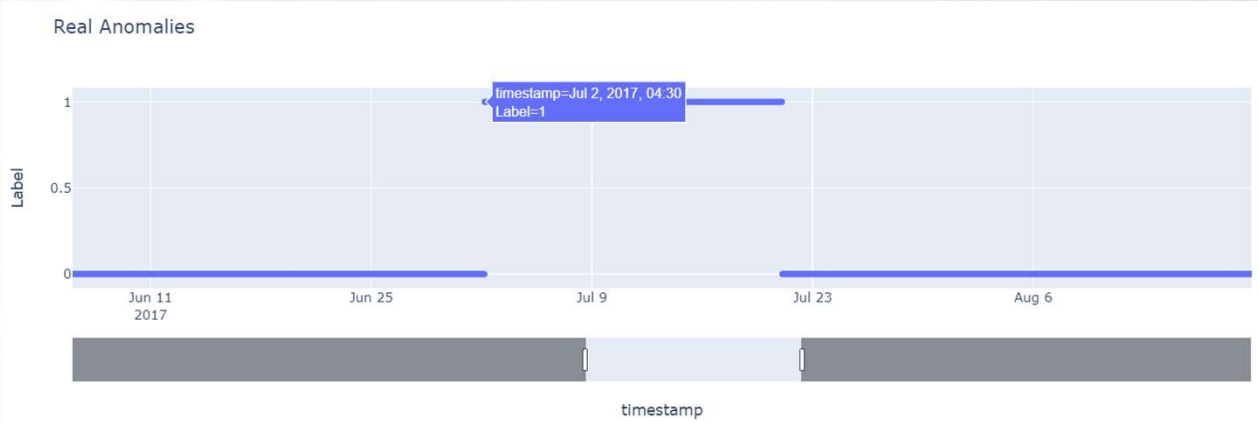
Water leakage detection methods

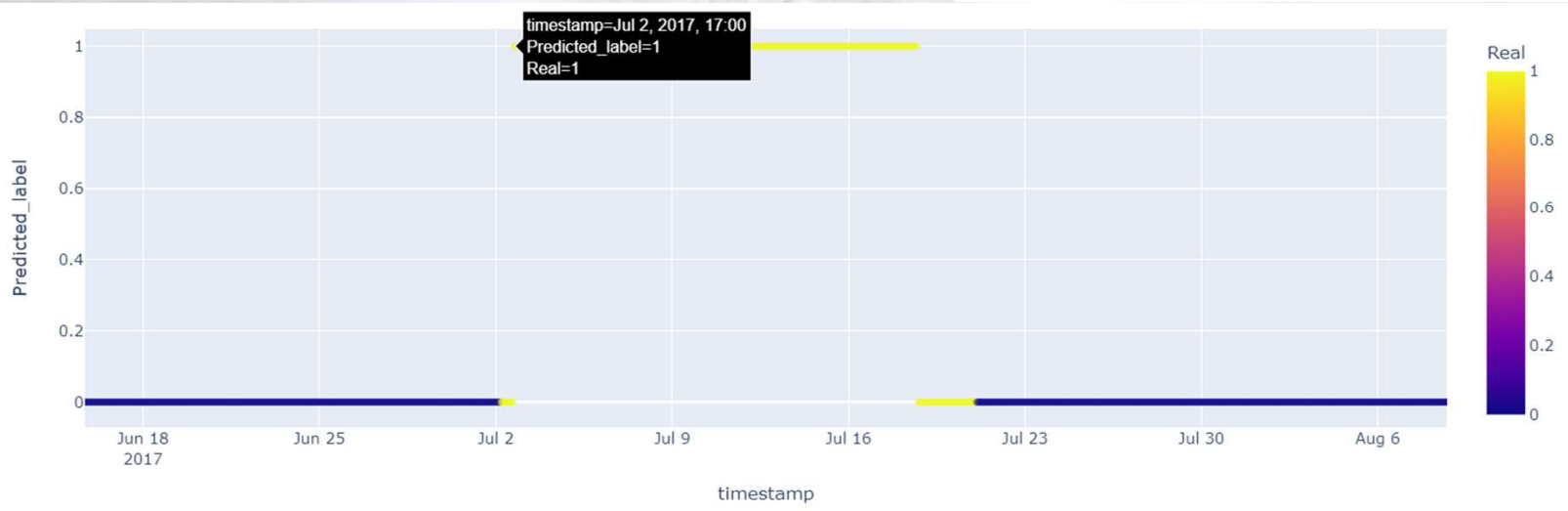
- Tracer gas
- Tracer chemical components
- Thermography
- Acoustic measurements
- Robot Technologies
- Data-Driven Technologies



Results

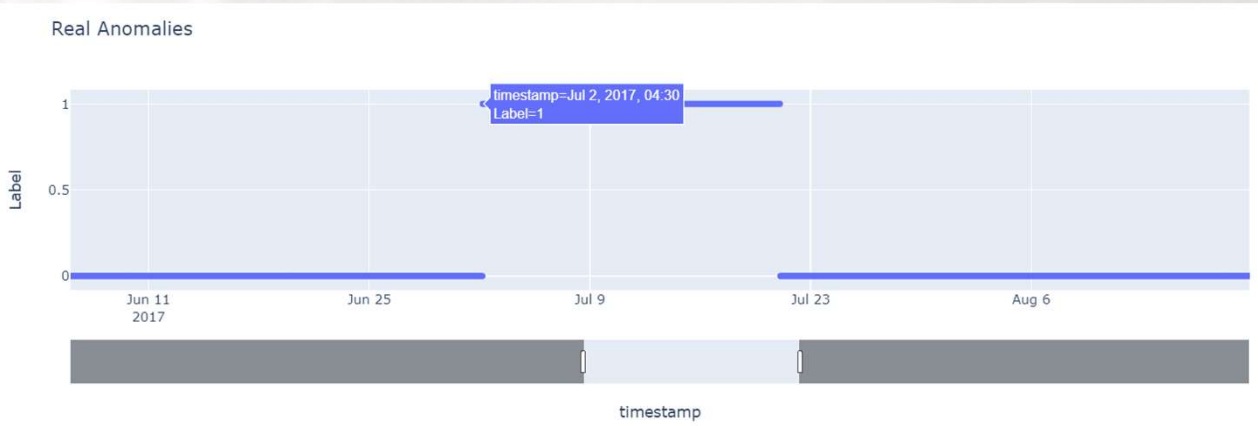
- PCA results on scenario 2
- Incipient leakage 5%

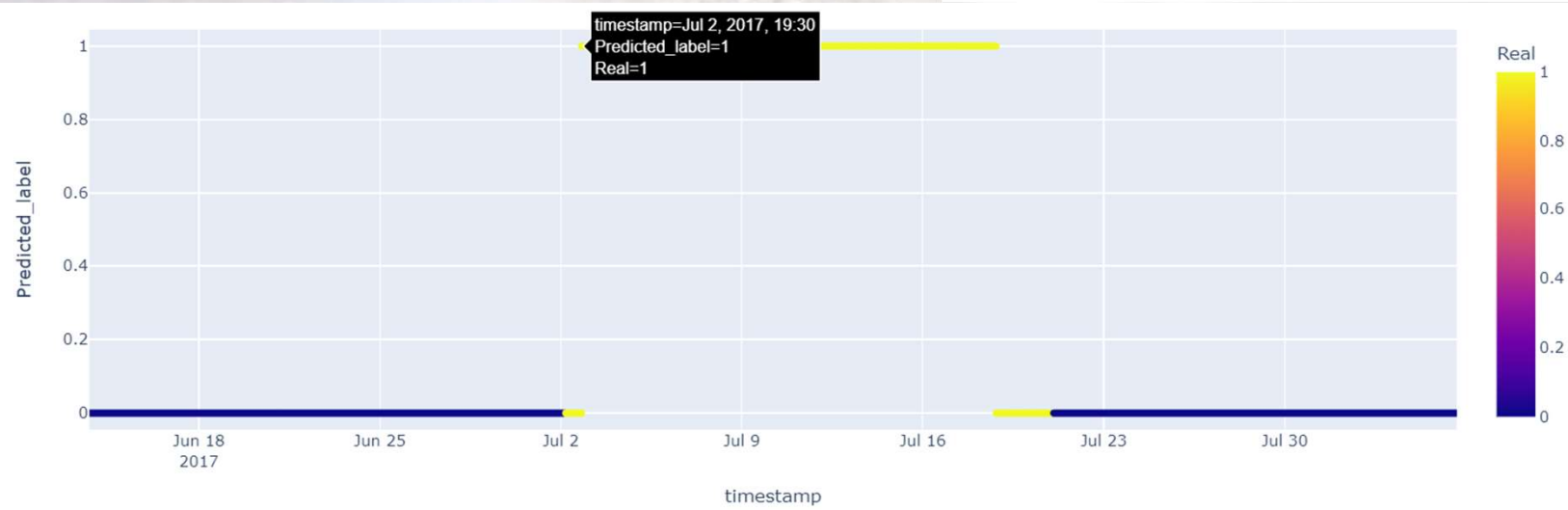




Results

- AE-NN results on scenario 2
- Incipient leakage 5%



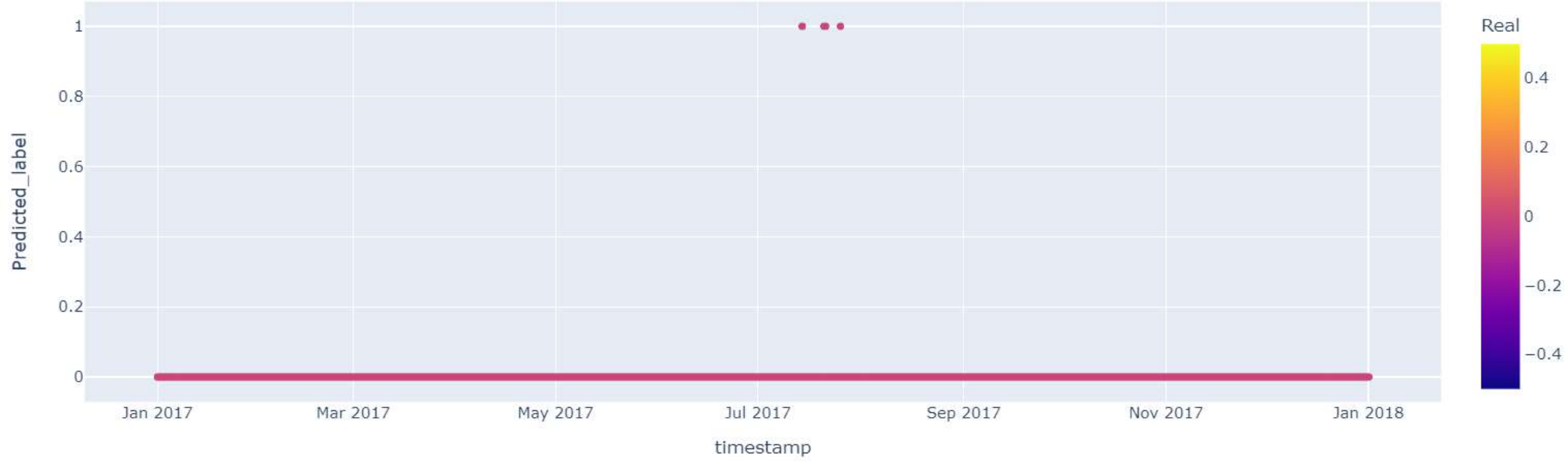


Results

- PCA results on scenario 7
- No leakage

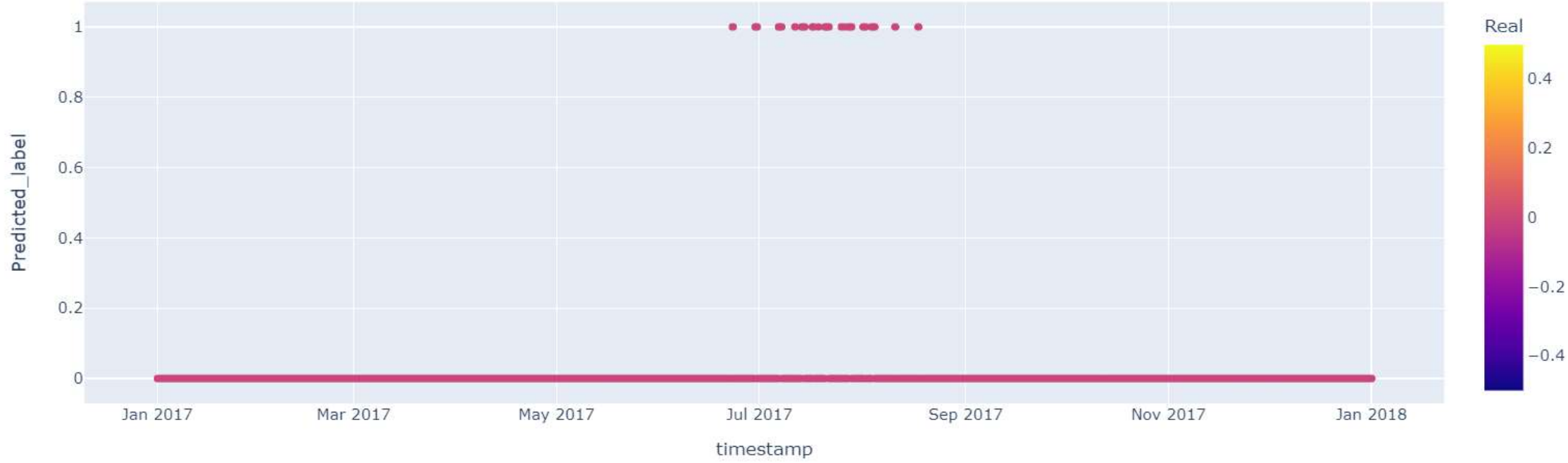
Results

- PCA results on scenario 10
- No leakage



Results

- AE-NN results on scenario 7
- No leakage



Results

- AE-NN results on scenario 10
- No leakage

Results

- PCA vs AE-NN
- Incipients leakage scenarios

Real Anomalies	Predicted Anomalies PCA	Predicted Anomalies AE-NN	Delta
Scenario 1: April 18th 09:00 pm	April 19th 00:30 am	April 19th 01:30 am	PCA: 3h30 AE-NN: 4h30
Scenario 3: October 3rd 10:30 pm	October 4th 06:30 pm	October 4th 08:30 pm	PCA: 8h AE-NN: 10h

Results

- PCA vs AE-NN
- Abrupt leakage scenarios

Real Anomalies	Predicted Anomalies PCA	Predicted Anomalies AE-NN	Delta
Scenario 5: December 10th 03:00 am	December 15th 06:00 am	December 10th 01:30 pm	PCA: 123h AE-NN: 10h30
Scenario 22: November 29th 05:30 pm	November 30th 06:00 am	November 30th 06:00 am	PCA: 12h30 AE-NN: 12h30

Business Recommendations

- Use of simulated data
- Use of machine learning models
- Visualize the network