

| ScaLaDE (Scalable Labeling for Data Enrichment)

NASPI Work Group Meeting
DOE Digitizing Utilities Prize

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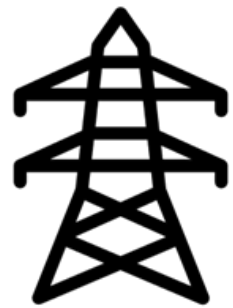
Olga Lositsky (Siemens Technology US)

Prof. Jianhui Wang (SMU)

Han Guo (SMU)

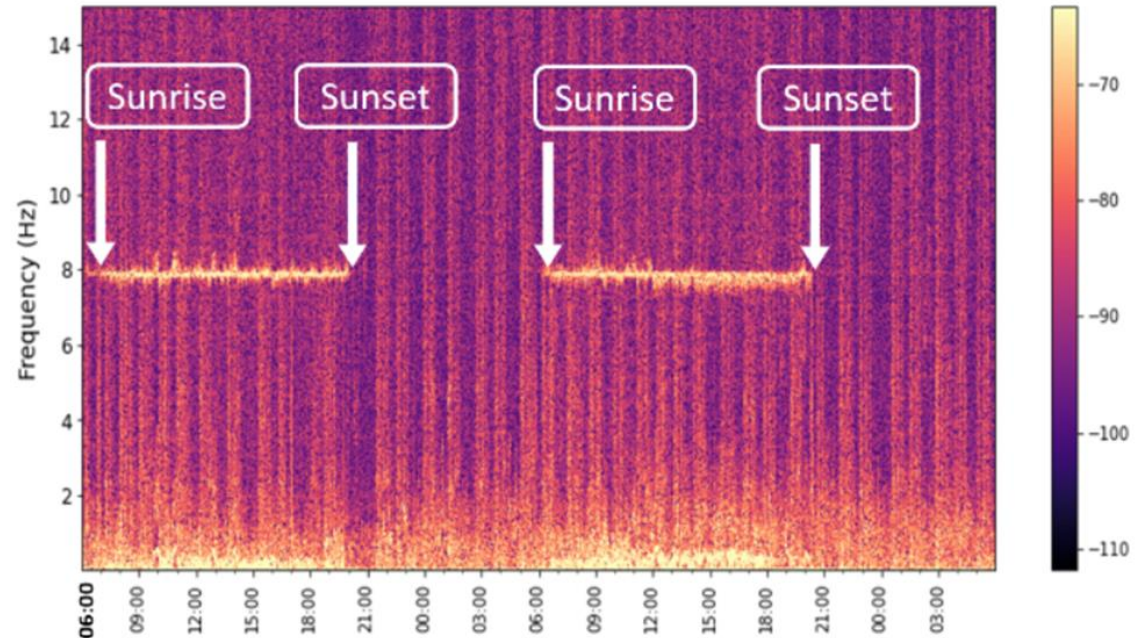
September 2023

Problem Definition



Power System

Measurements



X. Xu et al., "Fast Oscillation Detection and Labeling via Coarse Grained Time Series Data for ML Applications," 2022 IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT), New Orleans, LA, USA, 2022, pp. 1-5, doi: 10.1109/ISGT50606.2022.9882712.

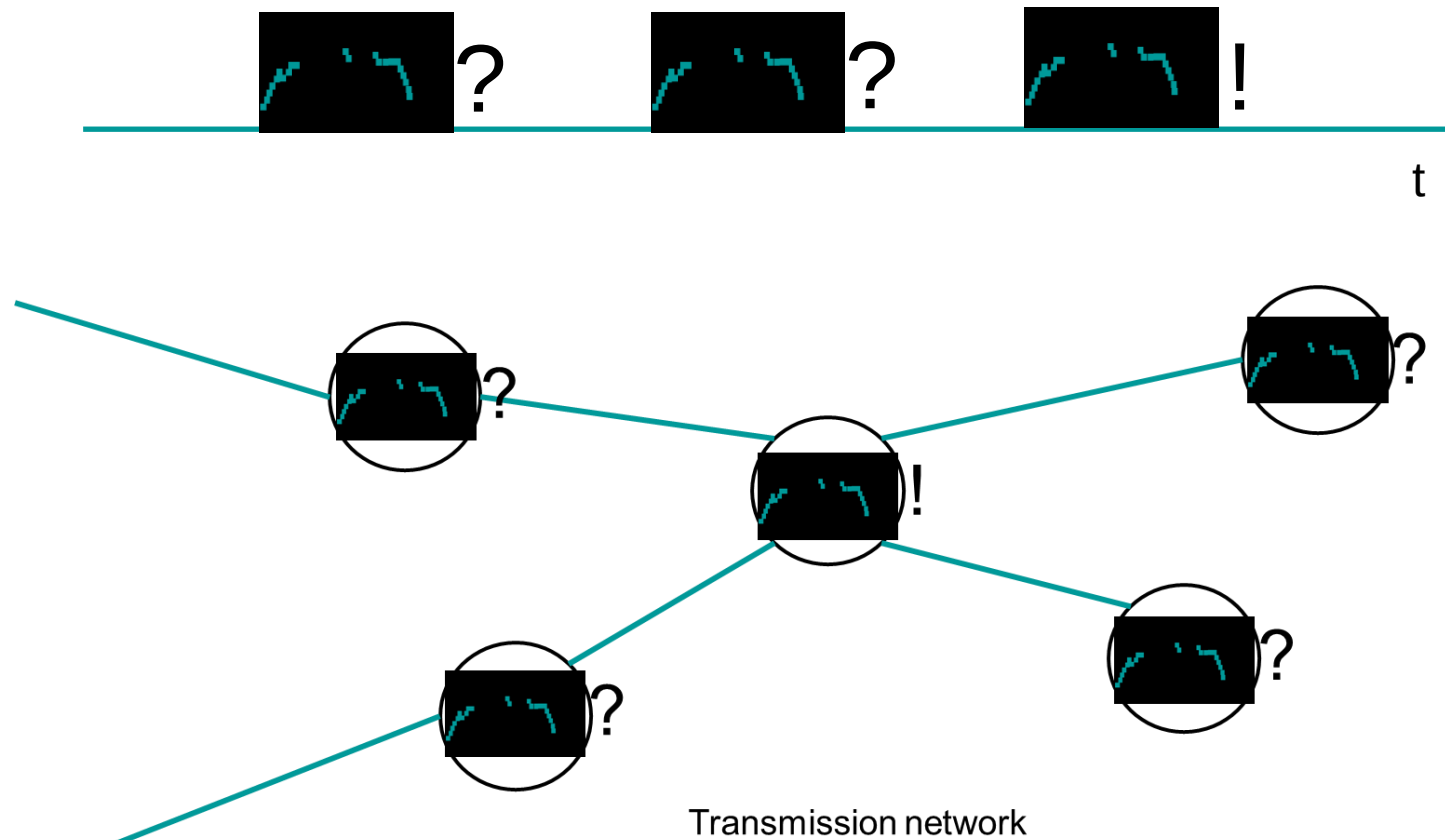
Opportunities

Continuous Performance Monitoring

- Focus on time-frequency patterns and how they change over time
- Opportunities
 - Automatic identification of new patterns for investigation
 - Automatic tracking of patterns over time
 - Automatic identification of region affected by phenomena
 - Automatic identification of similar patterns in historical data
 - Visualization in order to properly communicate information to stakeholders

Proposed Solution

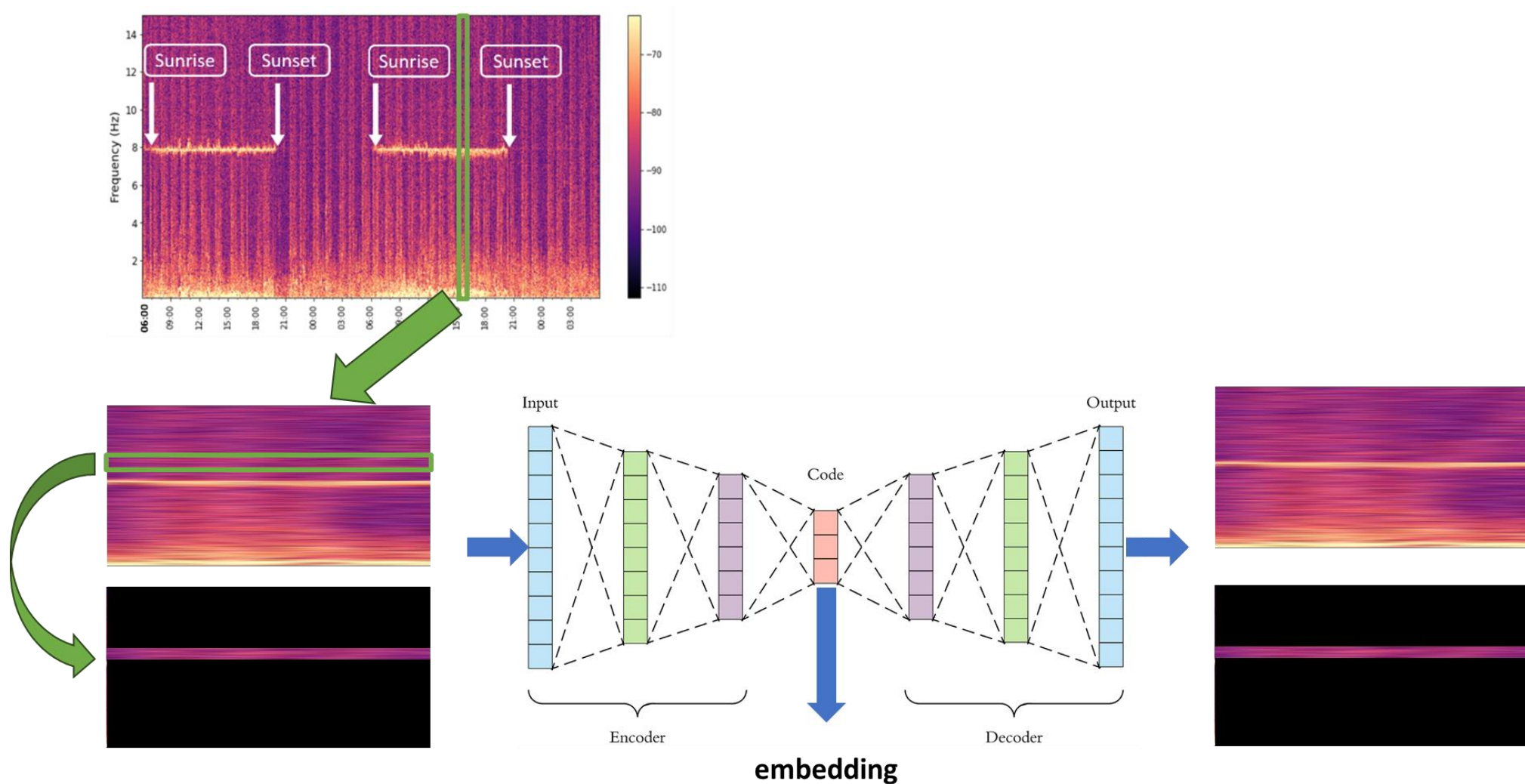
Data enrichment that enables identification and comparison of patterns over space and time



ScaLaDE Data Enrichment Concept

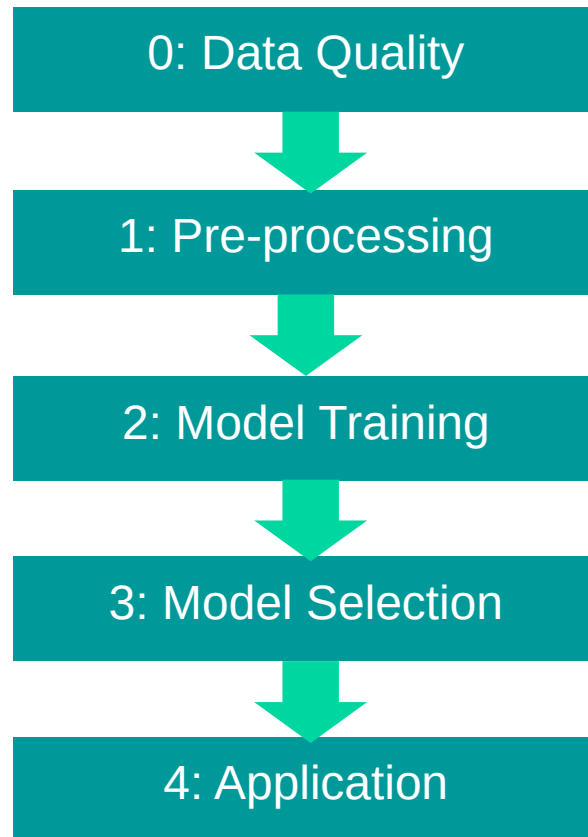


Technical Concept



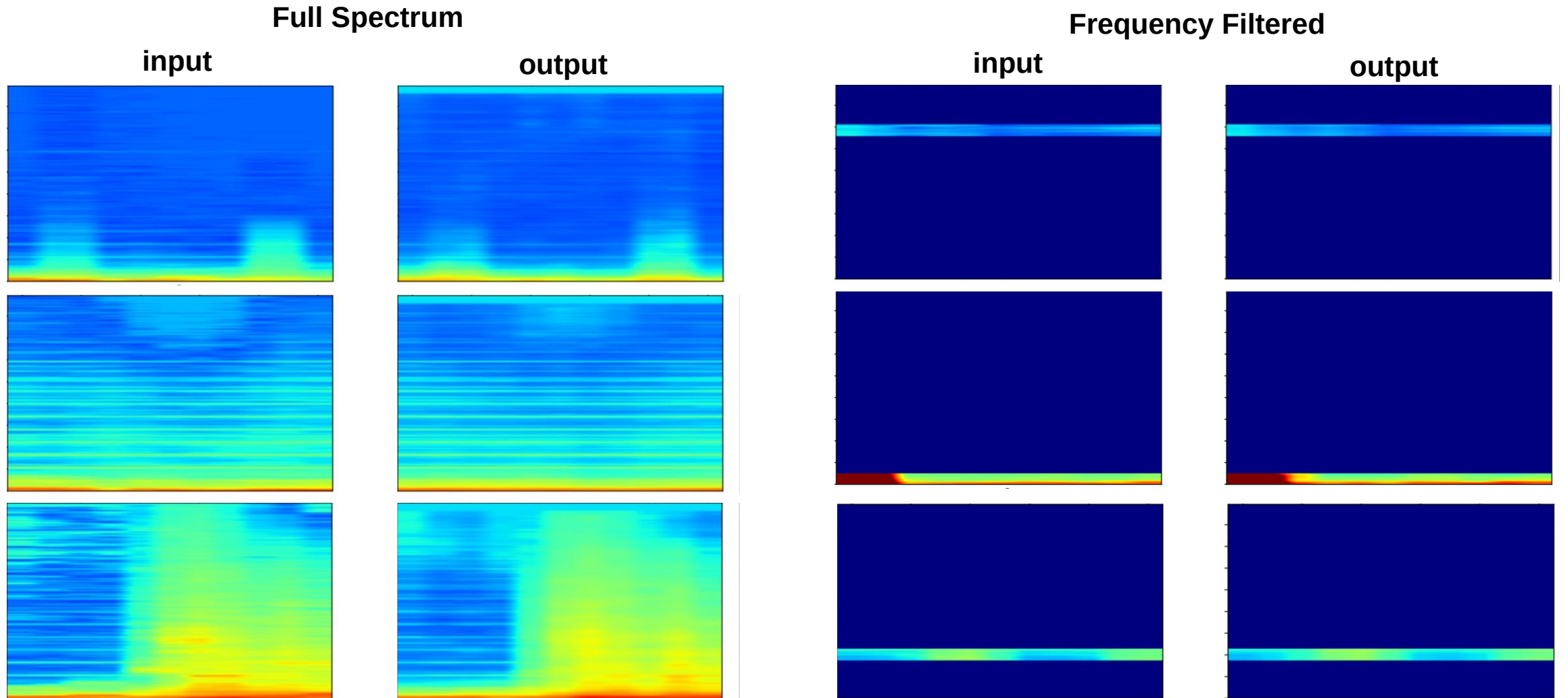
Implementation

Processing Pipeline

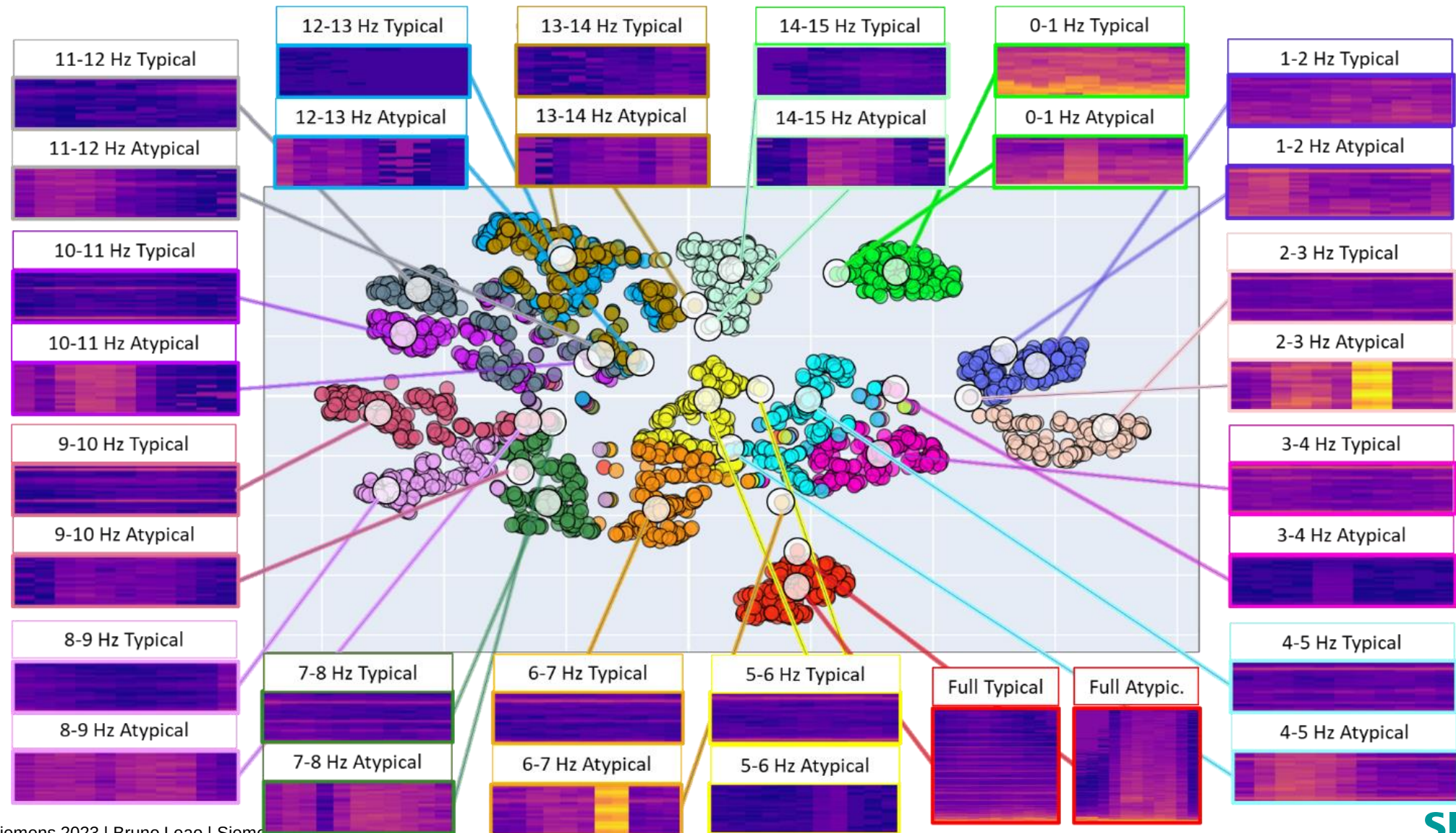


- **Data:** 2 data streams. 18 months of data.
- **Adaptations and prioritizations** performed due to the constraints in time, resources and computational power

AE Training Results

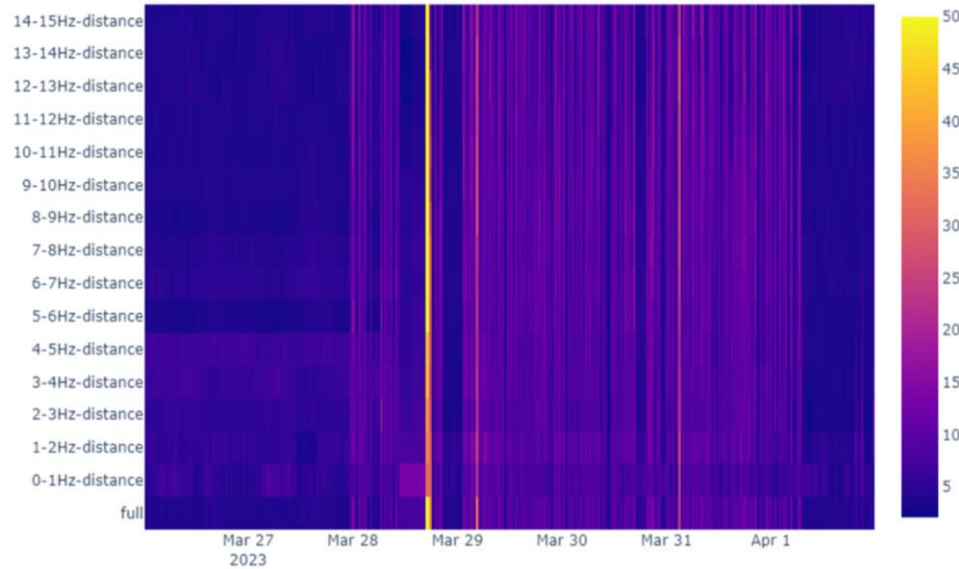


Embedding Results

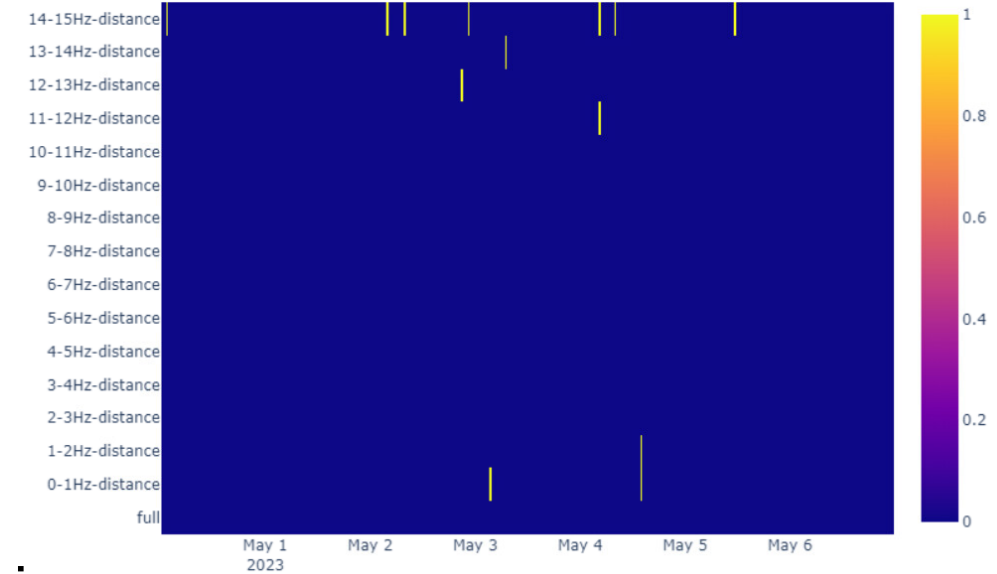


Sample Applications

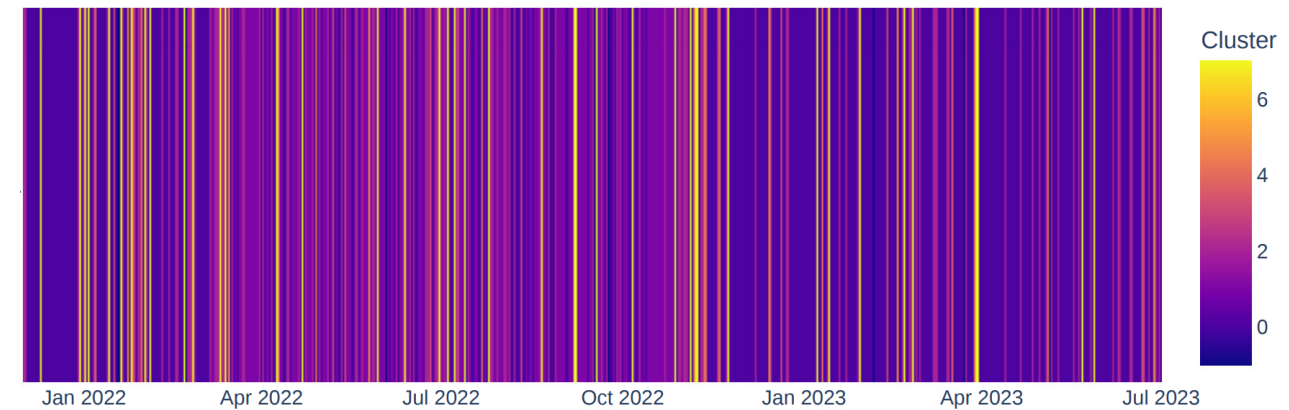
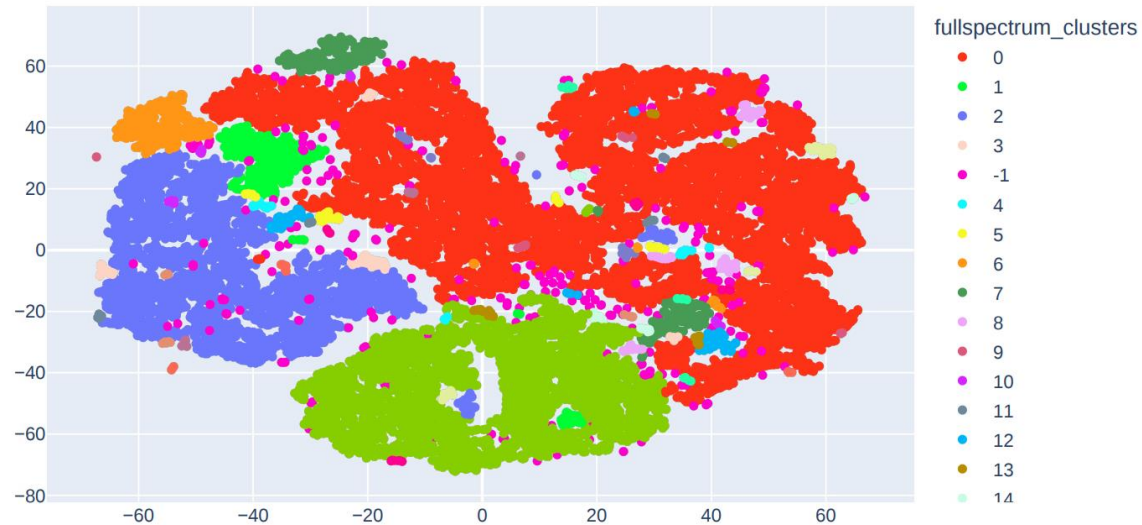
Distance / Similarity



Anomaly Detection



Clustering



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Conclusion and Future Steps

Identification of incipient phenomena → Reliable power delivery

- Achievements
 - Successful implementation of proposed data enrichment concept
 - Exploration of sample applications
- Future Work
 - Performance Improvement
 - Application and Impact
 - Integration into Operation

| Contact

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