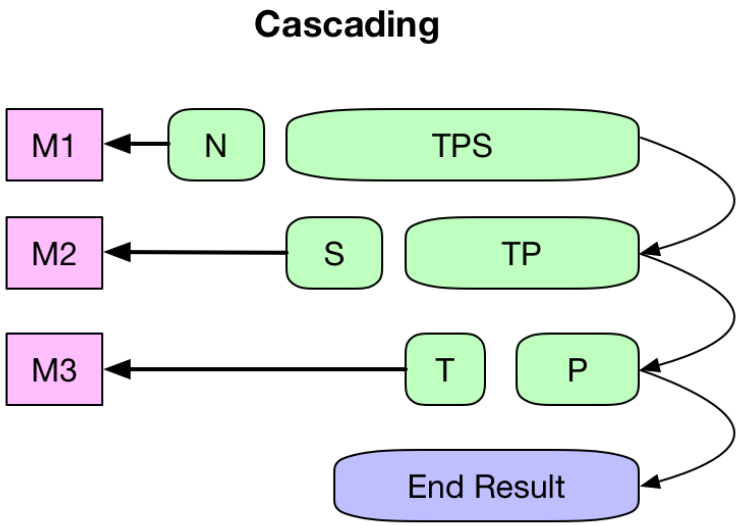
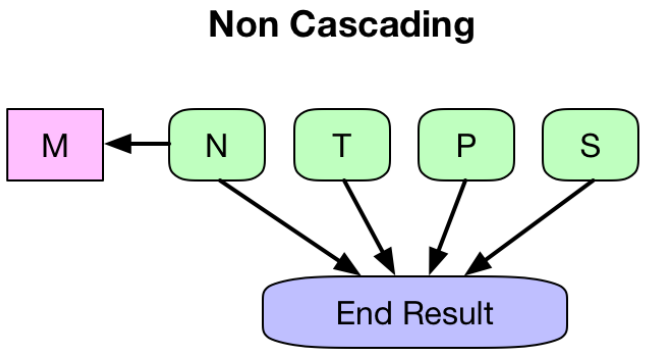
Seismic Phase Classification

Comparison of current Phase Classification and my Experiment

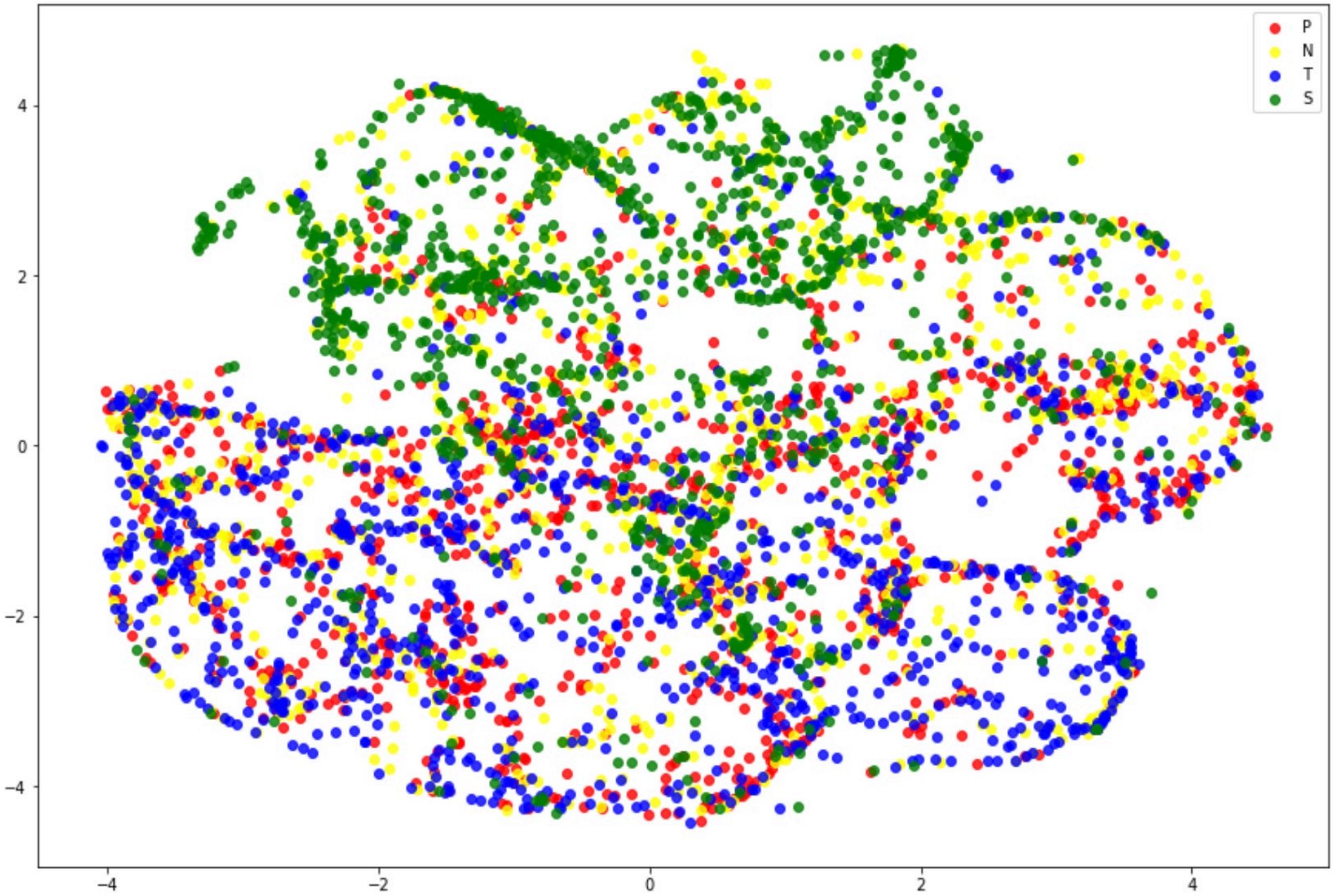




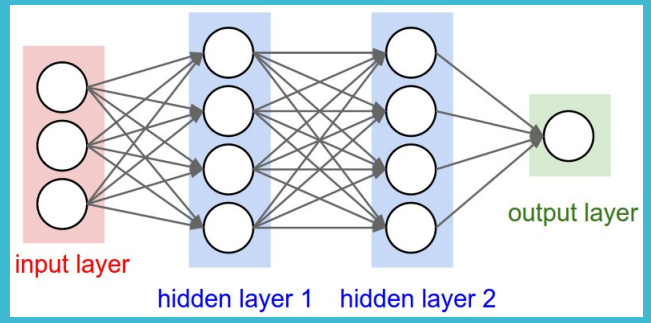
Layer: each level has 1 hidden layer
Training dataset: 6882, 6824, 6843, 20549
Test dataset: 2251, 2309, 2290, 6850
Overall accuracy: 75.45%

Layer: 2 hidden layers
Training dataset: 6882, 6824, 6843, 20549
Test dataset: 2280, 2280, 2280, 6840
Overall accuracy: 76.70%

Dataset Visualization using tSNE



Performance Comparison of difference Size of Hidden Layers in NN



Layers	Accuracy
4, 4	63.75 %
4, 16	70.75 %
4, 32	71.11 %
4, 128	72.19 %
8, 4	70.91 %
8, 16	73.41 %
8, 32	71.75 %
8, 128	73.82 %
16, 4	72.38 %
16, 16	74.96 %
16, 32	74.56 %
16, 128	75.61 %

Layers	Accuracy
32, 4	50.00 %
32, 16	76.53 %
32, 32	76.70 %
32, 128	75.65 %
64, 4	50.00 %
64, 16	76.48 %
64, 32	76.38 %
64, 128	76.35 %
128, 4	50.00 %
128, 16	75.83 %
128, 32	76.47 %
128, 128	74.87 %

Layers	Accuracy
16,16,16	74.80 %
32,32,32	76.10 %
64,64,64	76.24 %
128,128,128	74.77 %
16,16,16,16	74.90 %
32,32,32,32	76.29 %
32,64,64,64	76.19 %
32,128,64,128	75.15 %

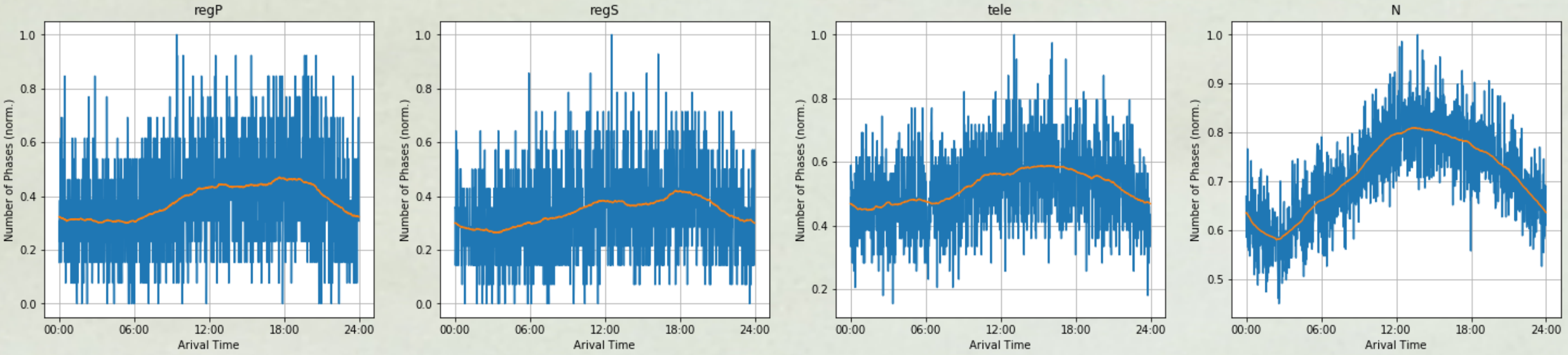
ML Algorithms Comparison

- Neural Network: … highly interconnected processing elements, …
- Support Vector Machine (SVM): a discriminative classifier formally defined by a separating hyperplane
- XGBoost: an optimized distributed gradient boosting library (more for tabular data than for data like images or videos)
- GCForest: a decision tree ensemble approach
- AutoML: provides methods and processes to make Machine Learning available for non-Machine Learning experts

	Neural Network*	SVM	XGBoost	GCForest	AutoML
Accuracy	76.7 %	73.9 %	77.58 %	77.10 %	77.40 %
Training Time	5 min. (GPU)	10 min. (CPU)	285 min. (CPU)	5 min. (CPU)	60 min. (CPU)

*: layer 32, 32; epochs: 2000; dropout: 0.2

Number of Phases by its arrival Daytime



Thanks