RT Data-Driven Detection of Bad Electrodes Connection

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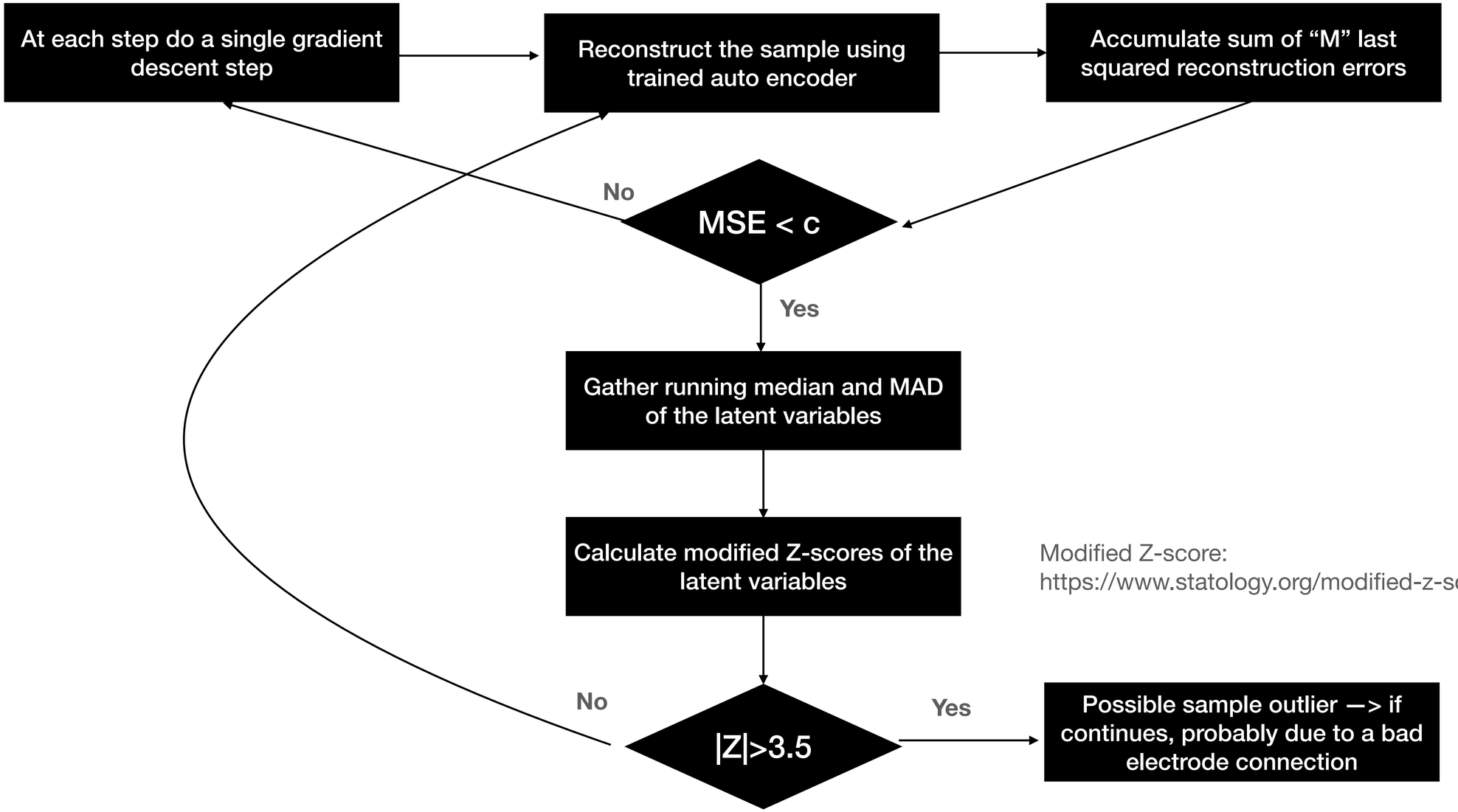
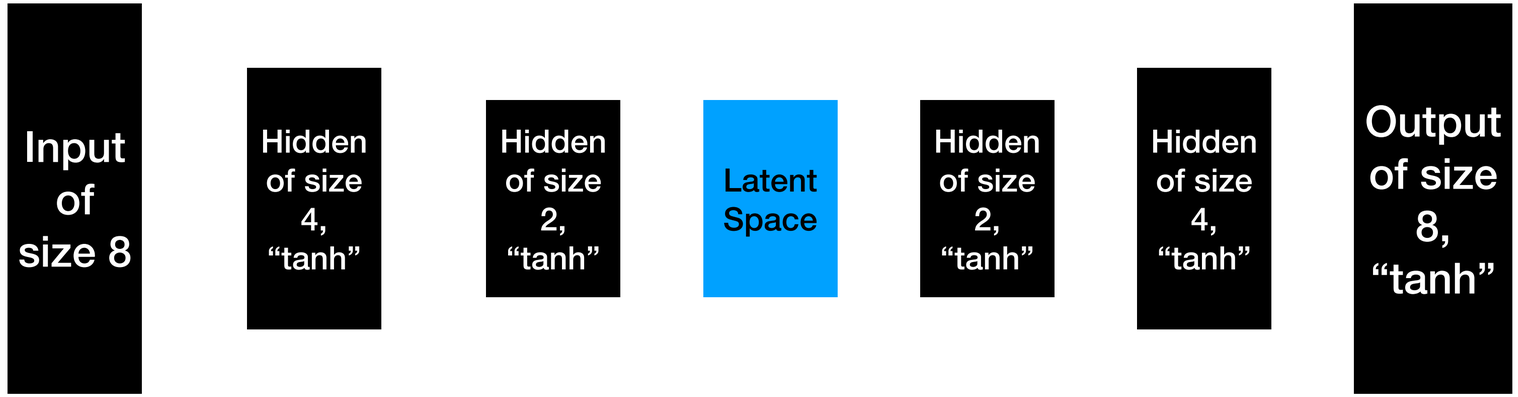
For each SNC sensor take windows of 8 consecutive samples, then at each time step do the following logic



Modified Z-score:
https://www.statology.org/modified-z-score/

Simple autoencoder architecture

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_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 input_1 (InputLayer)        [(None, 8)]               0

 model (Functional)          (None, 2)                 52

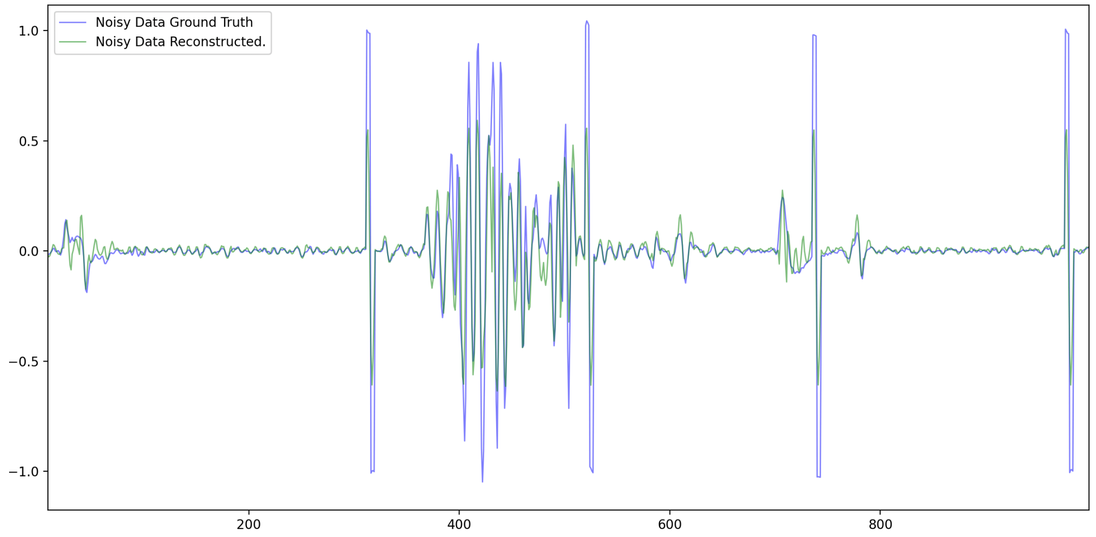
 model_1 (Functional)        (None, 8)                 58

=================================================================
Total params: 110 (440.00 Byte)
Trainable params: 110 (440.00 Byte)
Non-trainable params: 0 (0.00 Byte)
```

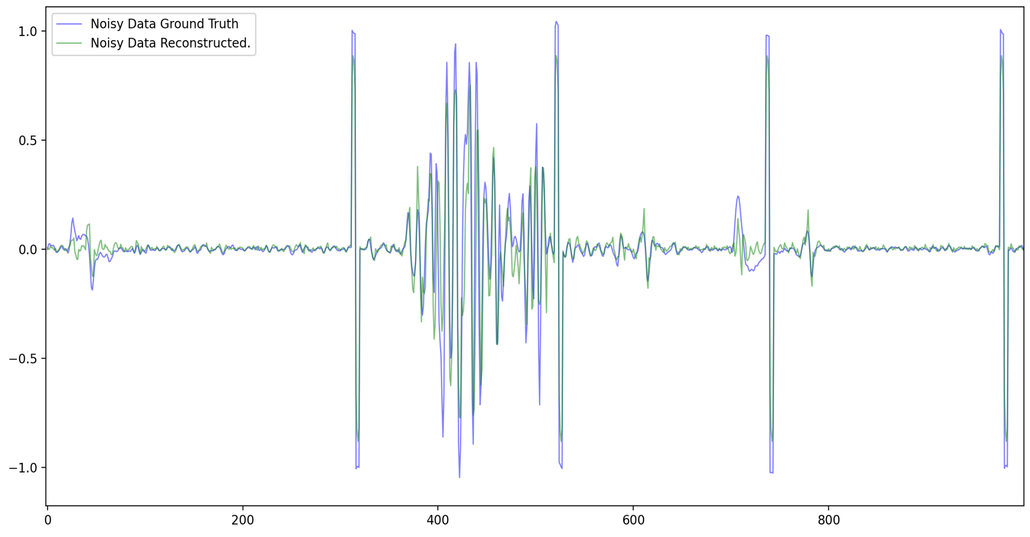
Only, 110 parameters - should work in mobile and might be suitable even for embedded

Example Doublet Noise

Autoencoder **trained on clean data**



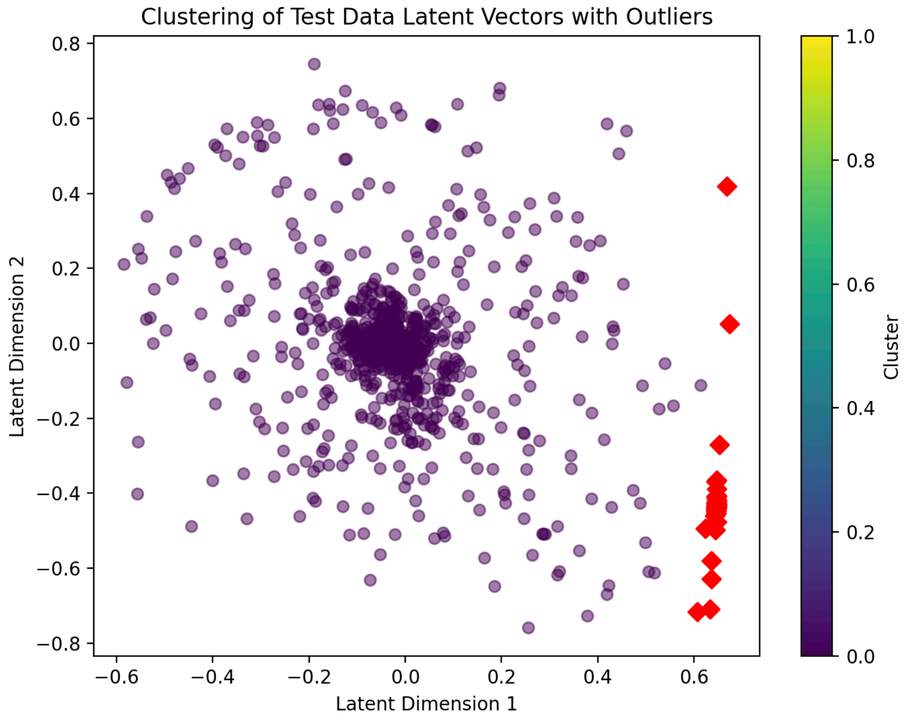
Autoencoder **trained on noisy data**



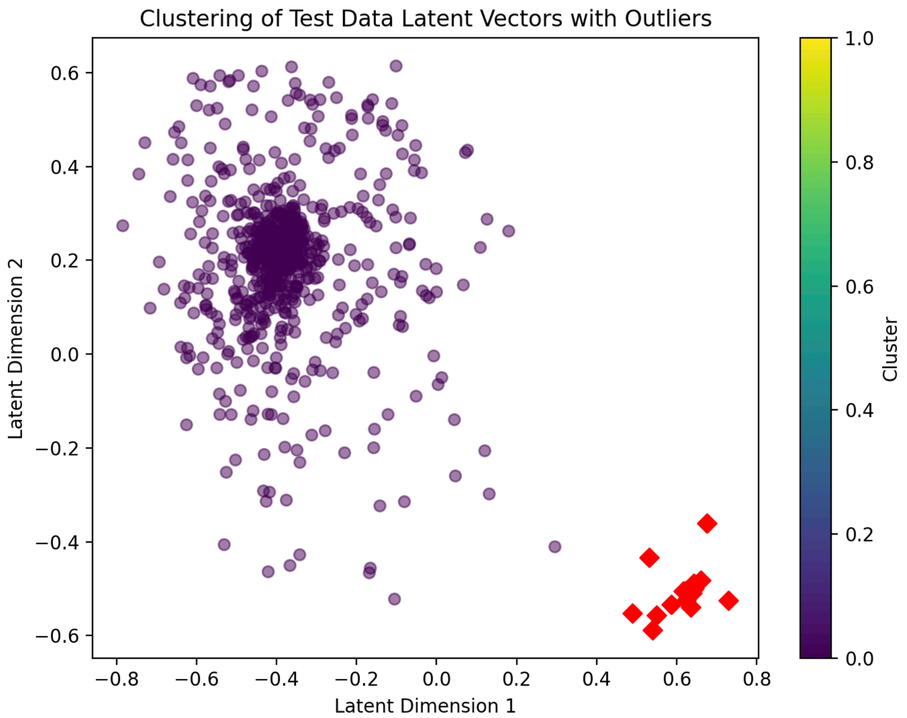
Reconstruction error is much smaller when trained on noisy train set, thus RT anomaly detection is better doing in the latent space.

Example Doublet Noise

Autoencoder and K-means **trained on clean data**

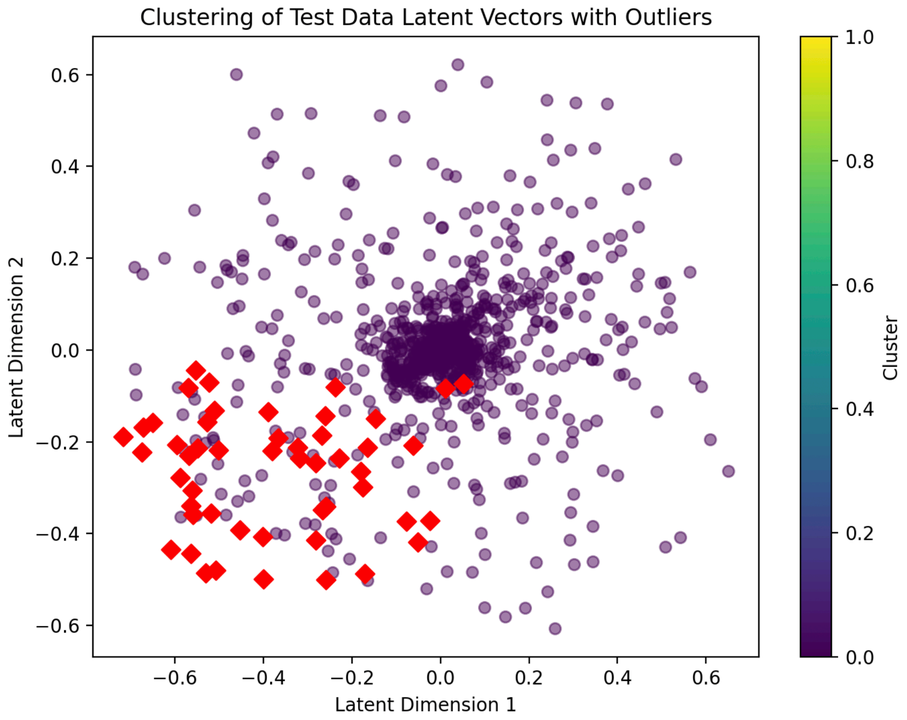


Autoencoder and K-means **trained on noisy data**

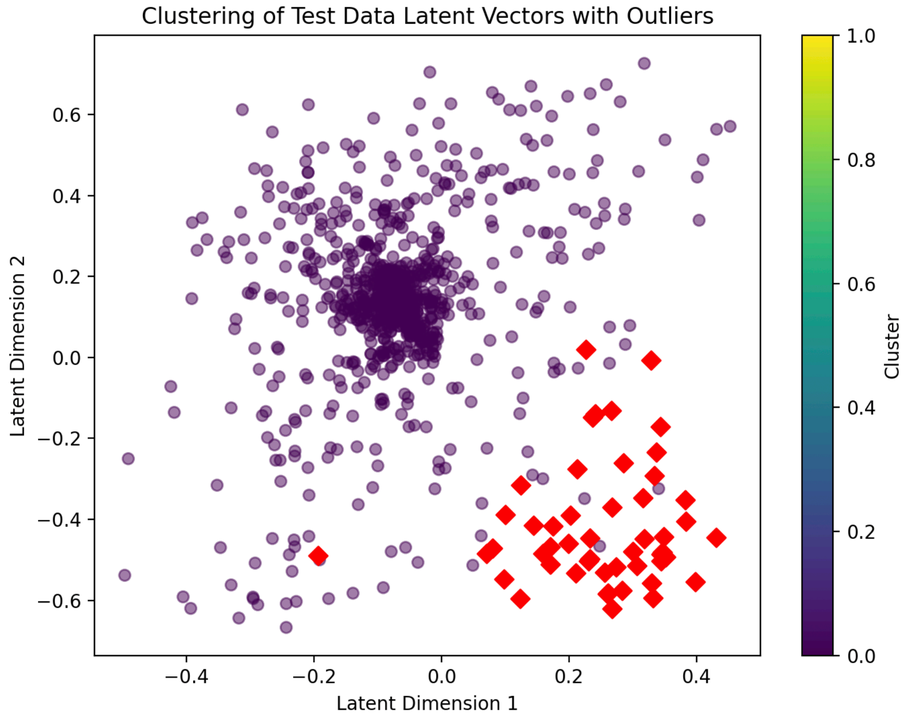


Example White Noise

Autoencoder and K-means trained on clean data



Autoencoder and K-means trained on noisy data



Here separability is worser than in a doublet case, probably because noise is a continuous value between (0, 1), while in doublet it is either 1, either -1. In addition doublet is more representative to electrode disconnection than white noise.