

A denoising stacked autoencoders for transient electromagnetic signal denoising

The paper presents a denoising method based on autoencoders, which learn “automatically” a lossy compression based on the input data with an unsupervised manner. In this paper, the authors apply autoencoders to TEMSFS data in order to reduce the potential existing noise by compressing and then reconstructing it. In this paper, the reconstructed signal is compared to the theoretical one.

The research carried out in this paper is relevant by means to the application to geophysical signals, which has not been applied before (according to the authors). However, in my opinion the paper needs major revision.

Important comments:

My field is machine learning and data science and not geophysics.

- The paper aims to denoise a signal with autoencoders (unsupervised manner). However, the authors did this by putting a theoretical signal as output. This is not an unsupervised manner to proceed. Why did the authors put an output? Is it a traditional way to proceed in geophysics?
- Page 2 line 3: can you please explain little bit why PCA is cumbersome and what could be the effect on the signal used as case study?
- Page 3, in which the SELU activation function and the ADAM optimisation algorithm are introduced, a justification of choice is needed.
- Page 3 line 24: “SELU activation function is utilized to prevent too many of depth”: please put a reference for that? Same page line 12, authors said: SELU and ADAM optimisation algorithm are used to solve the problem of over-fitting. How? Need references for this point or a good justification.
- Please add other criteria in addition to the MAE.
- The data splitting need more explanations. The experimental case study needs also some explanation with some exploratory analysis.
- For choosing only 2 hidden layers, did you take into account the other hyper parameters. I suggest a grid search, which is possible to do using TensorFlow library or Keras in Python.
- For the comparison with traditional methods, please add PCA.
- Explain how the traditional methods were applied (mother wavelet ...).

Some remarks:

- Put more explanation on the caption of figure 1 if possible.
- Equation 9: put bracket. In addition, explain it little bit (m , X , h ...) if possible.
- Page 6 line 10: the authors used Tensorflow, please put a figure of the architecture of the used model.
- Since the journal is open source, think to put your code on an open source platform (e.g. GitHub ...)