(1) The Matlab code is used to implement Back-Propagation Scheme (BPS) in

Z. Wei and X. Chen, "Deep learning schemes for full-wave nonlinear inverse scattering problems," IEEE Transactions on Geoscience and Remote Sensing, 57 (4), pp. 1849-1860, 2019.

This Matlab code is used to solve inverse scattering problem with convolutional neural network by BPS, which is written by Zhun WEI (weizhun1010@gmail. com).

Please feel free to contact if you have any question. Only CPU is required, and you can easily adapt it into GPU version or Python version.

(2) **Test:** I have already put a trained network in the folder "training_result", which is trained for the random permittivity between 1-1.5. You can simplely test the trained network by running "Display_Results_all_Results" for 25 examples.

If you want to test it on a profile defined by yourself, you can define your profile in "data_generate_Circle_Es_S1" , run it, and then run "Data_generate_Circle_BP_S1" to generate BP inputs, and at last run "Display_Results_your_example"

(3) **To start a new training:** You can start your training by simple run "BPS_Training", it consists of "data_generate_Circle_Es" (generate training scattering field) , "Data_generate_Circle_BP" (generate BP inputs), and training process.

To test your trained network, please refer to (2).

Reference:

Z. Wei and X. Chen, "Deep learning schemes for full-wave nonlinear inverse scattering problems," IEEE Transactions on Geoscience and Remote Sensing, 57 (4), pp. 1849-1860, 2019.

Z. Wei, D. Liu, and X. Chen, "Dominant-Current Deep Learning Scheme for Electrical Impedance Tomography Imaging," IEEE Transactions on Biomedical Engineering, vol. 66, no. 9, pp. 2546-2555, 2019.

K. H. Jin, M. T. McCann, E. Froustey, and M. Unser, "Deep convolutional neural network for inverse problems in imaging," IEEE Transactions on Image Processing, vol. 26, no. 9, pp. 4509–4522, 2017.