LPCNN QSM Tool for Arbitrary Orientation Dipole Inversion

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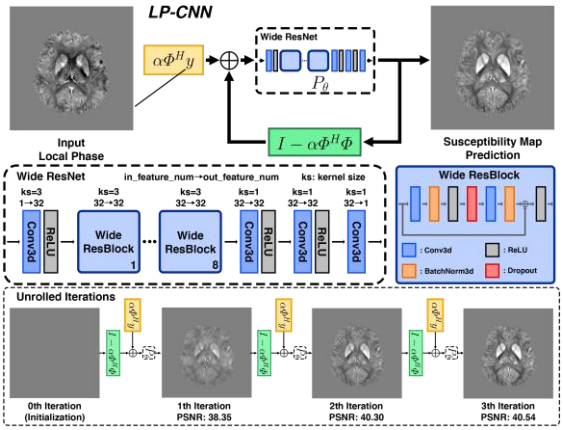
Learned Proximal Convolutional Neural Network (LPCNN)

- Solves field-to-susceptibility dipole inversion with data-driven restoration priors (neural network) + iterative solver (proximal gradient descent) according to the dipole model
- Handles dipole inversion with arbitrary orientation (oblique acquisition) and can-do multiple-orientation QSM
- Implemented in PyTorch



▪ LPCNN framework

Learned Proximal Convolutional Neural Network (LPCNN) is a QSM method combining the data-driven restoration priors and the iterative solver based on the forward dipole-model. The neural network serves as a data-driven regularizer. Because the learned parameters in the neural network are separated from the forward operator, LPCNN can solve arbitrary orientation dipole inversion and can do multiple orientation QSM without retraining or model modification.

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LPCNN tool includes

- **Multiple orientation QSM dataset (n=8)**
- **Scripts** used for preprocessing, training, validation and testing
- **Trained model weight** for immediate testing on your own data
- Need input of preprocessed local field map and pre-calculated dipole kernel

- Multiple orientation QSM

Links:
[Github/Download link]
https://github.com/Sulam-Group/LPCNN
[Publication link]
Kuo-Wei Lai, Manisha Aggarwal, Peter van Zijl, Xu Li, Jeremias Sulam. Learned proximal networks for quantitative susceptibility mapping. InternationalConference on Medical Image Computing and Computer-Assisted Intervention. pp. 125–135. Springer 2020.
https://link.springer.com/chapter/10.1007/978-3-030-59713-9_13

In the LPCNN tool we shared on github, we provide our QSM dataset used in the publication, the script used for preprocessing, training, validation and testing for arbitrary orientation dipole inversion and multiple orientation QSM. We also provide a trained LPCNN model weight for direct testing on your own data.