MathGeo

A toolbox for seismic data processing from Center of Geopyhsics, Harbin Institute of Technology, China

- AGCM:

We have used the asymmetric Gaussian chirplet model (AGCM) and established a dictionary-free variant of the orthogonal matching pursuit, a greedy algorithm for sparse approximation of seismic traces.

Reference:

F. Bossmann, J. Ma, Asymmetric chirplet transform for sparse representation of seismic data, Geophysics, 2015, 80 (6), WD89-WD100.

F. Bossmann, J. Ma, Asymmetric chirplet transform ¡ª Part 2: Phase, frequency, and chirp rate, Geophysiscs, 2016, 81(6):V425-V439.

- Decurtain:

An infimal convolution model is applied to split the corrupted 3D image into the clean image and two types of corruptions, namely a striped part and a laminar one.

Reference:

Fitschen J H, Ma J, Schuff S. Removal of curtaining effects by a variational model with directional forward differences[J]. Computer Vision & Image Understanding, 2017, 155(13):24-32.

- EMPCR:

We propose a simple yet efficient interpolation algorithm, which is based on the Hankel matrix, for randomly missing traces.

Reference:

Jia Y, Yu S, Liu L, et al. A fast rank-reduction algorithm for three-dimensional seismic data interpolation[J]. Journal of Applied Geophysics, 2016, 132:137-145.

- RegistrationMultiComponent:

We propose a new curvelet-based registration method to improve the precision of registration, especially for the data with heavy random noises.

Reference:

Wang H, Cheng Y, Ma J. Curvelet-based registration of multi-component seismic waves[J]. Journal of Applied Geophysics, 2014, 104(5):90-96.

- DL_toolbox

We propose a simultaneous dictionary learning and denoising method for seismic data.

Reference:

Beckouche S, Ma J. Simultaneous dictionary learning and denoising for seismic data[J]. Geophysics, 2014, 79(3):A27-A31.

- DDTF3D:

We study an application of the data-driven tight frame (DDTF) method to noise suppression and interpolation of high-dimensional seis- mic data.

Reference:

Yu S, Ma J, Zhang X, et al. Interpolation and denoising of high-dimensional seismic data by learning a tight frame[J]. Geophysics, 2015, 80(5):V119-V132.

- MCDDTF3D:

We have designed a new patch selection method for DDTF seismic data recovery. We suppose that patches with higher variance contain more information related to complex structures, and should be selected into the training set with higher probability.

Reference:

Yu S, Ma J, Osher S. Monte Carlo data-driven tight frame for seismic data recovery[J]. Geophysics, 2016, 81(4):V327-V340.

- CVMD:

We have extended varitional mode decomposition to complex-valued situation and apply CVMD to f-x spectrum of seismic for denoising.

Reference:

Yu S, Ma J. Complex Variational Mode Decomposition for Slop-preserving Denoising, summited to IEEE Transactions on Geoscience and Remote Sensing

- LDMM

We have applied low dimensional manifold method for seismic strong noise attenuation. LDMM uses a low dimensional method to approximate all the patches of seismic data.

Reference:

Yu S, et. al. Noise attenuation in a low dimensional manifold, Geophysics, 2017

- test data download link

http://pan.baidu.com/s/1qYwI1IG (http://pan.baidu.com/s/1qYwI1IG)