
Reproducible Deep Compressive Sensing

Collection of source code for deep learning-based compressive sensing (DCS). Links for source code, pdf, doi are available. Related works are classified based on the sampling matrix type (frame-based/block-based), sampling scale (single scale, multi-scale), and deep learning platform.

Code for other than sampling, reconstruction of image/video are given in the Other section.

P/s: If you know any source code please let me know.

Block-based DCS

Single-Scale Sensing

- TCS-NET:[code]
 - H. Gan et al., From Patch to Pixel: A Transformer-based Hierarchical Framework for Compressive Image Sensing, TCI 2023
- TransCS: [code]
 - M. Shen et al., TransCS: A Transformer-Based Hybrid Architecture for Image Compressed Sensing, IEEE Trans Image Process, 2022.
- TCS: [code]
 - M. B. Lorenzana et al., Transfomer compressed sensing via global image tokens, IEEE International Conference on Image Processing, ICIP 2022.
- IBM_CS: [code]
 - B. Lee et al., Information Bottleneck Measurement for Compressed Sensing Image Reconstruction, IEEE Signal Processing Letter 2022.
- RK-CSNet: [code] [Pytorch]
 - R. Zheng et al, “Runge-Kutta Convolutional Compressed Sensing Network,” ECCV 2022.
- TDCN: [code] [Pytorch]
 - R. Lu and K. Ye, “Tree-structured Dilated Convolutional Networks for Image Compressed Sensing,” IEEE Access, 2022.
- MTC-CSNET: [code] [Pytorch]
 - MTC-CSNet: Marrying Transformer and Convolution for Image Compressed Sensing, 2022.

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- CASNet: [code] [Pytorch]
 - B. Chen and J. Zhang, “Content-aware Scalable Deep Compressed Sensing,” IEEE Trans. Image Processing, 2022.
 - NL-CSNet: [code] [PyTorch]
 - W. Cui et al, Image Compressed Sensing Using Non-local Neural Network, Transaction on Multimedia, 2022.
 - MADUN: [code] [PyTorch]
 - J. Song et al. Memory-Augmented Deep Unfolding Network for Compressive Sensing (ACM MM 2021)
 - SP_DCS: Single pixel DCS [code] [PyTorch]
 - Mengyu Jia et al . Single pixel imaging via unsupervised deep compressive sensing with collaborative sparsity in discretized feature space, Journal of Bio photonic, 2022.
 - AMPD-Net:[Code] [PyTorch]
 - Z. Zhang, Y. Liu, J. Liu, F. Wen, C. Zhu, “AMP-Net: Denoising based Deep Unfolding for Compressive Image Sensing,” IEEE Transaction on Image Processing, 2021.
 - DRCS-SR [code]
 - H. Kasem, M. Selim, E. Mohamed, A. Hussein, “DRCS-SR-Deep-Robust-Compressed-Sensing-for-Single-Image-Super-Resolution,” IEEE Access, 2020.
 - OPINE-Net [Code] [Pytorch]
 - Jian Zhang, Chen Zhao, Wen Gao “Optimization-Inspired Compact Deep Compressive Sensing”, IEEE Journal of Selected Topics in Signal Processing (JSTSP), vol. 14, no. 4, pp. 765-774, May 2020. [pdf]
 - DUF-WL1:[Code]
 - J. Zhang, Y. Li, Z. Yu, Z. Gu, Y. Cheng, H. Gong, “Deep Unfolding With Weighted ℓ_2 Minimization for Compressive Sensing,” IEEE Internet of Thing Journal, 2020.
 - TGDOF [Code][Matlab]
 - R. Liu, Y. ZHANG, S. Cheng, X. Fan, Z. Luo, “A theoretically guaranteed optimization framework for robust compressive sensing MRI,” Proceeding of the AAAI Conference on Artificial Intelligence, 2019.
 - DNN-CS-STM32-MCU [Code] [Tensorflow]
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- Lab. of Statistical Signal Processing - Deep Neural Network for CS based signal reconstruction on STM32 MCU board
 - TIP-CSNet [DOI] [Code][Matconvnet] [Code] [Pytorch]
 - W. Shi et al., Image Compressed Sensing using Convolutional Neural Network, IEEE Trans. Image Process, 2019.
 - LapCSNet [PDF] [Code][Matconvnet]
 - Wenxue Cui, Heyao Xu, Xinwei Gao, Shengping Zhang, Feng Jiang, Debin Zhao, “An efficient deep convolutional laplacian pyramid architecture for CS reconstruction at low sampling ratios,” 2018.
 - Perceptual-CS [[Code]] (<https://github.com/jiang-du/Perceptual-CS>) [DOI] [Caffe]
 - J. Du, X. Xie, C. Wang, and G. Shi, “Perceptual Compressive Sensing,” Chinese Conference on Pattern Recognition and Computer Vision (PRCV), pp. 268 - 279, 2018.
 - ISTA-Net [Code] [PDF] [Tensorflow]
 - Z. Jian and G. Bernard, “ISTA-Net: Interpretable Optimization-Inspired Deep Network for Image Compressive Sensing”, IEEE International Conference on Computer Vision and Pattern Recognition, 2018.
 - CSNet [Code] [Code-Relmp] [PDF] [DOI] [Matconvnet] [Code-Relmp-Pytorch]
 - W. Shi, F. Jaing, S. Zhang, and D. Zhao, “Deep networks for compressed image sensing”, IEEE International Conference on Multimedia and Expo (ICME), 2017.
 - DeepInv [Code-Relmp] [PDF] [DOI]
 - A. Mousavi, R. G. Baraniuk et al., “Learning to invert: Signal recovery via Deep Convolutional Networks,” IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2017.
 - DBCS [Code] [PDF] [DOI] [Matlab]
 - A. Adler, D.Boublil, and M. Zibulevsky, “Block-based compressed sensing of images via deep learning,” IEEE International Workshop on Multimedia Signal Processing (MMSP), 2017.
 - DR2Net [Code] [Code] [PDF] [Caffe]
 - H. Yao, F. Dai, D. Zhang, Y. Ma, S. Zhang, Y. Zhang, and Q. Tian, “DR2-net: Deep residual reconstruction network for image compressive sensing”, arXiv:1702.05743, 2017.
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- CS-CAE [Code] [PDF] [Theanos]
 - S. Schneider, “A deep learning approach to compressive sensing with convolutional autoencoders,” tech. report, 2016.
 - ReconNet [Code] [Code] [PDF] [DOI] [Caffe]
 - K. Kulkarni, S. Lohi, P. Turaga, R. Kerviche, A. Ashok, “ReconNet: Non-Iterative Reconstruction of Images from Compressively Sensed Measurements,” IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), 2016.

Multi-Scale Sensing

- STDIP: [code]
 - Y. Zhong et al, Image Compressed Sensing Reconstruction via Deep Image Prior With Structure-Texture Decomposition, IEEE Signal Processing Letter 2023.
- AMS-NET: [code] [Python]
 - AMS-Net: Adaptive Multi-Scale Network for Image Compressive Sensing, IEEE Transaction on Multimedia, 2022.
- MS-DCI [DOI] [PDF] [Code][Matconvnet]
 - T. N. Canh et al., Multi-scale Deep Compressive Imaging, arxiv 2020.
- Scalable Compressed Sensing Network (SCSNet) [DOI] [PDF] [Code][Matconvnet]
 - W. Shi et al., Scalable Convolutional Neural Network for Image Compressed Sensing, CVPR 2019.
- DoC-DCS [Code] [PDF] [MatcovnNet]
 - T. N. Canh and B. Jeon, “Difference of Convolution for Deep Compressive Sensing,” IEEE International Conference on Image Processing (ICIP), 2019.
- DCSNet [Code] [PDF] [MatcovnNet]
 - T. N. Canh and B. Jeon, “Multi-Scale Deep Compressive Sensing Network,” IEEE International Conference on Visual Communication and Image Processing (VCIP), 2018.
- MS-CSNet [Code] [DOI] [MatconvNet]
 - W. Shi, F. Jiang, S. Liu, D. Zhao, “Multi-Scale Deep Networks for Image Compressed Sensing,” IEEE International Conference on Image Processing (ICIP), 2018.

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- LAPRAN [Code] [PDF] [PyTorch]
 - K. Xu, Z. Zhang, and F. Ren, “LAPRAN: A Scalable Laplacian Pyramid Reconstructive Adversarial Network for Flexible Compressive Sensing Reconstruction,” arXiv:1807.09388.

Adaptive Sensing

- AMS-NET: [code] [Python]
 - AMS-Net: Adaptive Multi-Scale Network for Image Compressive Sensing, IEEE Transaction on Multimedia, 2022.
- ACSNet [Code]
 - L. Zhong, S. Wan and L. Xie, “Adaptive Compressed Sensing imaging algorithm based on Deep Neural Network”, Journal of Pysics Conference.

Frame-based DCS

- DeepFlatCam[Code] [PDF]
 - Thuong Nguyen Canh and Hajime Nagahara, “Deep Compressive Sensing for Visual Privacy Protection in FlatCam Imaging,” IEEE the International Conference on Computer Vision Workshop, 2019.)
- MD-Recon-Net[Code] [PDF]
 - Maosong Ran, Wenjun Xia, Yongqiang Huang, Zexin Lu, Peng Bao, Yan Liu, Huaiqiang Sun, Jiliu Zhou, and Yi Zhang, “MD-Recon-Net: a parallel dual-domain convolutional neural network for compressed sensing MRI,” IEEE Transactions on Radiation and Plasma Medical Sciences, DOI: 10.1109/TRPMS.2020.2991877, online, 2020.
- CS-MRI-GAN[Code] [PDF]
 - P. Deora, B. Váudeva, S. Bhattacharya, P. M. Pradhan, “Structure Preserving Compressive Sensing MRI Reconstruction using Generative Adversarial Networks,” IEEE Computer Vision and Pattern Recognition Workshop, 2020.
- Tensor-ADMM-Net-CSI[Code] [Tensorflow]
 - Jiawei Ma, Xiao-Yang Liu, Zheng Shou, Xin Yuan, “Deep Tensor ADMM-Net for Snapshot Compressive Imaging,” IEEE ICCV, Nov. 2019.
- ADMM-CSNet[Code]

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- Yan Yang, Jian Sun, Huibin Li, Zongben Xu, “ADMM-CSNet: A Deep Learning Approach for Image Compressive Sensing,” IEEE Transaction on Pattern Recognition and Machine Intelligence, 2019.
 - DCS-GAN [Code][Pdf] - Available Soon from DeepMind
 - Yan Wu, Mihaela Rosca, Timothy Lillicrap, Deep Compressive Sensing, Arxiv 2019.
 - F-CSRG [Code] [PDF] [Tensorflow]
 - Shaojie Xu, Sihan Zeng, Justin Romberg, “Fast Compressive Sensing Recovery Using Generative Models with Structured Latent Variables ,” arXiv:1806.10175, 2019.
 - L1AE [Code] [PDF] [Tensorflow]
 - Shanshan Wu, Alexandros G. Dimakis, Sujay Sanghavi, Felix X. Yu, Daniel Holtmann-Rice, Dmitry Storcheus, Afshin Rostamizadeh, Sanjiv Kumar, “Learning a Compressed Sensing Measurement Matrix via Gradient Unrolling,” arXiv:1806.10175, 2018.
 - DIP [Code] [PDF] [Torch]
 - David Van Veen; Ajil Jalal, Eric Price; Sriram Vishwanath; Alexandros G. Dimakis, “Compressed Sensing with Deep Image Prior and Learned Regularization,” arXiv:1806.06438, 2018.
 - Deep-ADMM-Net [Code] [DOI] [MatconvNet]
 - Yan Yang ; Jian Sun ; HUIBIN LI ; Zongben Xu, “ADMM-CSNet: A Deep Learning Approach for Image Compressive Sensing,” IEEE Transaction on Pattern Recognition and Machine Intelligence, 2018.
 - VAR-MSI [Code] [[PDF]] [DOI] [Tensorflow]
 - H. Kerstin et al., “Learning a variational network for reconstruction of accelerated MRI data,” Magnetic Resonance in Medicine, vol. 79, no. 6, 2018.
 - CSMRI [Code] [PDF] [PyTorch]
 - M. Seitzer et al., “Adversarial and Perceptual Refinement Compressed Sensing MRI Reconstruction,” MICCAI 2018.
 - KCS-Net [Code] [PDF] [MatconvNet]
 - T. N. Canh and B. Jeon, “Deep Learning-Based Kronecker Compressive Imaging”, IEEE International Conference on Consumer Electronic Asia, 2018
 - DAGAN [Code] [PDF] [DOI] [Tensorflow]
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- G. Yang et al., “DAGAN: Deep De-Aliasing Generative Adversarial Networks for Fast Compressed Sensing MRI Reconstruction,” IEEE Transaction on Medical Imaging, vol. 37, no. 6, 2018.
 - SADN [Code][Doi] [Matlab]
 - Qiegen Liu and Henry Leung, Synthesis-analysis deconvolutional network for compressed sensing, IEEE International Conference on Image Processing, 2017.
 - CSGM [Code] [PDF] [Tensorflow]
 - A. Bora, A. Jalal, A. G. Dimakis, “Compressed sensing using Generative Models,” arXiv:1703.03208, 2017.
 - Learned D-AMP [Code] [PDF] [Tensorflow]
 - C. A. Metzler et al., “Learned D-AMP: Principled Neural Network based Compressive Image Recovery,” Advances in Neural Information Processing Systems, 2017.
 - Deep-Ternary [Code] [PDF] [Tensorflow]
 - D. M. Nguyen, E. Tsiliogianni and N. Deligiannis, “Deep learning sparse ternary projections for compressed sensing of images,” IEEE Global Conference on Signal and Information Processing (GlobalSIP), 2017.
 - GANCS [Code] [PDF] [Tensorflow]
 - M. Mardani et al., “Compressed Sensing MRI based on Deep Generative Adversarial Network,” arXiv:1706.00051, 2017.

Video Compressive Sensing

- DL-CACTI [Code] [Tensorflow]
 - M. Qiao, Z. Meng, J. Ma, X. Yuan, “Deep Learning for Video Compressive Sensing,” APL Photonics 5, 2020.
- DeepVideoCS [Web] [Code] [PDF] [DOI] [PyTorch]
 - M. Iliadis, L. Spinoulas, A. K. Katsaggelos, “Deep fully-connected networks for video compressive sensing,” Elsevier Digital Signal Processing, vol. 72, 2018.
- CSVideoNet [Code] [PDF] [Caffe] [Matlab]
 - K. Xu and F. Ren, “SVideoNet: A Recurrent Convolutional Neural Network for Compressive Sensing Video Reconstruction,” arXiv:162.05203, 2018.

Other

- CSNN [Code] [DOI] [Matlab][Tensorflow]
 - Yonar and Lee et. al., A Compressed Sensing Framework for Efficient Dissection of Neural Circuits.” (2019) Nature Methods 16, pages126–133.
- LIS-DL [Code] [PDF] [Matlab]
 - Abdelrahman Taha, Muhammad Alrabeiah, Ahmed Alkhateeb, “Enabling Large Intelligent Surfaces with Compressive Sensing and Deep Learning,” arXiv:1904.10136, Apr 2019.
- VAE-GANs [Code] [PDF] [Python]
 - Vineet Edupuganti, Morteza Mardani, Joseph Cheng, Shreyas Vasanaawala, John Pauly, “VAE-GANs for Probabilistic Compressive Image Recovery: Uncertainty Analysis,” arxiv1901.1128, 2019.
- Sparse-Gen [Code] [[PDF] [Tensorflow]
 - Manik Dhar, Aditya Grover, Stefano Ermon, “Modeling Sparse Deviations for Compressed Sensing using Generative Models,” International Conference on Machine Learning (ICML), 2018
- Super-LiDAR [Code] [PDF] [Tensorflow]
 - Nathaniel Chodosh, Chaoyang Wang, Simon Lucey, “Deep Convolutional Compressed Sensing for LiDAR Depth Completion,” arXiv:1803.08949, 2018.
- Unpaired-GANCS [Code] [Tensorflow]
 - Reconstruct under sampled MRI image
- CSGAN [Code] [PDF] [Tensorflow]
 - M. Kabkab, P. Samangouei, and R. Chellappa, “Task-Aware Compressed Sensing with Generative Adversarial Networks,” AAAI Conference on Artificial Intelligence, 2018
- DL-CSI [Code] [PDF] [Tensorflow][Keras]
 - Chao-Kai Wen, Wan-Ting Shih, and Shi Jin, “Deep learning for massive MIMO CSI feedback,” IEEE Wireless Communications Letters, 2018.
- US-CS [Code] [PDF] [DOI] [Tensorflow]
 - D. Perdios, A. Besson, M. Arditi, and J. Thiran, “A Deep Learning Approach to Ultrasound Image Recovery”, IEEE International Ultrasonics Symposium, 2017.

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- DeepIoT [Code-RelImplement] [PDF] [Tensorflow]
 - Shuochao Yao, Yiran Zhao, Aston Zhang, Lu Su, Tarek Abdelzaher, “DeepIoT: Compressing Deep Neural Network Structures for Sensing Systems with a Compressor-Critic Framework,” AAAI Conference on Artificial Intelligence, 2018
 - LSTM_CS [Code] [PDF] [DOI] [Matlab]
 - H. Palangi, R. Ward, and L. Deng, “Distributed Compressive Sensing: A Deep Learning Approach,” IEEE Transaction on Signal Processing, vol. 64, no. 17, 2016.