Stanford

Liyan Sun

Postdoctoral Scholar, Radiation Physics

Bio

BIO

Liyan Sun is a postdoctoral scholar at Department of Radiation Oncology, Stanford University, Stanford, CA, USA. He was born in Xuchang, China. He received B.E. degree in communication engineering from Zhengzhou University, Zhengzhou, China and Ph.D. degree in Signal and Information Processing from Xiamen University, Xiamen, China. He then did a one-year postdoctoral training at Xiamen University in Biomedical Imaging before joining Stanford University. His main research interests include machine learning and its application in biomedical imaging and radiation treatment.

HONORS AND AWARDS

- Winning Team Award, Grand Challenge on MR Brain Segmentation 2018 (2018)
- Student Travel Grant, IEEE Global Conference on Signal and Information Processing (2015)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Student Member, IEEE Signal Processing Society (2015 - 2016)

PROFESSIONAL EDUCATION

- Bachelor of Engineering, Zhengzhou University (2014)
- Doctor of Philosophy, Xiamen University (2021)
- Ph.D., Xiamen University , Signal and Information Processing (2021)
- B.E., Zhengzhou University , Communication Engineering (2014)

STANFORD ADVISORS

- Wu Liu, Postdoctoral Faculty Sponsor

LINKS

- Google Scholar: https://scholar.google.com/citations?user=5UDCaIAAAAAJ&hl=en

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

(1) Compressed sensing MRI with deep learning models optimized under a unified framework. The low-level reconstruction task and high-level analysis problem regularize each other. Deep learning models enable their joint optimization within a unified framework.

(2) Segmentation of medical images suffer from scarce data resources derived from low data acquisition efficiency, demand for annotation expertise and other factors. Develop deep learning algorithms capable of addressing aforementioned challenges is one important issue to be explored.

(3) Medical image generation from external modalities or subjects provides complementary information. Supervised/Unsupervised deep learning models enable flexible high-quality image synthesis under both paired and unpaired data condition.

(4) Time-series data offers longitudinal information on the disease development of patients. By leveraging temporary correlation, deep neural networks are able to predict future state of health of target patient.

(5) PET imaging with radiation treatment offers new possibility for better treating cancer patients. Improving real-time PET image quality with deep learning methods could potentially lead to better treatment outcome.

Publications

PUBLICATIONS

- **Harmonizing Pathological and Normal Pixels for Pseudo-Healthy Synthesis** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
  Zhang, Y., Lin, X., Zhuang, Y., Sun, L., Huang, Y., Ding, X., Wang, G., Yang, L., Yu, Y.
  2022; 41 (9): 2457-2468
- **A teacher-student framework for liver and tumor segmentation under mixed supervision from abdominal CT scans** *NEURAL COMPUTING & APPLICATIONS*
  Sun, L., Wu, J., Ding, X., Huang, Y., Chen, Z., Wang, G., Yu, Y.
  2022; 34 (19): 16547-16561
- **Few-shot medical image segmentation using a global correlation network with discriminative embedding** *COMPUTERS IN BIOLOGY AND MEDICINE*
  Sun, L., Li, C., Ding, X., Huang, Y., Chen, Z., Wang, G., Yu, Y., Paisley, J.
  2022; 140: 105067
- **Hierarchical deep network with uncertainty-aware semi-supervised learning for vessel segmentation** *NEURAL COMPUTING & APPLICATIONS*
  Li, C., Ma, W., Sun, L., Ding, X., Huang, Y., Wang, G., Yu, Y.
  2022; 34 (4): 3151-3164
- **Enhanced Deep Blind Hyperspectral Image Fusion** *IEEE TRANSACTIONS ON NEURAL NETWORKS AND LEARNING SYSTEMS*
  Wang, W., Fu, X., Zeng, W., Sun, L., Zhan, R., Huang, Y., Ding, X.
  2021
- **Triple-D network for efficient undersampled magnetic resonance images reconstruction** *MAGNETIC RESONANCE IMAGING*
  Li, Z., Bao, Q., Yang, C., Chen, F., Wu, G., Sun, L., Zhang, Z., Liu, C.
  2021; 77: 44-56
- **Fast Magnetic Resonance Imaging on Regions of Interest: From Sensing to Reconstruction**
  Sun, L., Huang, H., Ding, X., Huang, Y., Liu, X., Yu, Y., deBruijne, M., Cattin, P. C., Cotin, S., Padoy, N., Speidel, S., Zheng, Y., Essert, et al
  SPRINGER INTERNATIONAL PUBLISHING AG.2021: 97-106
- **Generator Versus Segmentor: Pseudo-healthy Synthesis**
  Zhang, Y., Li, C., Lin, X., Sun, L., Zhuang, Y., Huang, Y., Ding, X., Liu, X., Yu, Y., deBruijne, M., Cattin, P. C., Cotin, S., Padoy, et al
  SPRINGER INTERNATIONAL PUBLISHING AG.2021: 150-160
- **An Adversarial Learning Approach to Medical Image Synthesis for Lesion Detection** *IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS*
  Sun, L., Wang, J., Huang, Y., Ding, X., Greenspan, H., Paisley, J.
  2020; 24 (8): 2303-2314
- **A dual-domain deep lattice network for rapid MRI reconstruction** *NEUROCOMPUTING*
  Sun, L., Wu, Y., Shu, B., Ding, X., Cai, C., Huang, Y., Paisley, J.

2020; 397: 94-107

- **A 3D Spatially Weighted Network for Segmentation of Brain Tissue From MRI** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
  Sun, L., Ma, W., Ding, X., Huang, Y., Liang, D., Paisley, J.
  2020; 39 (4): 898-909
- **A deep error correction network for compressed sensing MRI.** *BMC biomedical engineering*
  Sun, L., Wu, Y., Fan, Z., Ding, X., Huang, Y., Paisley, J.
  2020; 2: 4
- **A Deep Information Sharing Network for Multi-Contrast Compressed Sensing MRI Reconstruction** *IEEE TRANSACTIONS ON IMAGE PROCESSING*
  Sun, L., Fan, Z., Fu, X., Huang, Y., Ding, X., Paisley, J.
  2019; 28 (12): 6141-6153
- **Region-of-interest undersampled MRI reconstruction: A deep convolutional neural network approach** *MAGNETIC RESONANCE IMAGING*
  Sun, L., Fan, Z., Ding, X., Huang, Y., Paisley, J.
  2019; 63: 185-192
- **A divide-and-conquer approach to compressed sensing MRI** *MAGNETIC RESONANCE IMAGING*
  Sun, L., Fan, Z., Ding, X., Cai, C., Huang, Y., Paisley, J.
  2019; 63: 37-48
- **Joint CS-MRI Reconstruction and Segmentation with a Unified Deep Network**
  Sun, L., Fan, Z., Ding, X., Huang, Y., Paisley, J., Chung, A. C., Gee, J. C., Yushkevich, P. A., Bao, S.
  SPRINGER INTERNATIONAL PUBLISHING AG.2019: 492-504
- **A Deep Ensemble Network for Compressed Sensing MRI**
  Wu, H., Wu, Y., Sun, L., Cai, C., Huang, Y., Ding, X., Cheng, L., Leung, A. C., Ozawa, S.
  SPRINGER INTERNATIONAL PUBLISHING AG.2018: 162-171
- **Compressed Sensing MRI Using a Recursive Dilated Network** *Thirty-Second AAAI Conference on Artificial Intelligence*
  Sun, L., Fan, Z., Huang, Y., Ding, X., Paisley, J.
  Association for the Advancement of Artificial Intelligence.2018
- **A Segmentation-Aware Deep Fusion Network for Compressed Sensing MRI**
  Fan, Z., Sun, L., Ding, X., Huang, Y., Cai, C., Paisley, J., Ferrari, Hebert, M., Sminchisescu, C., Weiss, Y.
  SPRINGER INTERNATIONAL PUBLISHING AG.2018: 55-70
- **COMPRESSED SENSING MRI USING TOTAL VARIATION REGULARIZATION WITH K-SPACE DECOMPOSITION**
  Sun, L., Huang, Y., Cai, C., Ding, X., IEEE
  IEEE.2017: 3061-3065
- **A novel nonlocal MRI reconstruction algorithm with patch-based low rank regularization**
  Sun, L., Chen, J., Zeng, D., Ding, X., IEEE
  IEEE.2015: 398-402
- **Patch-based nonlocal dynamic MRI reconstruction with low-rank prior** *IEEE 17th International Workshop on Multimedia Signal Processing*
  Sun, L., Chen, J., Zhang, X., Ding, X.
  IEEE.2015