KE YAN

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JOB AND EDUCATION

PAII Bethesda Research Lab, US
Senior Researcher in medical image analysis — May 2019 – now
National Institutes of Health, US
Postdoc in Imaging Biomarkers and Computer-Aided Diagnosis Laboratory — Jan 2017 – May 2019
Advisor: Dr. Ronald M. Summers, Dr. Le Lu
Tsinghua University, Beijing, P.R. China
Ph.D. Electronic Engineering, advisor: Prof. David Zhang, *IEEE fellow* — – Jul 2016
B.Eng. Electronic Engineering — – Jul 2010

RESEARCH INTERESTS

Computer vision, medical image analysis, deep learning, machine learning.

EXPERIENCES

In PAII Inc. May 2019 -

- Research on detection, classification, and segmentation problems in medical images. I mainly analyze general lesions and lymph nodes in CT images, and steatosis and fibrosis in liver ultrasound images. I am leading a group on the DeepLesion project.

Postdoc Project January 2017 - May 2019

- I mined CT images and lesion annotations from PACS to build a large-scale and diverse database - DeepLesion. I have been developing lesion detection, retrieval, classification, and body-part recognition algorithms on the dataset using deep learning approaches.

Researcher in DeePhi Tech, China August 2016 - November 2016

- I developed pedestrian detection algorithms with caffe using faster RCNN and region-based fully convolutional networks.

Ph.D. Project September 2011 - June 2016

- An interdisciplinary topic: I developed a sensor system (an electronic nose) to measure breath biomarkers of human, then proposed several machine learning (transfer learning, classification, and regression) algorithms to analyze the signals for non-invasive disease diagnosis and monitoring.

Intern in IBM China Research Lab July 2015 - August 2015

- I took part in developing a robot-based intelligent shopping assistant and wrote modules for speech recognition, text-to-speech, and movement by invoking public softwares and the APIs of the robot.

Intern in Xingke Intelligent Tech, China July 2013 - August 2013

- I developed a real-time gesture recognition system on Unity3D, which reads skeleton data from Microsoft Kinect, then recognizes gestures using template matching and finite-state machine algorithms.

Undergraduate Research Project March 2010 - August 2011

- I developed a face recognition system including geometry and illumination normalization, feature extraction, and subspace learning. The OpenCV-based program received over 10k downloads until 2014.

PUBLICATIONS

Google Scholar: 941 citations till 09/25/2020

Peer-Reviewed Journals

- Ke Yan, Jinzheng Cai, Youjing Zheng, Adam P. Harrison, Dakai Jin, You-Bao Tang, Yu-Xing Tang, Lingyun Huang, Jing Xiao, Le Lu, "Learning from Multiple Datasets with Heterogeneous and Partial Labels for Universal Lesion Detection in CT," *IEEE Transactions on Medical Imaging*, 2020.
- Jinzheng Cai, Adam P. Harrison, Youjing Zheng, Ke Yan, Yuankai Huo, Jing Xiao, Lin Yang, Le Lu, "Lesion-Harvester: Iteratively Mining Unlabeled Lesions and Hard-Negative Examples at Scale," *IEEE Transactions on Medical Imaging*, 2020.
- Yu-Xing Tang, Youbao Tang, Yifan Peng, Ke Yan, Mohammadhadi Bagheri, Bernadette Redd, Catherine Brandon, Zhiyong Lu, Mei Han, Jing Xiao, and Ronald Summers, "Automated abnormality classification of chest radiographs using deep convolutional neural networks," *npj Digital Medicine (Nature Partner Journals)*, 2020.
- Veit Sandfort, Ke Yan, Perry J. Pickhardt, Ronald M. Summers, "Data augmentation using generative adversarial networks (CycleGAN) to improve generalizability in CT segmentation tasks," *Scientific Reports*, 2019.
- Atsushi Teramoto, Hiroshi Fujita, Tetsuya Tsukamoto, Yuka Kiriyama, Ke Yan, et al., "Automated classification of benign and malignant cells from lung cytological images using deep convolutional neural network," *Informatics in Medicine Unlocked*, 2019.
- Ke Yan, Xiaosong Wang, Le Lu, Ronald M. Summers , "DeepLesion: Automated Mining of Large-Scale Lesion Annotations and Universal Lesion Detection with Deep Learning," *J. Med. Imaging*, 2018.
- Ke Yan, Lu Kou, and David Zhang, "Learning Domain-Invariant Subspace Using Domain Features and Independence Maximization," *IEEE Trans. on Cybernetics* (IF=4.943), Jan. 2017.
- Ke Yan, David Zhang, and Yong Xu, "Correcting Instrumental Variation and Time-Varying Drift Using Parallel and Serial Multitask Learning," *IEEE Trans. on Instrumentation and Measurement (TIM)* (IF=2.456), Jun., 2017.
- Ke Yan and David Zhang, "Correcting instrumental variation and time-varying drift: A transfer learning approach with autoencoders," *IEEE Trans. on Instrumentation and Measurement (TIM)* (IF=1.808), Sep., 2016.
- Ke Yan and David Zhang, "Calibration transfer and drift compensation of e-noses via coupled task learning," *Sensors and Actuators B: Chemical* (IF=4.758), Mar., 2016.
- Ke Yan and David Zhang, "Improving the transfer ability of prediction models for electronic noses," *Sensors and Actuators B: Chemical* (IF=4.758), Dec., 2015.
- Ke Yan and David Zhang, "Feature selection and analysis on correlated gas sensor data with recursive feature elimination," *Sensors and Actuators B: Chemical* (IF=4.758), Jun., 2015.
- Ke Yan, David Zhang, Darong Wu, Hua Wei, and Guangming Lu, "Design of a breath analysis system for diabetes screening and blood glucose level prediction," *IEEE Trans. on Biomedical Engineering* (IF=2.347), Nov., 2014.

Conference Proceedings

- Bowen Li, Ke Yan, Dar-In Tai, Yuankai Huo, Le Lu, Jing Xiao, Adam Harrison, "Reliable Liver Fibrosis Assessment from Ultrasound using Global Hetero-Image Fusion and View-Specific Parameterization," *MICCAI*, 2020.
- Jinzheng Cai, Ke Yan, Chi Tung Cheng, Jing Xiao, ChienHung Liao, Le Lu, Adam Harrison, "Deep Volumetric Universal Lesion Detection using Light-Weight Pseudo 3D Convolution and Surface Point Regression," *MICCAI*, 2020.
- Youbao Tang, Ke Yan, Jing Xiao, Ronald M. Summers, "One Click Lesion RECIST Measurement and Segmentation on CT Scans," *MICCAI*, 2020.

- Zhuotun Zhu, Dakai Jin, Ke Yan, Tsung-Ying Ho, Xianghua Ye, Dazhou Guo, Chun-Hung Chao, Jing Xiao, Alan Yuille, Le Lu,"Lymph Node Gross Tumor Volume Detection and Segmentation via Distance-based Gating using 3D CT/PET Imaging in Radiotherapy," *MICCAI*, 2020.
- Chun-Hung Chao, Zhuotun Zhu, Ke Yan, Dazhou Guo, Tsung-Ying Ho, Jinzheng Cai, Adam Harrison, Xianghua Ye, Jing Xiao, Alan Yuille, Min Sun, Le Lu, "Lymph Node Gross Tumor Volume Detection in Oncology Imaging via Relationship Learning Using Graph Neural Network," *MICCAI*, 2020.
- Ke Yan, Youbao Tang, Yifan Peng, Veit Sandfort, Mohammadhadi Bagheri, Zhiyong Lu, Ronald M. Summers, "MULAN: Multitask Universal Lesion Analysis Network for Joint Lesion Detection, Tagging, and Segmentation," *MICCAI*, 2019.
- Ke Yan, Yifan Peng, Veit Sandfort, Mohammadhadi Bagheri, Zhiyong Lu, and Ronald M. Summers, "Holistic and Comprehensive Annotation of Clinically Significant Findings on Diverse CT Images: Learning from Radiology Reports and Label Ontology," *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, 2019, oral presentation.
- Ke Yan, Yifan Peng, Zhiyong Lu, Ronald M. Summers, "Fine-Grained Lesion Annotation in CT Images with Knowledge Mined from Radiology Reports," *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2019, oral presentation, best paper finalist.
- You-bao Tang, Ke Yan, Yuxing Tang, Jiamin Liu, Jing Xiao, Ronald M. Summers, "ULDor: A Universal Lesion Detector for CT Scans with Pseudo Masks and Hard Negative Example Mining," *ISBI*, 2019.
- Ke Yan, X Wang, L Lu, L Zhang, A Harrison, M Bagheri, and R M Summers, "Deep Lesion Graphs in the Wild: Relationship Learning and Organization of Significant Radiology Image Findings in a Diverse Large-scale Lesion Database," *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, 2018.
- Ke Yan, Mohammadhadi Bagheri, Ronald M. Summers, "3D Context Enhanced Region-based Convolutional Neural Network for End-to-End Lesion Detection," *Intl. Conf. on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, Granada, Spain, 2018.
- Ke Yan, Xiaosong Wang, Le Lu, Ling Zhang, Mohammadhadi Bagheri, Ronald M. Summers, "DeepLesion: a Diverse and Large-scale Database of Significant Radiology Image Findings," *MICCAI workshop-Large-scale Annotation of Biomedical Data and Expert Label Synthesis (LABELS)*, spotlight, 2018.
- Jinzheng Cai*, Youbao Tang*, Le Lu, Adam P. Harrison, Ke Yan, Jing Xiao, Lin Yang, Ronald M. Summers, "Accurate Weakly-Supervised Deep Lesion Segmentation using Large-Scale Clinical Annotations: Slice-Propagated 3D Mask Generation from 2D RECIST," *MICCAI*, 2018.
- Youbao Tang*, Jinzheng Cai*, Le Lu, Adam P. Harrison, Ke Yan, Jing Xiao, Lin Yang, Ronald M. Summers, "CT Image Enhancement Using Stacked Generative Adversarial Networks and Transfer Learning for Lesion Segmentation Improvement," *MICCAI workshop-International Conference on Machine Learning in Medical Imaging (MLMI)*, oral, 2018.
- Ke Yan, Le Lu, and Ronald M. Summers, "Unsupervised Body Part Regression via Spatially Self-ordering Convolutional Neural Networks," *IEEE Intl. Symposium on Biomedical Imaging (ISBI)*, oral presentation, 2018.
- Ke Yan and David Zhang, "Blood glucose prediction by breath analysis system with feature selection and model fusion," in *36th Annual Intl. Conf. of the IEEE Engineering in Medicine and Biology Society (EMBC)*, oral presentation, Chicago, 2014.
- Ke Yan and David Zhang, "Sensor evaluation in a breath analysis system," in *Intl. Conf. on Medical Biometrics (ICMB)*, oral presentation, Shenzhen, 2014.
- Yujing Ning, Guangming Lu, Ke Yan, and Xia Zhang, "Standardization of gas sensors in a breath analysis system," in *9th Chinese Conf. on Biometric Recognition*, oral presentation, 2014.
- Ke Yan and David Zhang, "A novel breath analysis system for diabetes diagnosis," in *Intl. Conf. on Computerized Healthcare*, oral presentation, Hong Kong, China, 2012.
- Ke Yan, Youbin Chen, and David Zhang, "Gabor surface feature for face recognition," in *First Asian Conf. on Pattern Recognition (ACPR)*, oral presentation, Beijing, 2011.

Books

- D Jin, AP Harrison, L Zhang, K Yan, Y Wang, J Cai, S Miao, L Lu. "Artificial intelligence in radiology", book chapter of "Artificial Intelligence in Medicine", Elsevier, 2020.
- Ke Yan et al., "Deep Lesion Graph in the Wild: Relationship Learning and Organization of Significant Radiology Image Findings in a Diverse Large-Scale Lesion Database", book chapter of "Deep Learning and Convolutional Neural Networks for Medical Imaging and Clinical Informatics", Springer, 2019.
- Ke Yan, "Research on Key Signal Analysis Algorithms for Electronic Noses", Outstanding Doctoral Dissertation Series of Tsinghua University, Tsinghua University Press, 2019.
- David Zhang, Dongmin Guo, and Ke Yan, "Breath Analysis for Medical Applications," Springer, 2017.

Conference Abstracts

- Y Tang et al., "One Click Guided Automatic RECIST Lesion Measurement and Segmentation on CT Scans" (Featured Papers), *RSNA*, 2020.
- B Li et al., "Automatic Liver Fibrosis Assessment from Conventional Ultrasound Images Using Global Hetero Image Fusion", *RSNA*, 2020.
- J Cai et al., "Automatic Hepatocellular Carcinoma Detection in Patients with Chronic Liver Diseases Using Dynamic Contrast-enhanced CT and Light-Weight 3D Convolutional Neural Network", *RSNA*, 2020.
- Z Zhu et al., "Lymph Node Gross Tumor Volume Detection and Segmentation via Distance-based Gating Using CT/PET Imaging in Esophageal Cancer Radiotherapy", *RSNA*, 2020.
- Y Huo et al., "Identifying and Characterizing Indeterministic Liver Lesions via Deep Learning on Large-scale Dynamic Contrast Enhanced CT Imaging Data from Patients Receiving Invasive Procedures", *RSNA*, 2020.
- K Yan et al., "Comprehensive Lesion Tagging on Diverse CT Images: Learning from Radiology Reports and Label Ontology" (Scientific Paper), *RSNA*, 2019, Chicago.
- K Yan et al., "MULAN: Multitask Universal Lesion Analysis Network for Joint Lesion Detection, Tagging, and Segmentation in CT Images" (Scientific Paper), *RSNA*, 2019, Chicago.
- Veit Sandfort et al., "CT Organ Segmentation: Use of Variational Autoencoders to Detect Incorrect Segmentations in a Large Dataset (> 12,000 CT scans)" (Scientific Paper), *RSNA*, 2019, Chicago.
- K Yan et al., "Relationship Learning and Organization of Significant Radiology Image Findings for Lesion Retrieval and Matching," Scientific Paper, **Trainee Research Prize**, *RSNA*, 2018.
- K Yan, Mohammadhadi Bagheri, Ronald M. Summers, "3D Context Enhanced Region-based Convolutional Neural Network for Universal Lesion Detection in a Large Database of 32,735 Manually Measured Lesions on Body CT," *RSNA*, 2018.
- Y Tang et al., "CT Image Enhancement for Lesion Segmentation Using Stacked Generative Adversarial Networks," *RSNA*, 2018.
- X Wang*, K Yan*, et al., "DeepLesion: Automated Deep Mining, Categorization and Detection of Significant Radiology Image Findings using Large-Scale Clinical Lesion Annotations," scientific poster, *Annual Meeting of Radiology Society of North America (RSNA)*, Chicago, 2017.

For more details of the papers, please visit http://yanke23.com/research/.

AWARDS

- Winner of 2018 Radiological Society of North America (RSNA) Trainee Research Prize.
- Winner of the 2016 Tsinghua University Excellent Doctoral Dissertation Award.
- First prize of Tsinghua Outstanding Scholarship, 2 times (school-level, 2014, 2015);
- First prize of Foxconn Scholarship, 2 times (college-level, 2012, 2013);
- Most Creative Award in the First Photo Contest of University Town of Shenzhen.

- Best Intern Demonstration Award in IBM China Research Lab.

ACTIVITIES

- Invited talks: MICCAI 2018 Workshop of Computational Precision Medicine; NIH Research Festival; CVPR 2018 and 2019 Medical Computer Vision and Health Informatics Workshop, 2020 VALSE online seminar.
- My work of DeepLesion was reported by NIH, SPIE, American Association for Cancer Research, and many other news websites.
- My paper "Unsupervised Body Part Regression via Spatially Self-ordering Convolutional Neural Networks" was featured in the RSIP Vision and ISBI Daily in cooperation with Computer Vision News.