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Education

Sep 2004 - Aug 2008 Bachelor at Department of Automation, Tsinghua University, Beijing, China.

Sep 2008 - Jul 2014 Ph.D. student at Department of Automation, Tsinghua University, Beijing, China.

- Adviser: Changshui Zhang.
- Innovate novel Nystrom sampling technique and its applications in manifold learning.

Nov 2012 - Nov 2013 Visiting Research Scholar at Department of Computer Science and Engineering, Michigan State University, East Lansing, MI 48824, United States.

- Adviser: Rong Jin.
- Propose several online random sampling learning methods to accelerate kernel machine without losing generalization performance.

Dec 2013 - Jul 2014 Visiting Research Scholar at School of Computer Science, Carnegie Mellon University, Pittsburgh, PA 15213, United States.

- Adviser: Alexander G. Hauptmann.
- Develop multi-source fusion algorithms for video retrieval.

Experience

Aug 2014 - Aug 2015 Postdoctoral Research Fellow at School of Computer Science, Carnegie Mellon University, Pittsburgh, PA 15213, United States.

- Adviser: Alexander G. Hauptmann.
- Major developer of the ALADDIN project for video

retrieval.

Sep 2015 - Mar 2017 Postdoctoral Research Fellow at Department of Computational Medicine and Bioinformatics. University of Michigan Medical School, Ann Arbor, Michigan 48109, United States.

- Adviser: Jieping Ye.
- Theoretical guarantees for learning the second order linear models.
- Using machine learning techniques to assist the early diagnosis of Major Depressive Disorder and Alzheimer's disease.

Apr 2017- Mar 2018 Research Investigator at Department of Computational Medicine and Bioinformatics. University of Michigan Medical School, Ann Arbor, Michigan 48109, United States.

- Laboratory management, supervise Ph.D. students, proposal writing, etc.
- Early diagnosis of Major Depressive Disorder and Alzheimer's disease.

Apr 2018 - Present Staff Algorithm Engineer in DAMO Academic, Alibaba Group (U.S.), Seattle site.

- Lead a small group of research engineers
- Low-cost neural architecture search
- Efficient deep learning theories as well as various deep learning applications

Research Project

Jul 2014 – Sep 2015 **Automated Low-Level Analysis and Description of Diverse Intelligence Video (ALADDIN)**

- Develop a large-scale content-based video retrieval system with 47 features including 17 DCNN features.
- Our system ranked top-1 in 6 out of 8 tasks in MED 2014.
- This project is sponsored by Informedia@CMU.

Jan 2015 - Mar 2018 **The second order linear model: Theories and Applications.**

- Propose a novel model called the Second Order Linear Model (SLM)

- The SLM is able to capture high order feature interactions
- We applied SLM to Major Depressive Disorder (MDD) prediction and Alzheimer's Disease prediction.
- This project is a collaboration work with Janssen Research & Development, LCC.

Apr 2018 - Jun 2019 **Real-time High Precision GPS Grid System**

- Improve GPS precision to 1 centimeter level.
- Real-time positioning (1 second per query).

Jul 2019 - Jun 2020 **GPU-Efficient Deep Neural Network**

- Propose a GPU-efficient network GENet which is optimized for fast inference on GPU.
- 6.4 times faster than EfficientNet with high precision on ImageNet (Best top-1 accuracy 81.3%).

Jul 2020 - Jun 2021 **Zero-Shot/Zero-Cost Neural Architecture Search**

- Propose Zen-NAS, a novel zero-shot NAS method for high performance deep image recognition.
- The searching speed of Zen-NAS is 7800 times faster than EfficientNet while delivering the same or better final architectures using the same design space.
- With nearly zero-cost, Zen-NAS achieves 83.6% best top-1 accuracy on ImageNet.
- **Zen-NAS is used in the winner solution of WebFace260M Track of ICCV21-MFR.**

Deep Image Compression

- Using deep learning technique to learn image compression models.
- Better bit rate in both high quality and low quality regimes than JPEG2000 and WebP.

July 2021 - Present **Leading Multiple Ongoing Researches**

- ZenDet: High-performance detection backbone designed by zero-shot NAS.
- NAS-Bench-Zero: A large-scale dataset for understanding zero-shot NAS.
- Entroformer: Transformer-based deep image compression.
- Deep MAD: A **M**athematical **A**rchitecture **D**esign framework for efficient deep learning.

- Effective field theory for efficient deep learning.

Research Interest

- High-performance neural architecture design for real-world applications with theoretical guarantees.
- Effective field theory for deep learning.
- Large-scale non-convex optimization and statistical learning theory.
- Real-world applications in computer vision, nature language processing and bioinformatics.

Peer-Review Service

- Reviewer of AAAI, IJCAI, ICML, NIPS, ICLR, CVPR, ICCV etc.
- Reviewer of Journals:
  - IEEE Transactions on Pattern Analysis and Machine Intelligence.
  - ACM Transactions on Knowledge Discovery from Data.
  - Pattern Recognition
  - Neurocomputing
  - Computer Vision and Image Understanding.
  - Data Mining and Knowledge Discovery

Bibliography

Peer-Reviewed Conferences

1. Lijun Zhang, Jinfeng Yi, Ming Lin, Xiaofei He. Online Kernel Learning with a Near Optimal Sparsity Bound. In Proceedings of the 30th International Conference on Machine Learning (ICML), Pages 621 – 629, 2013.
2. Ming Lin, Rong Jin, Changshui Zhang. Efficient Sparse Recovery via Adaptive Non-Convex Regularizers with Oracle Property. In Proceedings of the 30th Conference on Uncertainty in Artificial Intelligenre (UAI), Pages 505-514, 2014.
3. Shoou-I Yu, Lu Jiang, Zexi Mao, Xiaojun Chang, Xingzhong Du, Chuang Gan, Zhenzhong Lan, Zhongwen Xu, Xuanchong Li, Yang Cai, Anurag Kumar, Yajie Miao, Lara Martin, Nikolas Wolfe, Shicheng Xu, Huan Li, Ming Lin, Zhigang Ma, Yi

Yang, Deyu Meng, Shiguang Shan, Pinar Duygulu Sahin, Susanne Burger, Florian Metze, Rita Singh, Bhiksha Raj, Teruko Mitamura, Richard Stern, Alexander Hauptmann. Informedia@ TRECVID 2014 MED and MER. NIST TRECVID Video Retrieval Evaluation Workshop, 2014.

4. Ming Lin, Zhenzhong Lan, Alexander G. Hauptmann. Density Corrected Sparse Recovery when R.I.P. Condition is Broken. In Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI), Pages 3664-3670, 2015.
5. Zhenzhong Lan, Ming Lin, Xuanchong Li, Alexander G. Hauptmann, Bhiksha Raj. Beyond Gaussian Pyramid: Multi-skip Feature Stacking for Action Recognition. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Pages 204-212, 2015.
6. Chuang Gang, Ming Lin, Yi Yang, Alexander G. Hauptmann. Exploring Semantic Inter-Class Relationships (SIR) for Zero-Shot Action Recognition. In Proceedings of the 29th AAAI Conference on Artificial Intelligence (AAAI), Pages 3769-3775, 2015
7. Chuang Gang, Ming Lin, Yi Yang, Gerard de Melo, Alexander G. Hauptmann. Concepts Not Alone: Exploring Pairwise Relationships for Zero-Shot Video Activity Recognition. In Proceedings of the 30th AAAI Conference on Artificial Intelligence (AAAI), Pages 3487-3493, 2016.
8. Ming Lin, Jieping Ye. A Non-convex One-Pass Framework for Generalized Factorization Machine and Rank-One Matrix Sensing. In Proceedings of the 30th Annual Conference on Neural Information Processing Systems (NIPS), Pages 1633-1641, 2016.
9. Zhenzhong Lan, Shoou-I Yu, Dezhong Yao, Ming Lin, Bhiksha Raj ; Alexander Hauptmann. The Best of BothWorlds: Combining Data-Independent and Data-Driven Approaches for Action Recognition. IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW). Pages 1196-1205, 2016.
10. Xiang Li, Aoxiao Zhong, Ming Lin, Ning Guo, Mu Sun, Arkadiusz Sitek, Jieping Ye, James Thrall, Quanzheng Li. Self-paced Convolutional Neural Network for Computer Aided Detection in Medical Imaging Analysis. In Proceedings of the 8th International Workshop on Machine Learning in Medical Imaging (MLMI), 2017.
11. Tieliang Gong, Guangtao Wang, Jieping Ye, Zongben Xu, Ming Lin. Margin Based PU Learning. In Proceedings of the 32nd AAAI Conference on Artificial Intelligence (AAAI), 2018.
12. Ming Lin, Shuang Qiu, Jieping Ye, Xiaomin Song, Qi Qian, Liang Sun, Shenghuo Zhu, Rong Jin. Which Factorization Machine Modeling is Better: A Theoretical

Answer with Optimal Guarantee. The Thirty-Third AAAI Conference on Artificial Intelligence (AAAI), 2019.

13. Ming Lin, Xiaomin Song, Qi Qian, Hao Li, Liang Sun, Shenghuo Zhu, Rong Jin. Robust Gaussian Process Regression for Real-Time High Precision GPS Signal Enhancement. In Proceedings of the 25TH ACM SIGKDD CONFERENCE ON KNOWLEDGE DISCOVERY AND DATA MINING (SIGKDD), 2019.
14. Yichen Qian, Zhiyu Tan, Xiuyu Sun, Ming Lin, Dongyang Li, Zhenhong Sun, Li Hao, Rong Jin. Learning Accurate Entropy Model with Global Reference for Image Compression. In Proceedings of the International Conference on Learning Representations (ICLR), 2021.
15. Ming Lin, Pichao Wang, Zhenhong Sun, Hesen Chen, Xiuyu Sun, Qi Qian, Hao Li, Rong Jin. Zen-NAS: A Zero-Shot NAS for High-Performance Deep Image Recognition. In Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV), 2021.

Peer-Reviewed Journals

1. Shizhun Yang, Ming Lin, Chenping Hou, Changshui Zhang, Yi Wu. A General Framework for Transfer Sparse Subspace Learning. Neural Computing and Applications. Volume 21, Number 7, Pages 1801-1817, August 2012.
2. Ming Lin, Shifeng Weng, Changshui Zhang. On the Sample Complexity of Random Fourier Features for Online Learning. ACM Transactions on Knowledge Discovery from Data (TKDD), Volume 8 Issue 3, Pages 13:1--13:19, June 2014.
3. Ming Lin, Fei Wang, Changshui Zhang. Large-Scale Eigenvector Approximation via Hilbert Space Embedding Nystrom. Pattern Recognition (PR), 48(5), Pages 1904-1912, 2015.
4. Zheng Pan, Ming Lin, Guangdong Hou, Changshui Zhang. Damping proximal coordinate descent algorithm for non-convex regularization. Neurocomputing, vol 152, Pages 151-163, 2015.
5. Zhen Hu, Ming Lin, Changshui Zhang. Dependent Online Kernel Learning with Constant Number of Random Fourier Features. IEEE Transactions on Neural Networks and Learning Systems (TNNLS), Volume 26, Issue 10, Pages 2464-2476, 2015.
6. Ming Lin, Lijun Zhang, Rong Jin, Shifeng Weng, Changshui Zhang. Online Kernel Learning with Nearly Constant Support Vectors. Neurocomputing. Volume 179, Pages 26-36, 2016.
7. Shoou-I Yu, Yi Yang, Zhongwen Xu, Shicheng Xu, Deyu Meng, Zexi Mao, Zhigang Ma, Ming Lin, Xuanchong Li, Huan Li, Zhenzhong Lan, Lu Jiang, Alexander G. Hauptmann, Chuang Gan, Xingzhong Du, Xiaojun Chang. Strategies for Searching

Video Content with Text Queries or Video Examples (Invited Paper). ITE Transactions on Media Technology and Applications 4.3, Pages 227-238, 2016

8. Xiaojun Chang, Zhigang Ma, Ming Lin, Yi Yang, Alexander G. Hauptmann. Feature Interaction Augmented Sparse Learning for Fast Kinect Motion Detection. IEEE Transactions on Image Processing, Volume 26, Issue 8, Pages 3911-3920. 2017.
9. Ming Lin, Vaibhav Narayan, Wayne C. Drevets, Jieping Ye, Qingqin Li. Application of Growth Mixture Modeling in Antidepressant Treatment Response Studies. Biological Psychiatry, Volume 81, Issue 10, Supplement, Page S224, May 2017.
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11. Ming Lin, Pinghua Gong, Tao Yang, Jieping Ye, Roger L. Albin, Hiroko H. Dodge. Big Data Analytical Approaches to the NACC Dataset: Aiding Preclinical Trial Enrichment, Volume 32, Issue1, Pages 18-27, January-March 2018.
12. Jian Liang, Kun Chen, Ming Lin, Changshui Zhang, Fei Wang. Robust Finite Mixture Regression for Heterogeneous Targets. Data Mining and Knowledge Discovery, Volume 32, Issue 6, pp 1509–1560, November 2018.