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Short Biography Dr. Peilin Zhao is currently a Senior Algorithm Expert at Artificial Intelligence Department, Ant Financial, China. His research interests include Large Scale Machine Learning and its applications to Big Data Analytics, Computational Finance, Multimedia Search, Computational Biology, Cybersecurity, etc. He previously worked as a research scientist at A*STAR Singapore, and a postdoc at Rutgers University USA. He received his PHD degree from School of Computer Engineering, Nanyang Technological University, Singapore and his bachelor degree from Zhejiang University, China. In his research areas, he has published about 70 papers in top venues, such as JMLR, AIJ, ICML, NIPS, KDD, etc. He has been invited as a PC member or reviewer for many international conferences and journals in his area.

Research Interests Machine Learning: Online Learning, Stochastic Optimization, Deep Learning, etc.
Applications: Multimedia Search, Computational Finance, Cybersecurity, Computational Biology, Computer Vision, etc.

Research Experience **Senior Algorithm Expert** Jul 2016 - present
Artificial Intelligence Department, Ant Financial, China.

Research Scientist Jul 2014 - Jun 2016
Institute for Infocomm Research, A*STAR, Singapore.

Visiting Scholar Jan 2014 - Jun 2014
Baidu Research, China.

Postdoc Sep 2013 - Jun 2014
Department of Statistics, Rutgers University, USA.
Advisor: Tong Zhang

Research Intern Jul 2013 - Sep 2013
Institute of Deep Learning, Baidu Inc, China.

Research Assistant Sep 2012 - Jun 2013
School of Computer Engineering, Nanyang Technological University, Singapore.
Advisor: Steven C.H. Hoi

Education **Nanyang Technological University**, Singapore. Aug 2008 – Sep 2013
Doctor of Philosophy (Ph.D.), Computer Science.
Thesis Title: Kernel Based Online Learning. Advisor: Steven C.H. Hoi

Zhejiang University, Hangzhou, China. Sep 2004 – Jun 2008
Bachelor of Science (BS), Mathematics.

Projects

Distributed Algorithms based on Parameter Server

This project is to develop a series of distributed algorithms based on a Parameter Server. Specifically, we implemented two algorithms: one is a distributed Factorization Machine, and the other is a Hash Matrix Factorization model. Both of these two algorithms can support a dataset with over 10 billion examples of 10 billion features. Large scale CTR prediction based on tailored Deep Learning algorithm.

Risk Management, Insurance, Anti-Money Laundering

Ensemble based supervised risk management model to improve the True Positive Rate. Un-supervised anomaly detection system to reduce the number of False Positive rate. Machine Learning model and feature selection method for Car Insurance Score. Deep Learning Model for Anti-Money Laundering.

Disruptive Big Data Analytics Approaches and Data Management Strategy for Complex System Health Management

This project is in collaboration with Boeing, which is a leading aerospace company. In this project, our goal is to utilize stream data from sensors on the airplane engine, to estimate the remaining useful life of the engine. In practice, we tried deep learning to extract high-level features and build a model, which achieves the best performance compared with some conventional methods, such as Support Vector Regression.

An On-line Process Monitoring Scheme to Improve Accuracy of the Tube Boiler Inspection Process

This project is in collaboration with Sembcorp, which is a leading energy, water and marine group operating across five continents worldwide. In this project, our objective is to use stream data from sensors on boiler tubes to detect the thickness of the tubes, which is used to determine whether the tubes should be replaced with new ones. Since the speed of sensor data will be very high, we will adopt online learning to train and maintain the models, to improve the scalability of the learning system.

LIBOL - A Library for Online Learning Algorithms

LIBOL is an open-source machine learning library that implements a large family of classical and state-of-the-art online learning algorithms for solving large-scale machine learning tasks towards a variety of emerging big data mining applications.

OLPS - On-Line Portfolio Selection

OLPS is a research project that aims to study intelligent on-line portfolio selection strategies in computational finance by exploring a family of state-of-the-art machine learning techniques.

Honors and Awards

The 1st Prize of Tmall Repeat Buyers Prediction Competition (1st Stage) from IJCAI, 2015.

Best Runner-Up Paper Award from Asian Conference on Machine Learning 2014.

IEEE International Conference on Data Mining Scholarships, 2012.

Machine Learning Summer School Scholarships, 2011.

The 27th International Conference on Machine Learning Scholarships, 2010.

The 2nd Prize of Best Student Paper Awards from PREMIA in Singapore, 2009.

Research Scholarships in Nanyang Technological University, 2008-2012

Excellent Graduate in Zhejiang University, 2008.

Excellent Undergraduate Scholarship and All-round Student in Zhejiang University, 2004-2007.

Computer Skills

Python, MATLAB, C/C++

Professional Services

Reviewer/ PC Member

- Journals: *JMLR*, *MLJ*, *TPAMI*, *ACM CSUR*, *TNNLS*, *TKDD*, *TIST*, *DAMI*, *Neurocomputing*, *TASLP*
- Conferences: *NIPS 2010 2011 2015 2017*, *ICML 2011 2014*, *WWW 2012 2013*, *AAAI 2011 2012 2016 2015 2017*, *ACML 2014 2015*, *IJCAI 2015 2017*, *ICDM 2015*, *ALT 2015*, *KDD 2013*, *CVPR 2013*, *ACM MM 2013*, *CIKM 2012*, *WSDM 2010*.

Citation Indices

h-index: 19, i10-index: 29, citations: 1644. (According to Google Scholar)

Tutorials

Steven C.H. Hoi, Peilin Zhao. Online Learning Methods for Big Data Analytics. IEEE International Conference on Data Mining (**ICDM 2014**), Dec 14-17, 2014, Shenzhen, China.

Publications

1. Peng Yang, **Peilin Zhao**, Xin Gao. Robust Online Multi-Task Learning with Correlative and Personalized Structures. IEEE Transactions on Knowledge and Data Engineering (**TKDE**), 2017. Accepted.
2. Chenghao Liu, Tao Jin, Steven C.H. Hoi, **Peilin Zhao**, Jianling Sun. Collaborative Topic Regression for Online Recommender Systems: An Online and Bayesian Approach. Machine Learning (**MLJ**), 2017. Accepted
3. Wenpeng Zhang, **Peilin Zhao**, Steven C.H. Hoi, Wei Liu, Tong Zhang, Wenwu Zhu. Projection-Free Distributed Online Learning in Networks. The 34th International Conference on Machine Learning (**ICML 2017**). Sydney, Australia, August 6-11 2017. Accepted.
4. Jun Zhou, Xiaolong Li, **Peilin Zhao**, Chaochao Chen, Longfei Li, Xinxing Yang, Qing Cui, Jin Yu, Xu Chen, Yi Ding, Yuan Qi. KunPeng: Parameter Server based Distributed Learning Systems and Its Applications in Alibaba and Ant. 23rd SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD 2017**) August 2017, Halifax, Canada. Accepted
5. Yong Liu, **Peilin Zhao**, Xin Liu, Min Wu, Lixin Duan, Xiaoli Li. Learning User Dependencies for Recommendation. The 26th International Joint Conference on Artificial Intelligence(**IJCAI 2017**). Melbourne, Australia, August 2017. Accepted
6. Shuji Hao, **Peilin Zhao**, Steven Hoi, Chunyan Miao. Online Multi-task Similarity Learning. The 26th International Joint Conference on Artificial Intelligence(**IJCAI 2017**). Melbourne, Australia, August 2017. Accepted
7. Chenghao Liu, Teng Zhang, **Peilin Zhao**, Jun Zhou, Jianling Sun. Local Linear Factorization Machine. The 26th International Joint Conference on Artificial Intelligence(**IJCAI 2017**). Melbourne, Australia, August 2017. Accepted
8. Cen Chen, **Peilin Zhao**, Longfei Li, Jun Zhou, Xiaolong Li, Minghui Qiu. Locally Connected Deep Learning Framework for Industrial-scale Recommender Systems. 26th International World Wide Web Conference (**WWW 2017**). 3-7 April, 2017.
9. Jun Zhou, Qing Cui, Xiaolong Li, **Peilin Zhao**, Shenquan Qu, Jun Huang. PSMART: Parameter Server based Multiple Additive Regression Trees System. 26th International World Wide Web Conference (**WWW 2017**). 3-7 April, 2017.
10. Jing Lu, Steven C.H. Hoi, Jialei Wang, **Peilin Zhao**, Zhi-yong Liu. Large Scale Kernel Online Learning. Journal of Machine Learning Research (**JMLR**).
11. Jing Lu, **Peilin Zhao**, Steven C.H. Hoi. Online Passive Aggressive Active Learning. Machine Learning (**MLJ**).

12. Pengcheng Wu, Steven C. H. Hoi, **Peilin Zhao**, Chunyan Miao, Zhi-Yong Liu. On-line Multi-modal Distance Metric Learning with Application to Image Retrieval. *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 2016.
13. Jialei Wang, **Peilin Zhao**, Steven C. H. Hoi. Soft Confidence-Weighted Learning. *ACM Transactions on Intelligent Systems and Technology (TIST)*, 2016.
14. Yong Liu, Min Wu, Chunyan Miao, **Peilin Zhao**, Xiaoli Li. Neighborhood Regularized Logistic Matrix Factorization for Drug-target Interaction Prediction. *PLOS Computational Biology*, 2016.
15. Ali Ezzat, **Peilin Zhao**, Min Wu, Xiaoli Li, Chee Keong Kwoh. Drug-Target Interaction Prediction with Graph Regularized Matrix Factorization. *IEEE/ACM Transactions on Computational Biology and Bioinformatics (TCBB)*, 2016.
16. G. Liu, J. Cao, N. T. Tam, J. Yang, W. Zha, M. Wu, **Peilin Zhao**, W. Chen. Repeat Buyer Prediction for E-Commerce. 22nd ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD 2016**). San Francisco, California, Aug 13-17, 2016.
17. Peng Yang, **Peilin Zhao**, Zhen Hai, Wei Liu. An Efficient Multi-class Selective Sampling Algorithm on Graphs. *The Conference on Uncertainty in Artificial Intelligence (UAI 2016)*. New York City, June 25 - 29, 2016.
18. Zhiqiang Xu, **Peilin Zhao**, Jianneng Cao, Xiaoli Li. Matrix Eigendecomposition via Doubly Stochastic Riemannian Optimization. *The 33rd International Conference on Machine Learning (ICML 2016)*, New York City, NY, USA, June 19 - June 24, 2016.
19. Chi Zhang, **Peilin Zhao**, Shuji Hao, Yeng Chai Soh, Bu-Sung Lee. ROM: A Robust Online Multi-task Learning Approach.. *The IEEE International Conference on Data Mining (ICDM 2016)*. Barcelona, Spain.
20. Shuji Hao, **Peilin Zhao**, Jing Lu, Steven C. H. Hoi, Chunyan Miao, Chi Zhang. SOAL: Second-Order Online Active Learning. *The IEEE International Conference on Data Mining (ICDM 2016)*. Barcelona, Spain.
21. Chenghao Liu, Steven C.H. Hoi, **Peilin Zhao**, Jianling Sun and Ee-Peng Lim. Online Adaptive Passive-Aggressive Methods for Non-Negative Matrix Factorization and Its Applications. *The 25th ACM International Conference on Information and Knowledge Management (CIKM 2016)*. October 24-28, 2016. Indianapolis, USA.
22. Jing Lu, **Peilin Zhao**, Steven C. H. Hoi. Online Sparse Passive Aggressive Learning with Kernels. 2016 SIAM International Conference on Data Mining (**SDM 2016**), May 5-7, 2016, Miami, Florida, USA.
23. Doyen Sahoo, Abhishek Sharma, Steven C.H. Hoi, **Peilin Zhao**. Temporal Kernel Descriptors for Learning with Time-sensitive Patterns. 2016 SIAM International Conference on Data Mining (**SDM 2016**), May 5-7, 2016, Miami, Florida, USA.
24. Peng Yang, **Peilin Zhao**, Guangxia Li, Xiao-Li Li, Sujatha Das Gollapalli. Learning Correlative and Personalized Structure for Online Multi-Task Classification. 2016 SIAM International Conference on Data Mining (**SDM 2016**), May 5-7, 2016, Miami, Florida, USA.
25. Doyen Sahoo, **Peilin Zhao**, Steven Hoi. Cost Sensitive Online Multiple Kernel Classification. *The 8th Asian Conference on Machine Learning (ACML 2016)*. New Zealand. November 16-18, 2016.
26. Zhen Hai, **Peilin Zhao**, Peng Cheng, Peng Yang, Xiaoli Li, Guangxia Li. Deceptive Review Spam Detection via Exploiting Task Relatedness and Unlabeled Data. *Conference on Empirical Methods in Natural Language Processing (EMNLP 2016)*. Nov 2016, Austin USA.

27. Sateesh Babu Giduthuri, **Peilin Zhao**, Xiaoli Li. Deep Convolutional Neural Network Based Regression Approach for Estimation of Remaining Useful Life. The 21th International Conference on Database Systems for Advanced Applications (**DASFAA-2016**). 16-19 April 2016, Dallas, Texas, USA.
28. Chenghao Liu, Steven C.H. Hoi, **Peilin Zhao**, Jianling Sun. Online ARIMA Algorithms for Time Series Prediction. The Thirtieth AAAI Conference on Artificial Intelligence (**AAAI-16**), February 12-17, Phoenix, Arizona, USA, 2016.
29. Shuji Hao, Chunyan Miao, Steven C.H. Hoi, **Peilin Zhao**. Active Crowdsourcing for Annotation. IEEE/WIC/ACM Web Intelligence 2015, IEEE/WIC/ACM Intelligent Agent Technology 2015 (**WI'15/ IAT'15**). December 6-9, 2015, Singapore.
30. **Peilin Zhao**, Furen Zhuang, Min Wu, Xiao-Li Li, Steven C.H. Hoi. Cost-sensitive Online Classification with Adaptive Regularization and Its Applications. IEEE International Conference on Data Mining (**ICDM 2015**), NJ, USA, November 14-17, 2015.
31. Peng Yang, **Peilin Zhao**, Vincent W. Zheng, Xiao-Li Li. An Aggressive Graph-based Selective Sampling Algorithm for Classification. IEEE International Conference on Data Mining (**ICDM 2015**), NJ, USA, November 14-17, 2015.
32. Dezhong Yao, **Peilin Zhao**, Chen Yu, Hai Jin, Bin Li. Sparse Online Relative Similarity Learning. IEEE International Conference on Data Mining (**ICDM 2015**), NJ, USA, November 14-17, 2015.
33. Peng Yang, **Peilin Zhao**. A Min-Max Optimization Framework for Online Graph Classification. The 24th ACM International Conference on Information and Knowledge Management (**CIKM 2015**), Melbourne, Australia, Oct 19-23, 2015.
34. Shuji Hao, **Peilin Zhao**, Steven C.H. Hoi, Chunyan Miao. Learning Relative Similarity from Data Streams: Active Online Learning Approaches. The 24th ACM International Conference on Information and Knowledge Management (**CIKM 2015**), Melbourne, Australia, Oct 19-23, 2015.
35. **Peilin Zhao**, Tong Zhang. Stochastic Optimization with Importance Sampling for Regularized Loss Minimization. The 32nd International Conference on Machine Learning (**ICML 2015**), Lille, France, on July 6-July 11, 2015.
36. **Peilin Zhao**, Jinwei Yang, Tong Zhang, Ping Li. Adaptive Stochastic Alternating Direction Method of Multipliers. The 32nd International Conference on Machine Learning (**ICML 2015**), Lille, France, on July 6-July 11, 2015.
37. Yong Liu, **Peilin Zhao**, Aixin Sun, Chunyan Miao. A Boosting Algorithm for Item Recommendation with Implicit Feedback. 24th International Joint Conference on Artificial Intelligence (**IJCAI-15**), July 25- August 01, 2015, Buenos Aires, Argentina.
38. Ji Wan, Pengcheng Wu, Steven C. H. Hoi, **Peilin Zhao**, Xingyu Gao, Dayong Wang, Yongdong Zhang, Jintao Li. Online Learning to Rank for Content-Based Image Retrieval. 24th International Joint Conference on Artificial Intelligence (**IJCAI-15**), July 25- August 01, 2015, Buenos Aires, Argentina.
39. Yi Ding, **Peilin Zhao**, Steven C.H. Hoi, Yew Soon Ong. An Adaptive Subgradient Method for Online AUC Maximization. The Twenty-Ninth AAAI Conference on Artificial Intelligence (**AAAI-15**), January 25-29, 2015, Austin, Texas, USA.
40. **Peilin Zhao**, Steven C.H. Hoi, Jialei Wang, Bin Li. Online Transfer Learning. Artificial Intelligence Journal (**AIJ**), 2014.
41. Steven C.H. Hoi, Jialei Wang, **Peilin Zhao**. LIBOL: A Library for Online Learning Algorithms. Journal of Machine Learning Research (**JMLR**), 2014.
42. Jialei Wang, **Peilin Zhao**, Steven C.H. Hoi. Cost-sensitive Online Classification and Its Applications. IEEE Transactions on Knowledge and Data Engineering (**TKDE**), 2014.

43. Jialei Wang, **Peilin Zhao**, Steven C.H. Hoi, Rong Jin. Online Feature Selection and Its Applications. *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 2014.
44. Hao Xia, Steven C.H. Hoi, Rong Jin, **Peilin Zhao**. Online Multiple Kernel Similarity Learning for Visual Search. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2014.
45. Dayong Wang, Pengcheng Wu, **Peilin Zhao**, Chunyan Miao, Steven C.H. Hoi. High-dimensional Data Stream Classification via Sparse Online Learning. *IEEE International Conference on Data Mining 2014 (ICDM 2014)*, Dec 14-17, 2014, Shenzhen, China.
46. Jing Lu, **Peilin Zhao**, Steven C.H. Hoi. Online Passive Aggressive Active Learning and Its Applications. *The 6th Asian Conference on Machine Learning (ACML 2014)*, Nha Trang, Vietnam, November 26-28, 2014.
47. Pengcheng Wu, Yi Ding, **Peilin Zhao**, Chunyan Miao, Steven C.H. Hoi. Learning Relative Similarity by Stochastic Dual Coordinate Ascent. *The Twenty-Eighth Conference on Artificial Intelligence (AAAI-14)*, July 27-31, 2014, Quebec City, Canada.
48. Steven C.H. Hoi, Rong Jin, **Peilin Zhao**, Tianbao Yang. Online Multiple Kernel Classification. *Machine Learning (MLJ)*, 2013.
49. Bin Li, Steven C.H. Hoi, **Peilin Zhao**, Vivekanand Gopalkrishnan. Confidence Weighted Mean Reversion Strategy for On-Line Portfolio Selection. *Transactions on Knowledge Discovery from Data (TKDD)*, 2013.
50. **Peilin Zhao**, Steven C.H. Hoi. Cost-Sensitive Online Active Learning with Application to Malicious URL Detection. *19th Conference on Knowledge Discovery and Data Mining (KDD 2013)*, Chicago, Illinois, USA, August 11-14, 2013.
51. **Peilin Zhao**, Steven C.H. Hoi, Jinfeng Zhuang. Active Learning with Expert Advice. *The Conference on Uncertainty in Artificial Intelligence (UAI 2013)*, Bellevue, Washington, USA, July 11-15, 2013.
52. **Peilin Zhao**, Steven C.H. Hoi. Cost-Sensitive Double Updating Online Learning and Its Application to Online Anomaly Detection. *SIAM International Conference on Data Mining (SDM 2013)*, Austin, Texas, USA, 2-4 May 2013.
53. Jing Lu, Steven C.H. Hoi, Jialei Wang, **Peilin Zhao**. Second Order Online Collaborative Filtering. *The 5th Asian Conference on Machine Learning (ACML 2013)*, Canberra, Australia, November 13-15, 2013.
54. Pengcheng Wu, Steven C.H. Hoi, Hao Xia, **Peilin Zhao**, Dayong Wang, Chunyan Miao. Online Multimodal Deep Similarity Learning with Application to Image Retrieval. *The 21st ACM International Conference on Multimedia (MM 2013)*, Barcelona, Spain, October 21-25, 2013.
55. Jialei Wang, Steven C.H. Hoi, **Peilin Zhao**, Zhi-Yong Liu. Online Multi-Task Collaborative Filtering for On-the-Fly Recommender Systems. *The seventh ACM conference in Recommender System (RecSys 2013)*, Hong Kong, China, Oct 12-16, 2013.
56. Jialei Wang, Steven C.H. Hoi, **Peilin Zhao**, Jinfeng Zhuang, Zhi-Yong Liu. Large Scale Online Kernel Classification. *International Joint Conference On Artificial Intelligence (IJCAI 2013)*, Beijing, China, August 03-09, 2013.
57. Bin Li, **Peilin Zhao**, Steven C. H. Hoi, Vivekanand Gopalkrishnan. PAMR: Passive aggressive mean reversion strategy for portfolio selection. *Machine Learning (MLJ)* 87(2): 221-258, 2012.
58. **Peilin Zhao**, Steven C.H. Hoi. BDUOL: Double Updating Online Learning on a Fixed Budget. *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD 2012)*: 810-826, Bristol, UK, 24-28 September 2012.

59. **Peilin Zhao**, Jialei Wang, Pengcheng Wu, Rong Jin, Steven C.H. Hoi. Fast Bounded Online Gradient Descent Algorithms for Scalable Kernel-Based Online Learning. The 29th International Conference on Machine Learning (**ICML 2012**), Edinburgh, Scotland, 26 June - 1 July 2012.
60. Jialei Wang, **Peilin Zhao**, Steven C.H. Hoi. Exact Soft Confidence-Weighted Learning. The 29th International Conference on Machine Learning (**ICML 2012**), Edinburgh, Scotland, 26 June - 1 July 2012.
61. Jialei Wang, **Peilin Zhao**, Steven C.H. Hoi. Cost-Sensitive Online Classification. IEEE International Conference on Data Mining (**ICDM 2012**), Brussels, Belgium, 10 - 13 December, 2012.
62. Steven C.H. Hoi, Jialei Wang, **Peilin Zhao**, Rong Jin. Online Feature Selection for Big Data Mining. The 1st ACM **SIGKDD** Workshop on Big Data Mining (**BigMine**) Beijing, P.R. China Aug, 2012.
63. **Peilin Zhao**, Steven C.H. Hoi, Rong Jin. Double Updating Online Learning. Journal of Machine Learning Research (**JMLR**) 12: 1587-1615, May 2011.
64. **Peilin Zhao**, Steven C.H. Hoi, Rong Jin, Tianbao Yang. Online AUC Maximization. The 28th International Conference on Machine Learning (**ICML 2011**): 233-240, Bellevue, Washington, USA, 28 June - 2 July 2011.
65. Bin Li, Steven C.H. Hoi, **Peilin Zhao**, Vivekanand Gopalkrishnan. Confidence Weighted Mean Reversion Strategy for On-Line Portfolio Selection. Journal of Machine Learning Research (JMLR), W&CP 10, vol. 10, (**AISTATS 2011**): 434-442, Fort Lauderdale, FL, USA, 11-13 April 2011.
66. Pengcheng Wu, Steven C.H. Hoi, **Peilin Zhao**, Ying He. Mining Social Images with Distance Metric Learning for Automated Image Tagging. The fourth ACM International Conference on Web Search and Data Mining (**WSDM 2011**): 197-206, Hong Kong, China, 9-12 February 2011.
67. **Peilin Zhao**, Steven C.H. Hoi. OTL: A Framework of Online Transfer Learning. The 27th International Conference on Machine Learning (**ICML 2010**): 1231-1238, Haifa, Israel, 21-24 June 2010.
68. Shenghua Gao, Ivor W. Tsang, Liang-Tien Chia, **Peilin Zhao**. Local Features Are Not Lonely - Laplacian Sparse Coding for Image Classification. Proceedings of the 23rd IEEE Computer Society Conference on Computer Vision and Pattern Recognition (**CVPR 2010**): 3555-3561, San Francisco, CA, USA, 13-18 June 2010.
69. **Peilin Zhao**, Steven C.H. Hoi, Rong Jin. DUOL: A Double Updating Approach for Online Learning. Advances in Neural Information Processing Systems (**NIPS 2009**): 2259-2267, Vancouver, B.C., Canada, 7-10 December 2009.