## Personal Information

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## Experience

- **2014.8~Present**
  Associate Professor: Department of Computer Science, Nanjing University China.
- **2011.9~2014.7**
  Assistant Researcher: Department of Computer Science, Nanjing University China.
- **2005.9~2011.6**
  Ph.D. degree: Department of Computer Science, Nanjing University, China.
  Supervisor: Prof. Zhi-Hua Zhou.
- **2008.9~2009.3**
  Visiting scholar: CERCIA, The University of Birmingham, U.K.
  Host supervisor: Prof. Xin Yao.
- **2004.9~2005.6**
  Volunteer service in western China.
- **2000.9~2004.6**
  B.Sc. degree: Department of Computer Science, Nanjing University, China.

## Summary

The center of evolutionary computation consists of nature-inspired optimization algorithms such as genetic algorithms. These algorithms have been employed to solve sophisticated optimizations widely, however, have no solid theoretical foundation for many decades.
Dr. Yang Yu has been focusing on building theoretical foundation of evolutionary algorithms, covering fundamental questions of *how to analyze the time complex? how good are the evolved solutions? what are the impact of their various operators?* Further, grounded in the built theoretical foundation, he developed novel algorithms for solving two classes of hard problems, the *subset selection problem* and the *non-convex Local Lipschitz Continuity problems*. These algorithms are now state-of-the-art for the two problems in both theoretical and empirical evaluations. More concretely, his three representatives research projects are:

1. **Developing tools for time complexity analysis of evolutionary algorithms**. His work proposed the *convergence-based analysis* tool that can be applied to bound the time complexity of a wide range of evolutionary algorithms. Further his work proposed the *switch analysis* that has been proved to be reducible to many previous analysis approaches, and can derive tighter time complexity bounds. The papers of this project have been published in Artificial Intelligence, IEEE TEC, etc.
2. **Developing the *Pareto optimization* for subset selection problems**. Pareto optimization, born from theoretical analysis of evolutionary algorithms, is a novel way for solving the subset selection problems by solving an intermediate bi-objective optimization problem. Pareto optimization has been proved to be the best approximate algorithm for various forms of subset selection problems, and has been successfully applied to machine learning tasks including ensemble selection and sparse regression. The papers of this project have been published in Artificial Intelligence, NIPS, IJCAI, AAAI, etc.

3. **Developing the *classification-based optimization* for non-convex optimization**. Classification-based optimization, born from statistical analysis of model-based evolutionary algorithms, has been proved to have polynomial time complexity for approximating Local Lipschitz Continuity functions, which cover a wide range of non-convex problems. His work further improved its scalability to high dimensions ($>10^6$) by *sequential random embedding* technique. It has been successfully applied to non-convex learning tasks including robust classification and direct policy search in reinforcement learning. This research has been published in AAAI, IJCAI, etc.

The above work has been published in top-tier venues, particularly AI-related venues including Artificial Intelligence, IJCAI, AAAI, NIPS, KDD, etc. These papers received citations world widely, and even in Prof. Dietterich's President's Address in AAAI'16. Dr. Yu was granted several awards/honors including the National Outstanding Doctoral Dissertation Award, China Computer Federation Outstanding Doctoral Dissertation Award, PAKDD'08 Best Paper Award, GECCO'11 Best Paper Award (Theory Track), IDEAL'16 Best Paper Award, etc. He was a Senior Program Committee member of IJCAI'17 and IJCAI'15, and a Publicity Co-Chair of IJCAI'17, IJCAI'16, and IEEE ICDM'16.

## Services

- Associate Editor:
  Frontiers of Computer Science (Junior AE)
- Senior PC Member:
  IJCAI 2017 (26th International Joint Conference on Artificial Intelligence)
  IJCAI 2015 (24th International Joint Conference on Artificial Intelligence)
- Publicity Chair:
  IJCAI 2017 (26th International Joint Conference on Artificial Intelligence)
  IJCAI 2016 (25th International Joint Conference on Artificial Intelligence)
  MCS 2013 (11th International Conference on Multiple Classifier Systems)
- Workshop Chair:
  ACML 2016 (8th Asian Conference on Machine Learning)
- Workshop Organizer:
  AWRL 2016 (1st Asian Workshop on Reinforcement Learning)
  ECOLE 2014 (1st Chinese Workshop on Evolutionary Computation and Learning)
  ECOLE 2015 (2st Chinese Workshop on Evolutionary Computation and Learning)
  MLChina 2015 (2nd Workshop on Machine Learning in China)
- Tutorial:
  IJCAI 2013 Tutorial: "*An Introduction on Evolutionary Optimization: Recent Theoretical and Practical Advances*" (with Ke Tang, Xin Yao and Zhi-Hua Zhou)

## Awards and Honors

- IDEAL 2016 Best Paper Award (with Chao Qian and Zhi-Hua Zhou)
- Microsoft Research Asia Collaborative Research Award, 2015
- China National Outstanding Doctoral Dissertation Award, 2013
- ACM SIGKDD 2012 Best Poster Award (with Sheng-Jun Huang and Zhi-Hua Zhou)
- China Computer Federation Outstanding Doctoral Dissertation Award, 2011
- GECCO 2011 Best Paper Award (Theory Track) (with Chao Qian and Zhi-Hua Zhou)

- PAKDD 2008 Best Paper Award (with Zhi-Hua Zhou)
- Microsoft Fellowship Award 2007
- PAKDD 2006 Data Mining Competition (Open Category): Grand Champion, (with De-Chuan Zhan, Xu-Ying Liu, Ming Li, and Zhi-Hua Zhou)

## Selected Journal Papers:

- Yang Yu and Zhi-Hua Zhou. *A new approach to estimating the expected first hitting time of evolutionary algorithms*. **Artificial Intelligence**, 2008, 172(15): 1809-1832.
- Yang Yu, Xin Yao, and Zhi-Hua Zhou. *On the approximation ability of evolutionary optimization with application to minimum set cover*. **Artificial Intelligence**, 2012, 180-181:20-33.
- Chao Qian, Yang Yu, and Zhi-Hua Zhou. *An analysis on recombination in multi-objective evolutionary optimization*. **Artificial Intelligence**, 2013, 204:99-119.
- Yang Yu, Chao Qian, and Zhi-Hua Zhou. *Switch analysis for running time analysis of evolutionary algorithms*. **IEEE Transactions on Evolutionary Computation**, 2015, 2015, 19(6):777-792.
- Chao Qian, Yang Yu, and Zhi-Hua Zhou. *Analyzing evolutionary optimization in noisy environments*. **Evolutionary Computation**, 2016, early access.

## Selected Conference Papers:

- Hong Qian and Yang Yu. *Solving high-dimensional multi-objective optimization problems with low effective dimensions*. In: **Proceedings of the 31st AAAI Conference on Artificial Intelligence (AAAI'17)**, San Francisco, CA, 2017.
- Yi-Qi Hu, Hong Qian, and Yang Yu. *Sequential classification-based optimization for direct policy search*. In: **Proceedings of the 31st AAAI Conference on Artificial Intelligence (AAAI'17)**, San Francisco, CA, 2017.
- Chao Qian, Yang Yu, and Zhi-Hua Zhou. *A lower bound analysis of populartion-based evolutionary algorithms for pseudo-Boolean functions*. In: **Proceedings of the 17th International Conference on Intelligent Data Enginering and Automated Learning (IDEAL'16)**, Yangzhou, China, 2016, pp.457-467.
- Xin Li, Yongjuan Liang, Hong Qian, Yi-Qi Hu, Lei Bu, Yang Yu, Xin Chen, and Xuandong Li. *Symbolic execution of complex program driven by machine learning based constraint solving*. In: **Proceedings of the 31th IEEE/ACM International Conference on Automated Software Engineering (ASE'16)**, Singapore, 2016.
- Hong Qian, Yi-Qi Hu and Yang Yu. *Derivative-free optimization of high-dimensional non-convex functions by sequential random embeddings*. In: **Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI'16)**, New York, NY, 2016, pp.1946-1952.
- Chao Qian, Jing-Cheng Shi, Yang Yu, Ke Tang, and Zhi-Hua Zhou. *Parallel Pareto optimization for subset selection*. In: **Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI'16)**, New York, NY, 2016.
- Yang Yu, Peng-Fei Hou, Qing Da, and Yu Qian. *Boosting nonparametric policies*. In: **Proceedings of the 2016 International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS'16)**, Singapore, 2016, pp.477-484.

- Yang Yu, Hong Qian, and Yi-Qi Hu. *Derivative-Free Optimization via Classification*. In: **Proceedings of the 30th AAAI Conference on Artificial Intelligence (AAAI'16)**, Phoenix, AZ, 2016.
- Hong Qian, Yang Yu. *Scaling Simultaneous Optimistic Optimization for High-Dimensional Non-Convex Functions with Low Effective Dimensions*. In: **Proceedings of the 30th AAAI Conference on Artificial Intelligence (AAAI'16)**, Phoenix, AZ, 2016.
- Chao Qian, Yang Yu and Zhi-Hua Zhou. *Subset selection by Pareto optimization*. In: **Advances in Neural Information Processing Systems 28 (NIPS'15)**, Montreal, Canada, 2015.
- Chao Qian, Yang Yu and Zhi-Hua Zhou. *On constrained Boolean Pareto optimization*. In: **Proceedings of the 23rd International Joint Conference on Artificial Intelligence (IJCAI'15)**, Buenos Aires, Argentina, 2015, pp.389-395.
- Chao Qian, Yang Yu and Zhi-Hua Zhou. *Pareto ensemble pruning*. In: **Proceedings of the 29th AAAI Conference on Artificial Intelligence (AAAI'15)**, Austin, TX, 2015, pp.2935-2941.
- Chao Qian, Yang Yu, Yaochu Jin and Zhi-Hua Zhou. *On the effectiveness of sampling for evolutionary optimization in noisy environments*. In: **Proceedings of the 13th International Conference on Parallel Problem Solving from Nature (PPSN'14)**, Ljubljana, Slovenia, 2014, pp.302-311.
- Qing Da, Yang Yu, and Zhi-Hua Zhou. *Learning with augmented class by exploiting unlabeled data*. In: **Proceedings of the 28th AAAI Conference on Artificial Intelligence (AAAI'14)**, Québec city, Canada, 2014, pp.1760-1766.
- Chao Qian, Yang Yu, and Zhi-Hua Zhou. *On algorithm-dependent boundary case identification for problem classes*. In: **Proceedings of the 12th International Conference on Parallel Problem Solving from Nature (PPSN'12)**, Taormina, Italy, 2012, pp.62-71.
- Sheng-Jun Huang, Yang Yu, and Zhi-Hua Zhou. *Multi-label hypothesis reuse*. In: **Proceedings of the 18th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD'12)**, Beijing, China, 2012, pp.525-533.
- Yang Yu, Yu-Feng Li, and Zhi-Hua Zhou. *Diversity Regularized Machine.* In: **Proceedings of the 22nd International Joint Conference on Artificial Intelligence (IJCAI'11),** Barcelona, Spain, 2011, pp. 1603-1608.
- Chao Qian, Yang Yu, and Zhi-Hua Zhou. *An analysis on recombination in multi-objective evolutionary optimization*. In: **Proceedings of the 13th ACM Conference on Genetic and Evolutionary Computation (GECCO'11)**, Dublin, Ireland, 2011, pp. 2051-2058.
- Chao Qian, Yang Yu, and Zhi-Hua Zhou. *Collisions are helpful for computing unique input-output sequences*. In: **Proceedings of the 13th ACM Conference on Genetic and Evolutionary Computation (GECCO'11)** (Companion Material/Poster), Dublin, Ireland, 2011, pp. 265-266.
- Yang Yu, Chao Qian, and Zhi-Hua Zhou. *Towards analyzing recombination operators in evolutionary search*. In: **Proceedings of the 11th International Conference on Parallel Problem Solving from Nature (PPSN'10)** Part I, Krakow, Poland, 2010, pp.144-153.

- Nan Li, Yang Yu, and Zhi-Hua Zhou. *Semi-naive exploitation of one-dependence estimators*. In: **Proceedings of the 9th IEEE International Conference on Data Mining (ICDM'09)**, Miami, FL, 2009, pp.278-287.
- Li-Ping Liu, Yang Yu, Yuan Jiang, and Zhi-Hua Zhou. *TEFE: A time-efficient approach to feature extraction*. In: **Proceedings of the 8th IEEE International Conference on Data Mining (ICDM'08)**, Pisa, Italy, 2008, pp.423-432.
- Yang Yu, Zhi-Hua Zhou, and Kai Ming Ting. *Cocktail ensemble for regression*. In: **Proceedings of the 7th IEEE International Conference on Data Mining (ICDM'07)**, Omaha, NE, 2007, pp.721-726.
- Yang Yu and Zhi-Hua Zhou. *A new approach to estimating the expected first hitting time of evolutionary algorithms*. In: **Proceedings of the 21st National Conference on Artificial Intelligence (AAAI'06)**, Boston, MA, 2006, pp.555-560.