YIFAN HE

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Education

2020.04 – 2023.03 **Ph.D. in Computer Science** **University of Tsukuba** **Ibaraki, Japan**

- Study Program Synthesis under the supervision of Prof. Tetsuya Sakurai and Prof. Claus Aranha
- Work on Seismic History Matching collaborated with Prof. Romain Chassagne at Heriot-Watt University
- Thesis (tentative title): Problem Formulations in Evolutionary Optimization with Multiple Tasks

2018.04 – 2020.03 **M.Eng. in Computer Science** **University of Tsukuba** **Ibaraki, Japan**

- Study the applications of Multi-Objective Evolutionary Algorithms in financial engineering under the supervision of Prof. Hitoshi Kanoh and Prof. Claus Aranha
- Thesis: Solving Portfolio Optimization Problems using MOEA/D and Lévy Flight

2013.09 – 2017.06 **B.S. in Computer Science** **Wenzhou-Kean University** **Zhejiang, China**
Minor in Mathematical Science

- Study on Assistive Technology, applications of Recommender Systems, and Human-Computer Interaction under the supervision of Prof. Tiffany Ya Tang and Prof. Pinata Winoto
- Thesis: A Hybrid Anime Movie Recommender System using Danmaku Analysis

Research Interests

Program Synthesis and its Applications

- Program synthesis with knowledge
- Synthesizing interactive computer programs

Evolutionary Computation and its Applications

- Solving real-world optimization problems with Evolutionary Computation
- Self-adaptive/Automated design (Hyper-heuristics) for Evolutionary Algorithms
- Visualization of Evolutionary Algorithms and fitness landscape analysis

Assistive Technology and Human-Computer Interaction

- Assistive technology development for disabled
- Shape optimization for assistive devices
- Layout optimization for Graphical User Interface
- Designing assistive devices by Interactive Evolutionary Computation

Experiences

2021.04 – 2022.06 **Research Assistant** **University of Tsukuba** **Ibaraki, Japan**

- Conducting research on History Matching with the collaboration of Prof. Romain Chassagne from Heriot-Watt University

2020.04 – 2022.07 **Teaching Assistant** **University of Tsukuba** **Ibaraki, Japan**

- Assist the tutoring activities in the graduate course Experiment Design in Computer Sciences and undergraduate course Introduction to Python Programming
- Take duty on Q&A on the course forum
- Evaluate the student assignments in Introduction to Python Programming
- Give tutorial on the case study in Experiment Design in Computer Sciences

2021.11 – 2021.12 **Program Committee** **CollaboTICS 2021** **Online**

- Member of organizing committee of CollaboTICS 2021 workshop
- Take duty on the construction of the platform infrastructure

2020.07 – 2021.03 **Research Assistant** **CAIR, University of Tsukuba** **Ibaraki, Japan**

- Conducting research and development projects on Federated Learning of medical data under the supervision of Prof. Anna Bogdanova

2019.04 – 2020.03 **Technical Assistant** **National Institute of Earth Science & Disaster Resilience** **Ibaraki, Japan**

- Maintained the computing devices in the research institute
- Take duty on the project to transfer a large amount of research data

2018.09 – 2018.10 **Summer Internship** **Sharp** **Chiba, Japan**

- Participated in the development of a Language Recognition system using PyTorch

Awards

2022.04 **Degree Program Leader Special Award** **University of Tsukuba**

- Award for organizing the International Workshop CollaboTICS 2021

Skills

Proficiency in Evolutionary Computation, Program Synthesis, and Assistive Technology
Experience in organizing academic events such as international workshops
Programming: Python, Java, C#, R
Excellent research, writing, and presentation skills
Working knowledge of statistics
Version Control Tools: Git
Operating Systems: Windows, macOS, Linux administrator
Languages: Chinese (Native), English (TOEFL 101), Japanese (JLPT N2)

Publications

Journal Articles

- Yifan He, Claus Aranha, Antony Hallam, Romain Chassagne: **Optimization of Subsurface Models with Multiple Criteria using Lexicase Selection**. *Operations Research Perspectives*. 10.1016/j.orp.2022.100237.
- Antony Hallam, Romain Chassagne, Claus Aranha, Yifan He: **Comparison of Maps Metrics as Fitness Input for Assisted Seismic History Matching**. *Journal of Geophysics and Engineering*. 10.1093/jge/gxac024.
- Yifan He, Claus Aranha: **Solving Portfolio Optimization Problems Using MOEA/D and Lévy Flight**. *Advances in Data Science and Adaptive Analysis*. 10.1142/S2424922X20500059.

Conference Papers

- Yifan He, Claus Aranha, Tetsuya Sakurai: **Knowledge-Driven Program Synthesis via Adaptive Replacement Mutation and Auto-constructed Subprogram Archives**. *2022 IEEE Symposium Series on Computational Intelligence* (SSCI 2022). arXiv:2209.03736.
- Yifan He, Claus Aranha, Tetsuya Sakurai: **Incorporating Sub-programs as Knowledge in Program Synthesis by PushGP and Adaptive Replacement Mutation**. *The Genetic and Evolutionary Computation Conference 2022* (GECCO 2022) Companion. 10.1145/3520304.3528891.
- Yifan He, Claus Aranha, Tetsuya Sakurai: **Parameter Evolution Self-Adaptive Strategy and its Application for Cuckoo Search**. *The 9th International Conference on Bioinspired Optimisation Methods and their Applications* (BIOMA 2020). 10.1007/978-3-030-63710-1_5.
- Yifan He, Tiffany Ya Tang: **Recommending Highlights in Anime Movies: Mining the Real-time User Comments "DanMaKu"**. *SAI Intelligent Systems Conference 2017* (IntelliSys 2017). 10.1109/IntelliSys.2017.8324311.
- Yifan He, Tiffany Ya Tang: **The Effect of Emotion in an Ultimatum Game: The Bio-Feedback Evidence**. *The 19th International Conference on Human-Computer Interaction* (HCII 2017). 10.1007/978-3-319-58753-0_19.
- Yifan He, Bo Zhu, Pinata Winoto: **A Customizable Calculator Application with 3D-Printed Cover for the Visually Impaired in China**. *The 8th International Conference on Applied Human Factors and Ergonomics* (AHFE 2017). 10.1007/978-3-319-60366-7_26.
- Tiffany Ya Tang, Maldini Yifan He, Vince Lineng Cao: **"One Doesn't Fit All": A Comparative Study of Various Finger Gesture Interaction Methods**. *The 18th International Conference on Human-Computer Interaction* (HCII 2016). 10.1007/978-3-319-40406-6_9.

Presentations

- **Knowledge-Driven Program Synthesis** (2021.12). Open Zemi. YouTube at https://youtu.be/Tr8VjFOkPEg.
- **Adaptive Knowledge-Driven Program Synthesis** (2021.12). International Collaborative Workshop of the University of Grenoble-Alpes, Ruhr-Universität Bochum, and the University of Tsukuba. Online.
- **Program Synthesis by Genetic Programming with Sub-program Archives** (2021.10). Tsukuba Global Science Week. Online.
- **Solving Multi-objective Optimization Problems with Differential Evolution and Lexicase Selection** (2021.03). Symposium of the Japanese Society of Evolutionary Computation. Online.
- **Parameter Evolution Self-Adaptive Strategy and its Application for Cuckoo Search** (2020.11). The 9th International Conference on Bioinspired Optimisation Methods and Their Applications. Online.
- **Evolving Stability Parameters of Lévy Flight in Cuckoo Search** (2020.02). Symposium of the Japanese Society of Evolutionary Computation. Online.
- **Solving Portfolio Optimization Problems based on MOEA/D and Lévy Flight** (2019.10). Symposium of the Japanese Society of Evolutionary Computation. Sendai, Japan.
- **Solving Portfolio Optimization Problems based on MOEA/D and Lévy Flight** (2019.07). Joint Seminar at Shinshu University. Shishu, Japan.
- **"One Doesn't Fit All": A Comparative Study of Various Finger Gesture Interaction Methods** (2016.07). HCI International Conference 2016. Toronto, Canada.

Open-Source Projects

PyshGP **https://github.com/erp12/pyshgp** **Contributor**

- PushGP is a leading software synthesis system. It utilized evolutionary search methods to produce programs that can manipulate all the common data types, control structures, and data structures. PyshGP is an implementation of PushGP in Python.
- Fixing several "MemoryError" bugs

Kdps **https://github.com/Y1fanHE/kdps** **Maintainer**

- kdps is an implementation of the Knowledge-Driven Program Synthesis system in Python. It allows extracting and storing knowledge from a solved problem and using knowledge in later tasks.

PyBenchFCN **https://github.com/Y1fanHE/PyBenchFCN** **Maintainer**

- PyBenchFCN is a Python implementation of over 63 mathematical optimization benchmark functions. It also provides 3D plots and contour plots of the fitness landscape of each function.

moead-levy-python **https://github.com/Y1fanHE/moead-levy-python** **Maintainer**

- moead-levy-python is an implementation of the MOEA/D-Lévy algorithm using Python. MOEA/D is a Multi-objective Evolutionary Algorithm and "Lévy" is short for the mutation method Lévy Flight.

rvea-python **https://github.com/Y1fanHE/rvea-python** **Maintainer**

- rvea-python is an implementation of the RVEA algorithm using Python. RVEA (Reference Vector-guided Evolutionary Algorithm) is a Multi-objective Evolutionary Algorithm.

CyStack **https://github.com/Y1fanHE/CyStack** **Maintainer**

- CyStack is an implementation of stack data structure based on Cython. I practiced Cython programming in this project.

po_with_moead-levy **https://github.com/Y1fanHE/po_with_moead-levy** **Maintainer**

- po_with_moead-levy is a Python implementation of MOEA/D-Lévy algorithm to solve portfolio optimization problems. It contains five portfolio optimization benchmarks, several Multi-objective Optimization algorithms, metric computing scripts, and plotting tools.

benchmark-by-gp **https://github.com/Y1fanHE/benchmark-by-gp** **Maintainer**

- benchmark-by-gp aims to generate mathematical optimization problems using Genetic Programming that help to compare the characteristics of different metaheuristic algorithms. It is implemented in Python. This repository is under development and currently remains "Private".

Online MOOCs

2022.07 **Fundamentals of Reinforcement Learning**

- Sequential Decision-Making, Markov Decision Process, Value Functions & Bellman Equations, and Dynamic Programming

2020.11 **The Data Scientist's Toolbox**

- R and RStudio, Version Control and GitHub, and R Markdown, Scientific Thinking, and Big Data

2019.07 **Guided Tour of Machine Learning in Finance**

- Mathematical Foundations of Machine Learning, Introduction to Supervised Learning, and Supervised Learning in Finance

2018.10 **Deep Learning Specialization**

- Neural Networks and Deep Learning, Hyperparameter Tuning, Regularization and Optimization, Convolutional Neural Networks, and Sequence Models

2016.08 **Machine Learning**

- Regression, Classification, Support Vector Machine, and Neural Network

2016.08 **Interactive Computer Graphics**

- Graphical User Interfaces, 2D Drawings and Animations, 3D Geometric Modeling, Deformation and Animation, Fabrication, and Computer-aided Design

References

Prof. Claus Aranha

- Assistant Professor at the University of Tsukuba
- Homepage: `http://conclave.cs.tsukuba.ac.jp`
- E-mail: `caranha@cs.tsukuba.ac.jp`

Prof. Romain Chassagne

- Assistant Professor at Heriot-Watt University
- Homepage: `https://rlchassagne.github.io`
- E-mail: `R.L.Chassagne@hw.ac.uk`

Prof. Tetsuya Sakurai

- Professor at the University of Tsukuba
- Homepage: `http://www.cs.tsukuba.ac.jp/~sakurai`
- E-mail: `sakurai@cs.tsukuba.ac.jp`