



# AABOH@GECCO-2021 Workshop

## Analysing Algorithmic Behaviour of Optimisation Heuristics

### Genetic and Evolutionary Computation Conference (GECCO'21)

Lille, France, July 10-14, 2021  
<http://iao.hfu.edu.cn/aaboh21>

Optimisation and Machine Learning tools are among the most used tools in the modern world with its omnipresent computing devices. Yet, the dynamics of these tools have not been analysed in detail. Such scarcity of knowledge on the inner workings of heuristic methods is largely attributed to the complexity of the underlying processes that cannot be subjected to a complete theoretical analysis. However, this is also partially due to a superficial experimental set-up and, therefore, a superficial interpretation of numerical results. Indeed, researchers and practitioners typically only look at the final result produced by these methods. Meanwhile, the vast amount of information collected over the run(s) is wasted. In the light of such considerations, it is now becoming more evident that such information can be useful and that some design principles should be defined that allow for online or offline analysis of the processes taking place in the population and their dynamics.

Hence, with this workshop, we call for *both theoretical and empirical achievements* identifying the desired features of optimisation and machine learning algorithms, quantifying the importance of such features, spotting the presence of intrinsic structural biases and other undesired algorithmic flaws, studying the transitions in algorithmic behaviour in terms of convergence, any-time behaviour, performances, robustness, etc., with the goal of gathering the most recent advances to fill the aforementioned knowledge gap and disseminate the current state-of-the-art within the research community.

Thus, we encourage submissions exploiting carefully designed experiments or data-heavy approaches that can come to help in analysing primary algorithmic behaviours and modelling internal dynamics causing them. As an indication, some (but not all) relevant topics of interests are reported in the list below:

- global search vs. local search,
- exploration vs. exploitation,
- time and space complexity,
- premature convergence and stagnation,
- structural bias,
- genotypic or phenotypic diversity,
- robustness of the produced solution,
- secondary benchmarking,
- anytime performance.

All accepted papers of this workshop will be included in the Proceedings of the Genetic and Evolutionary Computation Conference (GECCO'21) Companion Volume.

Submission Opening:	11 February	2021
<b>Paper Submission Deadline:</b>	<b>12 April</b>	<b>2021</b>
Notification of Acceptance:	26 April	2021
Camera-Ready Copy Due:	3 May	2021
Author Registration:	3 May	2021
Conference Presentation:	10 July	2021 to 14 July 2021

If you have questions or suggestions, please contact Dr. Kononova at [a.kononova@liacs.leidenuniv.nl](mailto:a.kononova@liacs.leidenuniv.nl) and Dr. Wang at [h.wang@liacs.leidenuniv.nl](mailto:h.wang@liacs.leidenuniv.nl), with CC to [tweise@ustc.edu.cn](mailto:tweise@ustc.edu.cn).

### Instructions for Authors

Our workshop invites the submission of papers of at most 8 pages (excluding references), which should present original work that meets the high-quality standards of GECCO. Each paper will be rigorously evaluated in a double-blind review process. Accepted papers appear in the ACM digital library as part of the Companion Proceedings of GECCO. Each paper accepted needs to have at least one author registered by the author registration deadline. By submitting a paper you agree to register and present at the conference in case the paper is accepted. Papers must be submitted via the online submission system <https://ssl.linklings.net/conferences/gecco/>.

Please refer to <https://gecco-2021.sigevo.org/Paper-Submission-Instructions> for more detailed instructions.

## Chairs

- Anna V. Kononova, LIACS, Leiden University, Leiden, The Netherlands
- Hao Wang, LIACS, Leiden University, Leiden, The Netherlands
- Thomas Weise, Institute of Applied Optimization, Hefei University, Hefei, China
- Carola Doerr, CNRS and Sorbonne University, Paris, France
- Thomas Bäck, LIACS, Leiden University, Leiden, The Netherlands
- Fabio Caraffini, De Montfort University, Leicester, UK
- Johann Dreo, Pasteur Institute and CNRS, Computational Biology Departement, USR 3756, System Biology Group

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- Christine Zarges, Aberystwyth University, Aberystwyth, Wales, United Kingdom
- Aleš Zamuda, University of Maribor, Slovenia
- Xingyi Zhang, Anhui University, Hefei, China

## Chair Biographies



**Anna V. Kononova** is currently an Assistant Professor at the Leiden Institute of Advanced Computer Science. She received her MSc degree in Applied Mathematics from Yaroslavl State University (Russia) in 2004 and her PhD degree in Computer Science from University of Leeds in 2010. After 5 years of postdoctoral experience at Technical University Eindhoven, the Netherlands and Heriot-Watt University, UK, Anna has spent a number of years working as a mathematician in industry. Her current research interests include analysis of optimization algorithms.



**Hao Wang** obtained his PhD (cum laude, promotor: Prof. Thomas Bäck) from Leiden University in 2018. He is currently employed as an assistant professor of computer science in Leiden University. Previously, he has a research stay at Sorbonne University, France (supervised by Carola Doerr). He received the Best Paper Award at the PPSN 2016 conference and was a best paper award finalist at the IEEE SMC 2017 conference. His research interests are in the analysis and improvement of efficient global optimization for mixed-continuous search spaces, Evolution strategies, Bayesian optimization, and benchmarking.



**Thomas Weise** obtained the MSc in Computer Science in 2005 from the Chemnitz University of Technology and his PhD from the University of Kassel in 2009. He then joined the University of Science and Technology of China (USTC) as PostDoc and subsequently became Associate Professor at the USTC-Birmingham Joint Research Institute in Intelligent Computation and Its Applications (UBRI) at USTC. In 2016, he joined Hefei University as Full Professor to found the Institute of Applied Optimization (IAO) of the School of Artificial Intelligence and Big Data. Prof. Weise has more than a decade of experience as a full time researcher in China, having contributed significantly both to fundamental as well as applied research. He has published more than 90 scientific papers in international peer reviewed journals and conferences. His book "Global Optimization Algorithms – Theory and Application" has been cited more than 900 times. He is Member of the Editorial Board of the Applied Soft Computing Journal and has acted as reviewer, editor, or program committee member at 80 different venues.



**Carola Doerr**, formerly Winzen, is a permanent CNRS researcher at Sorbonne University in Paris, France. Carola's main research activities are in the mathematical analysis of randomized algorithms, with a strong focus on evolutionary algorithms and other sampling-based optimization heuristics. Carola has received several awards for her work on evolutionary computation, among them the Otto Hahn Medal of the Max Planck Society and four best paper awards at GECCO. She is associate editor of ACM Transactions on Evolutionary Learning and Optimization, editorial board member of the Evolutionary Computation journal, advisory board member of the Springer Natural Computing Book Series. She was program chair of PPSN 2020, FOGA 2019, and the theory tracks of GECCO 2015 and 2017. Carola was guest editor of two special issues in Algorithmica. She is also vice chair of the EU-funded COST action 15140 on "Improving Applicability of Nature-Inspired Optimisation by Joining Theory and Practice (ImAppNIO)". She is a founding and coordinating member of the [Benchmarking Network](#), an initiative created to consolidate and to stimulate activities on benchmarking sampling-based optimization heuristics, she has organized several workshops on benchmarking, and was co-organizer of the [Open Optimization Competition 2020](#).



**Thomas Bäck** is professor of Computer Science at the Leiden Institute of Advanced Computer Science, Leiden University, Netherlands, since 2002. He received his PhD in Computer Science from Dortmund University, Germany, in 1994, and was leader of the Center for Applied Systems Analysis at the Informatik Centrum Dortmund until 2000. Until 2009, Thomas was also CTO of NuTech Solutions, Inc. (Charlotte, NC), where he gained ample experience in solving real-world problems in optimization and data analytics, by working with global enterprises in the automotive and other industry sectors. Thomas received the IEEE Computational Intelligence Society (CIS) Evolutionary Computation Pioneer Award for his contributions in synthesizing evolutionary computation (2015), was elected as a fellow of the International Society of Genetic and Evolutionary Computation (ISGEC) for fundamental contributions to the field (2003), and received the best dissertation award from the "Gesellschaft für Informatik" in 1995. Thomas has more than 300 publications, as well as two books on evolutionary algorithms: Evolutionary Algorithms in Theory and Practice (1996), Contemporary Evolution Strategies (2013). He is co-editor of the Handbook of Evolutionary Computation and the Handbook of Natural Computing.



**Fabio Caraffini** is currently an Associate Professor in Computer Science and Mathematics at De Montfort University (UK) and a Fellow of the Higher Education Academy (UK). He received the BSc in "Electronics Engineering" and the MSc in "Telecommunications Engineering" degrees from the University of Perugia (Italy) in 2008 and 2011 respectively. Fabio holds a PhD in Computer Science (De Montfort University, UK, 2014) and a PhD in Computational Mathematics (University of Jyväskylä, Finland, 2016). His research interests include theoretical and applied computational intelligence with a strong emphasis on metaheuristics for optimization.



**Johann Dreö** works at the Pasteur Institute and CNRS, Computational Biology Departement, USR 3756, System Biology Group. His scientific interests are in optimization, search heuristics, artificial intelligence, machine learning, algorithm design and engineering, automated planning, and differential geometry. He has more than 13 years of expertise of applying randomized optimization heuristics in practice.



## Hosting Event

Genetic and Evolutionary Computation Conference (GECCO'21)

Lille, France, July 10-14, 2021

<https://gecco-2021.sigev.org/>

The Genetic and Evolutionary Computation Conference (GECCO) presents the latest high-quality results in genetic and evolutionary computation since 1999. Topics include: genetic algorithms, genetic programming, ant colony optimization and swarm intelligence, complex systems (artificial life, robotics, evolvable hardware, generative and developmental systems, artificial immune systems), digital entertainment technologies and arts, evolutionary combinatorial optimization and metaheuristics, evolutionary machine learning, evolutionary multiobjective optimization, evolutionary numerical optimization, real world applications, search-based software engineering, theory and more.

