**DOCS 2023 Special Session Proposal**

**Special Session on “Data-Driven Evolutionary Optimization of Computationally Expensive Problems”**

**Organizers:**

**Chaoli Sun**

School of Computer Science and Technology, Taiyuan University of Science and Technology

Taiyuan, Shanxi 030024 China

[chaoli.sun.cn@gmail.com](mailto:chaoli.sun.cn@gmail.com)

http://www.dscil.cn/people/sun\_en.html

**Handing Wang**

Department of Artificial Intelligence, Xidian University

Xi’an, Shaaxi, 710126, China

[hdwang@xidian.edu.cn](mailto:hdwang@xidian.edu.cn)

https://faculty.xidian.edu.cn/HandingWang/zh\_CN/index/404706/list/index.htm

**Aim and Scope**

Meta-heuristic algorithms, including evolutionary algorithms and swarm optimization, face challenges when solving time-consuming problems, as typically these approaches require thousands of function evaluations to arrive at solutions that are of reasonable quality. Surrogate models, which are computationally cheap, have in recent years gained in popularity in assisting meta-heuristic optimization, by replacing the compute-expense/time-expensive problem during phases of the heuristic search. However, due to the curse of dimensionality, it is very difficult, if not impossible to train accurate surrogate models. Thus, appropriate model management techniques, memetic strategies and other schemes are often indispensable. In addition, modern data analytics involving advance sampling techniques and learning techniques such as semi-supervised learning, transfer learning and active learning are highly beneficial for speeding up evolutionary search while bringing new insights into the problems of interest. This special session aims at bringing together researchers from both academia and industry to explore future directions in this field.

The topics of this special session include but are not limited to the following topics:

* Surrogate-assisted evolutionary optimization for computationally expensive problems
* Adaptive sampling using machine learning and statistical techniques
* Surrogate model management in evolutionary optimization
* Data-driven optimization using big data and data analytics
* Knowledge acquisition from data and reuse for evolutionary optimization
* Computationally efficient evolutionary algorithms for large scale and/or many-objective optimization problems
* Federated data-driven optimization
* Real world applications including multidisciplinary optimization

**Potential Contributors:**

* Chaoli Sun, Taiyuan University of Science and Technology, China, [chaoli.sun.cn@gmail.com](mailto:chaoli.sun.cn@gmail.com)
* Rommel G. Regis, Saint Joseph's University, Philadelphia PA, [rregis@sju.edu](mailto:rregis@sju.edu)
* Bo Liu, Glyndwr University, UK, [b.liu@glyndwr.ac.uk](mailto:b.liu@glyndwr.ac.uk)
* Tapabrata Ray, The University of New South Wales, Australia, [t.ray@adfa.edu.au](mailto:t.ray@adfa.edu.au)
* Xuhua Shi, Ningbo University, China, [Shixuhua@nbu.edu.cn](mailto:Shixuhua@nbu.edu.cn)
* Handing Wang, Xidian University, China, [hdwang@xidian.edu.cn](mailto:hdwang@xidian.edu.cn)
* Xingyi Zhang, Anhui University, China, [xyzhanghust@gmail.com](mailto:xyzhanghust@gmail.com)
* Jie Tian, Taiyuan University of Science and Technology, China, [tianjie918@163.com](mailto:tianjie918@163.com)
* Tinkle Chugh, University of Exeter, UK, T.Chugh@exeter.ac.uk
* Jakob Bossek, University of Munster, Germany, [bossek@wi.uni-muenster.de](mailto:bossek@wi.uni-muenster.de)
* Ivo Couckuyt, Ghent University, Belgium, [ivo.couckuyt@ugent.be](mailto:ivo.couckuyt@ugent.be)
* [Rodolphe Le Riche](http://www.emse.fr/~leriche/contact.html), CNRS and Ecole des Mines de Saint Etienne, France, leriche@ emse.fr
* [Ilya Loshchilov](http://www.loshchilov.com/), University of Freiburg, Germany, ilya.loshchilov@ gmail.com
* Nobuo Namura, Tohoku University, Japan, [namura@edge.ifs.tohoku.ac.jp](mailto:namura@edge.ifs.tohoku.ac.jp)

* [Victor Picheny](https://sites.google.com/site/victorpicheny/), INRA, France, [Victor.Picheny@toulouse.inra.fr](mailto:Victor.Picheny@toulouse.inra.fr)
* Bas van Stein, LIACS, Netherlands, [bas9112@gmail.com](mailto:bas9112@gmail.com)
* Simon Wessing, [TU Dortmund](http://www.tu-dortmund.de/), Germany, [simon.wessing@tu-dortmund.de](mailto:simon.wessing@tu-dortmund.de)
* [Saul Zapotecas-martinez](http://computacion.cs.cinvestav.mx/~zapoteca/), SHINSHU University, Japan, [saul.zapotecas@gmail.com](mailto:saul.zapotecas@gmail.com)
* Kheng Cheng Wai, University Tunku Abdul Rahman, Malaysia, [khengcw@utar.edu.my](mailto:khengcw@utar.edu.my)
* Hemant Singh, The University of New South Wales, Australian, [h.singh@adfa.edu.au](mailto:h.singh@adfa.edu.au)
* Michael T.M. Emmerich, Leiden University, UK, [m.t.m.emmerich@liacs.leidenuniv.nl](mailto:m.t.m.emmerich@liacs.leidenuniv.nl)
* Yaochu Jin, University of Surrey, UK, [yaochu.jin@surrey.ac.uk](mailto:yaochu.jin@surrey.ac.uk)
* Zhonghua Han, Northwestern Polytechnical University, China, [hanzh@nwpu.edu.cn](mailto:hanzh@nwpu.edu.cn)
* Qi Zhou, [Huazhong University of Science & Technology](https://scholar.google.co.uk/citations?view_op=view_org&hl=zh-CN&org=7177955212759034238), China, [qizhouhust@gmail.com](mailto:qizhouhust@gmail.com)
* Liang Gao, [Huazhong University of Science & Technology](https://scholar.google.co.uk/citations?view_op=view_org&hl=zh-CN&org=7177955212759034238), China, [gaoliang@mail.hust.edu.cn](mailto:gaoliang@mail.hust.edu.cn)
* Yinan Guo, China University of Mining and Technology, China, [nanfly@126.com](mailto:nanfly@126.com)
* Dunwei Gong, China University of Mining and Technology, China, [dwgong@vip.163.com](mailto:dwgong@vip.163.com)
* Wenyin Gong, China University of Geosciences, China, [wygong@cug.edu.cn](mailto:wygong@cug.edu.cn)
* Chunna Li, Northwestern Polytechnical University, China, [chunnali@nwpu.edu.cn](mailto:chunnali@nwpu.edu.cn)
* Joshua D. Knowles, University of Birmingham, UK, [j.knowles@cs.bham.ac.uk](mailto:j.knowles@cs.bham.ac.uk)
* Marcus Gallagher, University of Queensland, Australian, [marcusg@uq.edu.au](mailto:marcusg@uq.edu.au)
* Kwang-Yong Kim, Inha University, South Korea, [kykim@inha.ac.kr](mailto:kykim@inha.ac.kr)
* Aimin Zhou, East China Normal University, China, [amzhou@cs.ecnu.edu.cn](mailto:amzhou@cs.ecnu.edu.cn)
* Cheng He, Southern University of Science and Technology, China, [chenghehust@gmail.com](mailto:chenghehust@gmail.com)
* Ye Tian, Anhui University, China, [field910921@gmail.com](mailto:field910921@gmail.com)
* Jonathan Fieldsend, University of Exeter, UK, [J.E.Fieldsend@exeter.ac.uk](mailto:J.E.Fieldsend@exeter.ac.uk)
* Hao Wang, Leiden University, UK, [h.wang@liacs.leidenuniv.nl](mailto:h.wang@liacs.leidenuniv.nl)
* Ke Li, University of Exeter, UK, [K.Li@exeter.ac.uk](mailto:K.Li@exeter.ac.uk)
* Farooq Akhtar, University of Kotli, Pakistan, [farooq.akhtar@uokajk.edu.pk](mailto:farooq.akhtar@uokajk.edu.pk)

**Short Biography of the Organizers**

**Chaoli Sun**

School of Computer Science and Technology, Taiyuan University of Science and Technology

Taiyuan, Shanxi 030024 China

[chaoli.sun.cn@gmail.com](mailto:chaoli.sun.cn@gmail.com), chaoli.sun@tyust.edu.cn

http://www.dscil.cn/people/sun\_en.html

Dr. Chaoli Sun received her B.C. and M.S. degrees in Computer Application Technology from [Hohai University](http://www.hhu.edu.cn/), Nanjing, Jiangsu, China, and Ph.D. in Mechanical Design and Theory from [Taiyuan University of Science and Technology](http://www.tyust.edu.cn/), Taiyuan, Shanxi, China, in 2011. From September 2014 to September 2016, she was a Postdoctoral Research Fellow in Department of Computer science, University of Surrey. Now she is a Professor in the School of Computer Science and Technology, [Taiyuan University of Science and Technology](http://www.tyust.edu.cn/). Her areas of expertise include evolutionary computation, swarm intelligence, self-organized robotic systems, fitness estimation and surrogate assisted evolutionary optimization with application to mechanical structural optimization.

Prof. Sun is an Associate Editor of the *IEEE Transactions on Evolutionary Computation*, an Associate Editor of the *IEEE Transactions on Artificial Intelligence*, and an Associate Editor of the *Soft Computing* Journal. She is also an Editorial Board Member of *Complex and Intelligence Systems* and an Editorial Board Member of *Memetic Computing*. She is a member of the Evolutionary Computation Technical Committee of IEEE CIS and a member of the Intelligent Systems Application Technical Committee of IEEE CIS. She was the chair of TF on Data-Driven Evolutionary Optimization of Expensive Problems (2016-2020). She published two monographs and more than 40 first-author papers in international journals and conferences.

**Handing Wang**

Department of Artificial Intelligence, Xidian University

Xi’an, Shaaxi, 710126, China

[hdwang@xidian.edu.cn](mailto:hdwang@xidian.edu.cn)

https://faculty.xidian.edu.cn/HandingWang/zh\_CN/index/404706/list/index.htm

Handing Wang received the B.Eng. and Ph.D. degrees from Xidian University, Xi'an, China, in 2010 and 2015, respectively. She is currently a professor with School of Artificial Intelligence, Xidian University, Xi'an, China. Her research interests include nature-inspired computation, multi-objective optimization, multiple criteria decision making, surrogate-assisted evolutionary optimization, and real-world optimization problems.

Prof. Wang is a member of IEEE Computational Intelligence Society and an Associate Editor of IEEE Transactions on Evolutionary Computation, IEEE Computation Intelligence Magazine, Memetic Compution, Complex & Intelligence System (Springer). She has published more than 30 papers as the first author in international journals and conferences.