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SIGEVolution

VOLUME 15, ISSUE 3

SEPTEMBER, 2022

newsletter of the ACM Special Interest Group on Genetic and Evolutionary
Computation

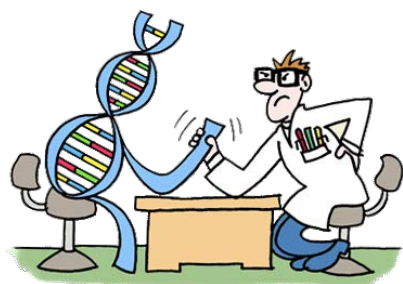
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Editorial

Welcome to the 3rd (Fall) 2022 issue of the SIGEvolution newsletter! We start with an overview of the 2022 *Humies* competition, which awards results produced by evolutionary algorithms that are competitive or outperform results produced by human designers. We continue with a summary of the article receiving the 2022 SIGEVO impact award, which recognizes a highly cited and deemed seminal article published at GECCO ten years earlier (i.e. 2012). Our final contribution reports the winners of the SIGEVO best dissertation award, which recognizes excellent thesis research by doctoral candidates in the field of evolutionary computing. We complete the issue with recent announcements and call for submissions. Please get in touch if you would like to contribute an article for a future issue or have suggestions for the newsletter.

Gabriela Ochoa, Editor.



2022 Humies Winners Awarded at GECCO in Boston!

by Erik Goodman, BEACON Centre, Michigan State University, USA

The GECCO 2022 Conference was held in hybrid mode this year, with many attending in person in Boston, Massachusetts, USA, July 9-13, 2022. As usual, the final of the Human-Competitive Results competition (“Humies”) was held there, on Monday, July 11th.

The Humies competition annually awards \$10,000 in cash prizes for computational results that are deemed to be competitive with results produced by human beings but are generated automatically by computers.

This year, there were 18 entries submitted, and the judges selected eight of those to be finalists, based on the papers and entry forms they submitted. Because GECCO was held in hybrid mode, four of the finalists presented in person and four by submitting videos shown during the Humies session. The judges viewed all presentations and then held their deliberations to select the prize winners. All 18 entries and the eight finalists’ videos are available to the general public at the Humies website www.human-competitive.org, so anyone can watch them there.

The competition, sponsored by John Koza (who is widely regarded as the “Father of Genetic Programming”) solicits papers published within the last year that describe work fulfilling one or more of eight criteria, including such features as winning a regulated competition against humans or other programs; producing results that are publishable in their own right, not because they were created by a computer program; patentability; and other criteria described in full on the Humies website. The Gold Award includes US\$5,000; the Silver Award, \$3,000, and the Bronze, \$2,000. This year, there was a tie for the Silver Award, so each Silver awardee will receive \$2,500. The judges for the competition were

Wolfgang Banzhaf, Stephanie Forrest, Erik Goodman, Una-May O'Reilly, Lee Spector and Darrell Whitley. Publicity for the Humies was done by Bill Langdon.

As usual, after considering all of the entries, the judges wanted to give awards to many of them, but the final result was the following three awards:

Gold Award

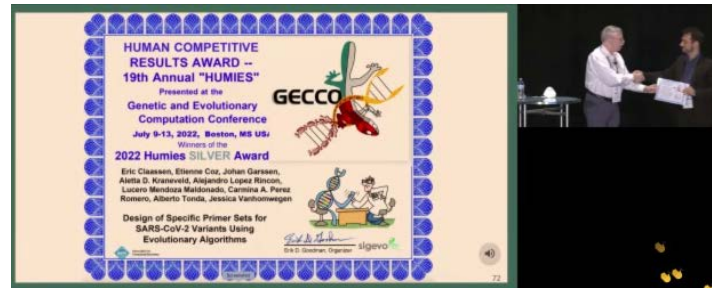


The Gold, \$5,000 prize was awarded to the team of Jonas Schmitt, Sebastian Kuckuk, and Harald Koestler, from Universitaet Erlangen-Nuernberg in Erlangen, Germany, and their entry was presented by Jonas Schmitt.

It included two papers, “Evolving Generalizable Multigrid-Based Helmholtz Preconditioners with Grammar-Guided Genetic Programming” (GECCO 2022 Proceedings) and “EvoStencils: a grammar-based genetic programming approach for constructing efficient geometric multigrid methods“, in *Genetic Programming and Evolvable Machines*, 22(4).

They used multi-objective, grammar-guided genetic programming to evolve multigrid solvers using Helmholtz preconditioners for systems of partial differential equations with up to a million variables and on linear elastic boundary value problems with up to 16 million unknowns. Their methods use a succession of increasingly ill-conditioned problem instances to evaluate the efficiency of preconditioners, and their codes can be distributed among multiple compute nodes. Their system constructs geometric multigrid solvers that outperform hand-crafted methods for Poisson’s equation and a linear elastic boundary value problem.

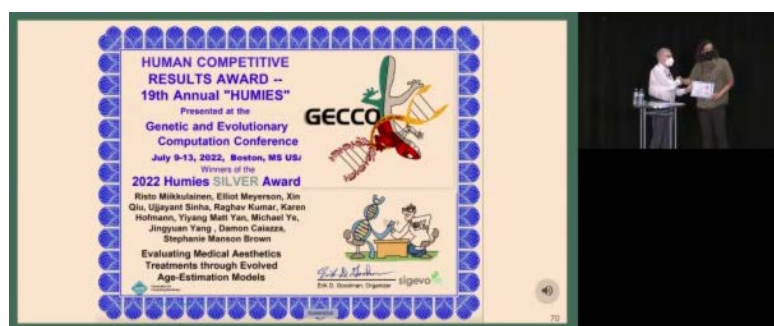
Silver Award



One of the Silver Awards and \$2,500 went to a large team which was represented by Alberto Tonda, who gave the presentation, and included Eric Claassen, Etienne Coz, Johan Garssen, Aletta D. Kraneveld, Alejandro Lopez Rincon, Lucero Mendoza Maldonado, Carmina A. Perez Romero, Jessica Vanhomwegen, who are distributed among France, Netherlands and Mexico.

Their papers were entitled “Design of Specific Primer Sets for SARS-CoV-2 Variants Using Evolutionary Algorithms” (GECCO 2021), and “Design of Specific Primer Sets for the Detection of SARS-CoV-2 Variants of Concern B.1.1.7, B.1.351, P.1, B.1.617.2 using Artificial Intelligence” (bioRxiv). Their work involves the generation of primer sets, which are short DNA sequences of 18-22 base pairs, that are specific to the identification of a particular virus, so can be used as the basis for a test (COVID or Monkey Pox, for example). Their team used a completely automated pipeline built around deep learning and evolutionary algorithms to design primer sets specific to COVID variants B.1.1.7, B.1.351, and P.1, for example. Their methods allow rapid generation of primer sets for new variants.

Silver Award



The other Silver Award and \$2,500 went to Risto Miikkulainen, Elliot Meyerson, Xin Qiu, Ujjayant Sinha, Raghav Kumar, Karen Hofmann, Yiyang Matt Yan, Michael Ye, Jingyuan Yang, Damon Caiazza, Stephanie Manson Brown, from Cognizant, Abbvie, and University of Texas Austin.

Their entry was presented by Risto Miikkulainen and was entitled “Evaluating Medical Aesthetics Treatments through Evolved Age-Estimation Models” (GECCO 2021). They developed a neuroevolutionary approach that customizes the architecture, learning, and data augmentation hyperparameters and the loss function to the task of estimating a person’s age from a facial image, demonstrating in the process that their methods outperformed the prior state-of-the-art, significantly reducing the mean error in estimated age. They used this method to demonstrate that botox treatments (compared to placebo treatments) did indeed produce a significant reduction in the person’s apparent age, through evaluation of pre- and post-treatment facial images.

More Information

See any of the finalists’ videos and papers and entry forms at www.human-competitive.org. And start preparing your own best human-competitive work for the 2023 Humies competition at GECCO next July! Any questions? Contact me, Erik Goodman, at goodman@msu.edu.

ACM SIGEVO Best Dissertation Award 2022

by Manuel López-Ibáñez, University of Manchester, UK

The SIGEVO Best Dissertation Award was created in 2019 to recognize excellent thesis research by doctoral candidates in the field of evolutionary computing. Doctoral dissertation awards are given by other Special Interest Groups of ACM, such as SIGCOMM, SIGKDD, SIGARCH and others. The SIGEVO Best Dissertation Award will be given annually to a maximum of 1 winner and a maximum of 2 honourable mentions. The award presentation will take place at the awards ceremony of GECCO. The award will carry a monetary value, contributed by SIGEVO, of \$2,000 to be awarded to the winner and \$1,000 to each of the honourable mentions. The award winner and honourable mentions will each receive a beautiful plaque.

Dissertations are reviewed by a selection committee for technical depth and significance of the research contribution, the potential impact on the field of evolutionary computing, and the quality of presentation. This year, the members of the selection committee were:

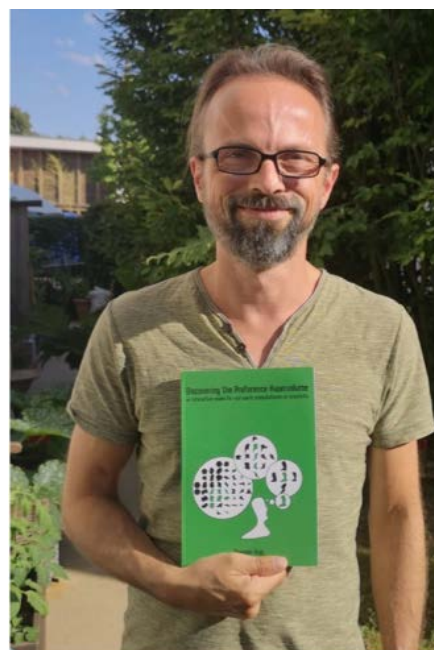
- Francisco Chicano, University of Málaga, Spain
- Kenneth De Jong, George Mason University, SA
- Jonathan Fieldsend, University of Exeter, UK
- Manuel López-Ibáñez, University of Manchester, UK
- Tea Tušar, Jožef Stefan Institute, Slovenia
- Christine Zarges, Aberystwyth University, UK

The committee received and reviewed 9 nominations this year, in topics as diverse as multi-objective optimization, automated software engineering, grammatical evolution, quality-diversity algorithms, hyper-heuristics, and runtime analysis.



The winner of the 2022 SIGEVO Best Dissertation Award is Automated Software Transplantation by Alexandru Marginean from University College London (UK) with the following citation from the selection committee: "This dissertation proposes tools for multi-lingual automated code transplantation based on evolutionary computation to transplant functionality from one piece of software to another one. These methods speed up software development and automate bug fixing. Already 2.9 billion people daily run software that has been automatically repaired by the Sapfix system described in this work."

In addition to the winner, the committee decided to award two honorary mentions due to their high quality.



The first honorary mention is given to Discovering the Preference Hypervolume: an Interactive Model for Real World Computational Co-creativity by Alexander Hagg from Leiden University (The Netherlands) with the following citation: “This dissertation transcends the usual domain-oriented research by connecting cognitive psychology with evolutionary computation and machine learning. It develops a novel co-creative process, which considerably improves the existing Quality Diversity (QD) methods, for supporting engineers to efficiently discover many innovative solutions in early design stages, with a demonstration of its practical application in the domains of fluid dynamics, the built environment and robotics.”



The second honorary mention was given to Genetic Programming Hyper-heuristics for Dynamic Flexible Job Shop Scheduling by Fangfang Zhang from the Victoria University of Wellington (New Zealand) with the following citation: “This dissertation proposes multiple innovative ideas for developing new hyper-heuristics based on genetic programming that tackles challenging dynamic-flexible production scheduling problems. It develops novel surrogate models, genetic operators, feature selection algorithms and multi-task techniques, significantly improving training efficiency, and the accuracy and interpretability of evolved scheduling rules.”

The next edition of the award will welcome dissertations defended between January and December of 2022. The deadline for submitting nominations is March 1st, 2023.

Announcements

ACM Transactions on Evolutionary Learning and Optimization, Vol 2, Issue 2

Editor: Juergen Branke, Manuel López-Ibáñez



Analysis of Evolved Response Thresholds for Decentralized Dynamic Task Allocation

H. David Mathias, Annie S. Wu, Daniel Dang

Deep Genetic Programming Trees Are Robust

William B. Langdon

Code and Data Synthesis for Genetic Improvement in Emergent Software Systems

Penny Faulkner Rainford, Barry Porter

A Survey on High-dimensional Gaussian Process Modeling with Application to Bayesian Optimization

Mickaël Binois, Nathan Wycoff

ACM SIGEVO Outstanding Contribution Award: Call for Nominations

The SIGEVO Outstanding Contribution Award will recognize truly distinctive contributions to the field of Evolutionary Computation (EC) when evaluated over an extended period of

at least 15 years.

These contributions can include technical innovations, publications, leadership, teaching, mentoring, and service to the Evolutionary Computation community.

Eligibility

Individuals must be nominated and have been members of SIGEVO for at least 5 years.

Self-nomination is not possible. A nominee to the award who has not been selected in the first year of their nomination is automatically eligible for selection for the two years following the first nomination.

Important Dates for 2023

- Submission Deadline: February 1st, 2023
- Decision Deadline: May 1st, 2023
- Public Announcement: July 15 – 19, during GECCO 2023 in Lisbon, Portugal

Outstanding Contribution Award Selection Committee

The 2022-2023 committee has five members: Chair: Una-May O'Reilly, Thomas Baeck, Wolfgang Banzhaf, Ken De Jong, Erik Goodman.

Additional details including the submission procedure can be found at the SIGEVO website.

Questions regarding the selection process should be emailed to ACM SIGEVO Chair Prof. Franz Rothlauf (rothlauf@uni-mainz.de). Questions regarding the nomination process should be emailed to Committee Chair Una-May O'Reilly (unamay@csail.mit.edu).

EvoStar 2023: Call for Papers

evo



2023

The EvoStar conferences are being held in Brno, Czech Republic from 12 to 14 April 2023.

The venue is the Faculty of Information Technology of the Brno University of Technology.

[Read more about EvoStar here.](#)

Important Dates

- Submission deadline: 1 November 2022
- Notification to authors: 18 January 2023
- Early registration deadline: 1 March 2023
- Late-Breaking Abstracts submission: 2 April 2023
- EvoStar Conference: 12-14 April 2023

About this Newsletter

SIGEVOlution is the newsletter of SIGEVO, the ACM Special Interest Group on Genetic and Evolutionary Computation. To join SIGEVO, please follow this link: [\[WWW\]](#).

We solicit contributions in the following categories:

Art: Are you working with Evolutionary Art? We are always looking for nice evolutionary art for the cover page of the newsletter.

Short surveys and position papers. We invite short surveys and position papers in EC and EC-related areas. We are also interested in applications of EC technologies that have solved interesting and important problems.

Software. Are you a developer of a piece of EC software, and wish to tell us about it? Then send us a short summary or a short tutorial of your software.

Lost Gems. Did you read an interesting EC paper that, in your opinion, did not receive enough attention or should be rediscovered? Then send us a page about it.

Dissertations. We invite short summaries, around a page, of theses in EC-related areas that have been recently discussed and are available online.

Meetings Reports. Did you participate in an interesting EC-related event? Would you be willing to tell us about it? Then send us a summary of the event.

Forthcoming Events. If you have an EC event you wish to announce, this is the place.

News and Announcements. Is there anything you wish to announce, such as an employment vacancy? This is the place.

Letters. If you want to ask or to say something to SIGEVO members, please write us a letter!

Suggestions. If you have a suggestion about how to improve the newsletter, please send us an email.

Contributions will be reviewed by members of the newsletter board. We accept contributions in plain text, MS Word, or Latex, but do not forget to send your sources and images.

Enquiries about submissions and contributions can be emailed to gabriela.ochoa@stir.ac.uk

All the issues of SIGEVolution are also available online at: www.sigevolution.org

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