

Anthony Bucci

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Interests

I have a longstanding interest in coevolutionary and co-optimization dynamics in interactive domains, to which the usual tools and intuitions developed for evolutionary dynamics cannot be effectively applied. We need new ways to conceive of co- dynamics. I work on developing them.

Education

Brandeis University Waltham, MA
Ph.D. in Computer Science, 2007

Case Western Reserve University Cleveland, OH
B.S. in Mathematics, 1995

Employment

Self employed Independent Researcher	Cambridge, MA	Jan 2020 - present
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Cienaga Systems, Inc. Scientific Advisor	Cambridge, MA (remote)	Feb 2024 - present
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Electric Infrastructure Security Council Technical Director for Infrastructure Simulation	Cambridge, MA (remote)	Aug 2020 - Jul 2024
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Tufts University Part time Lecturer	Medford, MA	Jul 2022, Jul 2023
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Inventr, Inc. Advisor	Cambridge, MA (remote)	Aug 2020 - Oct 2021
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Legit (Deftr, Inc.) Chief Scientist and Cofounder	Cambridge, MA	Aug 2016 - Nov 2019
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Tufts University Part time Lecturer	Medford, MA	Sep 2016 - Dec 2018
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Cienaga Systems, Inc. Scientific Advisor	Cambridge, MA (remote)	Feb 2016 - Feb 2018
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Self employed Independent Researcher	Cambridge, MA	Oct 2013 - Aug 2016
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Icosystem Corporation Director of Science	Cambridge, MA	Jan 2012 - Aug 2013
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Icosystem Corporation
Complexity Scientist

Cambridge, MA

May 2007 - Jan 2012

Pfizer, Inc.
Research Application Developer / Strategic Alliance Partner

Cambridge, MA

May 2000 - Nov 2003

Dissertation

Bucci, A. (2007). *Emergent Geometric Organization and Informative Dimensions in Coevolutionary Algorithms*. Presented to the faculty of the Michtom School of Computer Science, Brandeis University, July 2007.

Book Chapters

Popovici, E., **Bucci, A.**, Wiegand, R.P. and De Jong E.D. (2012). Coevolutionary principles. Chapter in *Handbook of Natural Computing*, Springer-Verlag, 2012.

De Jong, E.D. and **Bucci, A.** (2008). Objective set compression: Test-based problems and multi-objective optimization. *Multi-Objective Problem Solving From Nature: From Concepts to Applications*, Springer Verlag, 2008.

Publications

Wiegand, R.P., **Bucci, A.**, Kumar, A., Albert, J.L., Gaspar, A. (2022). Identifying Informatively Easy and Informatively Hard Concepts. *Transactions On Computing Education (TOCE)*, ACM Press. Mar 2022.

Beaulieu, M.C. and **Bucci, A.** (2020). Programming without Code: Teaching Classics and Computational Methods. *Papers of the 2018 Digital Approaches to Teaching the Ancient Mediterranean Conference (DATAM)*, New York University, S. Heath and B. Caraher eds.

Bari, A.T.M. G., Gaspar, A., Wiegand, R.P., Albert, J.L., **Bucci, A.**, Kumar, A. (2019). EvoParsons: design, implementation and preliminary evaluation of evolutionary Parsons puzzle. *Genetic Programming and Evolvable Machines* 20 (2), 213-244

Bari, A.T.M. G., Gaspar, A., Wiegand, R.P., **Bucci, A.** (2018). Selection methods to relax strict acceptance condition in test-based coevolution. *Proceedings of the 2018 IEEE Congress on Evolutionary Computation (CEC)*, IEEE Press, 2018

Gaspar, A., Bari, A.T.M. G., Wiegand, R.P., **Bucci, A.**, Kumar, A., Albert, J.L. (2017). Evolutionary practice problems generation: More design guidelines. *Proceedings of the Thirtieth International Florida Artificial Intelligence Research Society Conference (FLAIRS)*, The AAAI Press, 2017

Bari, A.T.M. G., Gaspar, A., Wiegand, R.P., **Bucci, A.** (2017). Does relaxing strict acceptance condition improve test based Pareto coevolution? *2017 IEEE Symposium Series on Computational Intelligence (SSCI)*, IEEE Press, 2017

Gaspar, A., Bari, A.T.M. G., Kumar, A., Wiegand, R.P., **Bucci, A.**, Albert, J.L. (2016). Evolutionary practice problems generation: design guidelines. *28th IEEE International Conference on Tools with Artificial Intelligence (ICTAI)*, IEEE Press, 2016.

Bucci, A., Wiegand, R.P., Kumar, A., Gaspar, A., Albert, J.L. (2016). Dimension extraction analysis of student performance on problems. *Proceedings of the Twenty-Ninth International Florida Artificial Intelli-*

gence Research Society Conference (FLAIRS), The AAAI Press, 2016.

Wiegand, R.P., **Bucci, A.**, Kumar, A., Albert, J.L. and Gaspar, A. (2016). A data-driven analysis of informatively hard concepts in introductory programming. Proceedings of the 47th ACM Technical Symposium on Computing Science Education (SIGCSE), ACM Press, 2016.

Popovici, E., Winston, E., and **Bucci, A.** (2011). On the practicality of optimal output mechanisms for co-optimization algorithms. Proceedings of the 2011 Foundations of Genetic Algorithms conference (FOGA), ACM Press, 2011.

Stuermer, P., **Bucci, A.**, Branke, J., Funes, P. and Popovici, E. (2009). Analysis of coevolution for worst-case optimization. Proceedings of the 2009 Genetic and Evolutionary Computation Conference (GECCO), ACM Press, 2009.

Bucci, A. and Pollack, J.B. (2007). Thoughts on solution concepts. Proceedings of the 2007 Genetic and Evolutionary Computation Conference (GECCO), ACM Press, 2007.

De Jong, E.D. and **Bucci, A.** (2006). DECA: dimension extracting coevolutionary algorithm. Proceedings of the 2006 Genetic and Evolutionary Computation Conference (GECCO), ACM Press, 2006.

Bucci, A. and Pollack, J.B. (2005). On identifying global optima in cooperative coevolution. Proceedings of the 2005 Genetic and Evolutionary Computation Conference (GECCO), ACM Press, 2005.

Bucci, A., Pollack, J.B. and De Jong, E.D. (2004). Automated extraction of problem structure. Proceedings of the 2004 Genetic and Evolutionary Computation Conference (GECCO), Springer Verlag, 2004.

Bucci, A. and Pollack, J.B. (2003). Focusing versus intransitivity: Geometrical aspects of co-evolution. Proceedings of the 2003 Genetic and Evolutionary Computation Conference (GECCO), Springer Verlag, 2003.

Bucci, A. and Pollack, J.B. (2003). A mathematical framework for the study of coevolution. Foundations of Genetic Algorithms 7. Proceedings of FOGA VII, Torremolinos Spain, 4-6 September 2002.

Bucci, A. and Pollack, J.B. (2002). Order-theoretic analysis of coevolution problems: Coevolutionary statics. 2002 Genetic and Evolutionary Computation Conference (GECCO) Workshop: Understanding Coevolution.

Bucci, A. and Johnson, J.M. (2001). Neural network and genetic algorithm identification of coupling specificity and functional residues in G-protein Coupled Receptors. Poster presented at the Intelligent Systems in Molecular Biology Conference (ISMB), 2001.

Invited talks, Webinars, and Podcasts

Generative AI And Cascading Infrastructure Failures. Conference talk to be presented at part 2 of the *Rethinking the Inevitability of AI: The Environmental and Social Impacts of Computing in Historical Context* conference, Dec 2024

Criminal Network. Audible Original series invited interview, podcast, Jan 2023.

The Global Infrastructure Network Optimization Model. Electric Infrastructure Security Council Global Resilience Commission, online webinar, Jun 2022.

Metagrid Restoration And Black Sky Hazards. Societal Resilience To Black Sky Hazards Webinar, Electric Infrastructure Security Council and Imperial College London, online webinar, Mar 2022.

Simulation And The Green Grid. Electric Infrastructure Security Council Global Resilience Commission, online webinar, Aug 2021.

Teaching Classics and Computational Methods. Invited talk given with Marie-Claire Beaulieu. Organized by William D. Wharton, Headmaster of Commonwealth School, Boston, MA, Feb 2021.

In D'Arcy Thompson's Footsteps - Science, Technology and the Classics. Organized by Matthew Jarron of the University of Dundee Museum Services, Feb 2021. <https://www.youtube.com/watch?v=wLrz08QLsXw>

The Digital Glossary of Greek Birds: A Discovery and Outreach Tool. Invited talk given with Marie-Claire Beaulieu. Organized by Lisa Maurizio, Professor of Classical and Medieval Studies, Bates College, Lewiston ME, Mar 2019.

Ornithological Approaches to Greek Mythology: The Case of the Shearwater. Conference talk with Marie-Claire Beaulieu at the annual meeting of The Classical Association of the Middle West and South (CAMWS), Albuquerque NM, 2018.

Programming without Code: Teaching Classics and Computational Methods. Conference talk with Marie-Claire Beaulieu, Digital Approaches to Teaching the Ancient Mediterranean (DATAM), Institute for the Study of the Ancient World (ISAW), Oct 2018.

Data Analytics for the Humanities. Talk with Marie-Claire Beaulieu at GREAT training event, Tufts University, Graduate School of Arts and Sciences, Jun 2018.

Digitizing D'Arcy Thompson's Glossary of Greek Birds. Tufts faculty webinar with Marie-Claire Beaulieu, Jennifer Burton, and Michael Reed, May 3, 2018. <https://www.youtube.com/watch?v=XRfCox1xmQk>

Co-Teaching. Talk with Marie-Claire Beaulieu at GREAT training event, Tufts University, Graduate School of Arts and Sciences, 2018.

Coevolution and Cyber Exploitation. Invited talk at the ISMS Forum Foro de la Ciberseguridad Madrid, Spain, September 2017.

Teaching Data Science for Classics. Conference talk with Marie-Claire Beaulieu at the annual meeting of The Classical Association of the Middle West and South (CAMWS), Kitchener, Canada, 2017.

Coevolutionary Algorithms and Multi-objective Optimization. Invited class lecture series on multi-objective optimization, coevolutionary algorithms, and connections between them at Tufts University Computer Science Department, Medford, MA, November 2011.

Coevolutionary Algorithms. Invited class lecture at Tufts University Computer Science Department course COMP-150, Medford, MA, April 2009.

When Performing Is Not Enough: Informativeness Incentives in Coevolutionary Algorithms. Presented at GE Global Research Headquarters, Niskayuna, NY., December 2008.

Solution Concepts and the Subdomain Representation. Presented at the Theory of Evolutionary Algorithms seminar at Schloss Dagstuhl, Wadern Germany, January 2008.

When Performing Is Not Enough: Informativeness Incentives in Coevolutionary Algorithms. Presented at the Tufts University Computer Science Department, Medford, MA, December 2007.

Evaluation Structures in Coevolution. Presented at the Theory of Evolutionary Algorithms seminar at Schloss Dagstuhl, Wadern Germany, February 2006.

Evaluation Structures and Innovative Dynamics. Presented at the Coevolutionary and Coadaptive Systems symposium, part of the AAAI Fall Symposium Series, Washington D.C., November 2005.

Towards a Geometric Theory of Interactive Domains. Presented at the Theory of Evolutionary Algorithms seminar at Schloss Dagstuhl, Wadern Germany, February 2004.

Towards a Geometric Theory of Interactive Domains. Presented at the University of Utrecht, February 2004.

Teaching Experience

Lecturer. Tufts University, Tufts Summer Accelerator: *Chaos Theory, Chaos Practice*. July 2023.

Lecturer. Tufts University, Tufts Summer Accelerator: *Chaos Theory, Chaos Practice*. July 2022.

Lecturer. Tufts University, COMP-150: *Advanced Topics in Natural Language Processing*. Spring 2018.

Lecturer. Tufts University, CLS-0160: *Computational Methods for the Humanities*. Co-teaching with Marie-Claire Beaulieu, Fall 2017, 2018.

Lecturer. Tufts University, CLS-0091: *Introduction to Digital Humanities*. Co-teaching with Marie-Claire Beaulieu, Fall 2016.

Teaching Assistant. Brandeis University, cos123a: *Statistical Machine Learning*. Taught by Prof. Pengyu Hong, Spring 2006.

Teaching Assistant. Brandeis University, cos155b: *Computer Graphics*. Taught by Dr. Giovanni Motta, Fall 2003.

Teaching Assistant. Brandeis University, cos170a: *Information Theory*. Taught by Prof. Martin Cohn, Spring 2002.

Teaching Assistant. Brandeis University, cos113: *Topics in Machine Learning*. Taught by Prof. Jordan Pollack, Fall 2002.

Teaching Assistant. Brandeis University, cos30a: *Introduction to the Theory of Computation*. Taught by Prof. Jacques Cohen, Spring 2001.

Teaching Assistant. Brandeis University, cos113: *Topics in Machine Learning*. Taught by Prof. Jordan Pollack, Fall 2000.

Grants and Awards

Israel Ministry of Energy, *Innovative AI-Enhanced Power Grid + Multi-infrastructure Simulation*, 2023. R&D project funded by the government of Israel. Participated in proposal writing and as the technical director of the project.

Israel Ministry of Energy, *Innovative AI-Enhanced Power Grid + Multi-infrastructure Simulation*, 2022. R&D project funded by the government of Israel. Participated in proposal writing and as the technical director of the project.

Israel Ministry of Energy, *GINOM AI Israel*, 2021. R&D project funded by the government of Israel. Participated in proposal writing and as the technical director of the project.

National Science Foundation awards #1504634, #1502564, and #1504634, *Scalable scaffolding of novice programmers' learning and automated analysis of their online activities*, Sep 2015 - Aug 2018. Participated as a researcher and co-author, as well as in proposal writing for extensions and followups.

Brandeis University Graduate School of Arts and Sciences Alumni Scholars Award, 2004. Awarded from the Alumni Scholars Fund to cover expenses for attending the Genetic and Evolutionary Computation Conference in 2004.

Pfizer, Inc. Strategic Alliance Grant, 2002. Grant funding a computational chemistry project titled *Application of Genetic Programming to the Prediction of Turbidimetric Solubility*.

Professional Service

Co-organizer. *Advanced Coevolution Tutorial*, presented at the Genetic and Evolutionary Computation Conference, 2008.

Co-organizer. *Introductory Coevolution Tutorial*, presented at the Genetic and Evolutionary Computation Conference, 2008.

Program Committee Member. Foundations of Genetic Algorithms workshop sponsored by SIGEVO (part of ACM), 2007, 2009, 2011

Program Committee Member. Genetic and Evolutionary Computation Conference, Coevolution Track, 2003 - 2008, 2013.

Co-organizer. *Advanced Coevolution Tutorial*, presented at the Genetic and Evolutionary Computation Conference, 2007.

Co-organizer. *Introductory Coevolution Tutorial*, presented at the Genetic and Evolutionary Computation Conference, 2006.

Co-organizer. *Coevolutionary and Coadaptive Systems Symposium*, part of the AAAI Fall Symposium Series, 2005.

Co-organizer. *Coevolution Workshop*, Genetic and Evolutionary Computation Conference, 2005.

Reviewer. *Computational Intelligence and Neuroscience*, Hindawi Publishing Corporation.

Reviewer. *Artificial Life*, MIT Press.

Reviewer. *Machine Learning Journal*, Kluwer Academic Publishers.

Reviewer. *IEEE Transactions on Evolutionary Computation*, IEEE Press.

Reviewer. *IEEE Transactions on Neural Networks*, IEEE Press.

Reviewer. *IEEE Transactions on Systems, Man, and Cybernetics*, IEEE Press.

Reviewer. *Genetic Programming and Evolvable Machines*, Springer Verlag.

Reviewer. *Multi-Objective Problem Solving From Nature: From Concepts to Applications*. Springer Verlag.