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Publications

Minimal Neural Network Models for Permutation Invariant Agents

Winther Pedersen, J. & Risi, S., 9 Jul 2022.

A Unified Substrate for Body-Brain Co-evolution

Pontes-Filho, S., Walker, K. E., Najarro, E., Nichele, S. & Risi, S., 2022.

HyperNCA: Growing Developmental Networks with Neural Cellular Automata

Najarro, E., Sudhakaran, S., Glanois, C. & Risi, S., 2022, In: arXiv.

Mario Plays on a Manifold: Generating Functional Content in Latent Space through Differential Geometry

Duque, M. G., Berg Palm, R., Hauberg, S. & Risi, S., 2022, In: Proceedings of the 2022 IEEE Conference on Games (CoG).

Physical Neural Cellular Automata for 2D Shape Classification

Walker, K. E., Berg Palm, R., Garcia, R. M., Faina, A., Støy, K. & Risi, S., 2022, In: IROS 2022. 7 p.

Towards a Framework for Human-AI Interaction Patterns in Co-Creative GAN Applications

Grabe, I., Duque, M. G., Risi, S. & Zhu, J., 2022, *Joint Proceedings of the ACM IUI Workshops 2022, March 2022, Helsinki, Finland*.

Variational Neural Cellular Automata

Berg Palm, R., Duque, M. G., Sudhakaran, S. & Risi, S., 2022, In: International Conference on Learning Representations 2022.

Squeezer - A Mixed-Initiative Tool for Designing Juice Effects

Johansen, M., Pichlmair, M. & Risi, S., 16 Sep 2021, *Proceedings of The 16th International Conference on the Foundations of Digital Games (FDG) 2021 (FDG'21)*. Association for Computing Machinery, 11 p. 37

Dealing with Adversarial Player Strategies in the Neural Network Game iNNk through Ensemble Learning

Löwe, M., Villareale, J., Freed, E., Sladek, A., Zhu, J. & Risi, S., Aug 2021.

Growing 3D Artefacts and Functional Machines with Neural Cellular Automata

Sudhakaran, S., Grbic, D., Li, S., Katona, A., Najarro, E., Glanois, C. & Risi, S., 19 Jul 2021, In: Artificial Life Conference Proceedings . 2021, 9 p.

Safer Reinforcement Learning through Transferable Instinct Networks

Grbic, D. & Risi, S., 19 Jul 2021, In: Artificial Life Conference Proceedings . 2021, 10 p.

Evolving and Merging Hebbian Learning Rules: Increasing Generalization by Decreasing the Number of Rule

Winther Pedersen, J. & Risi, S., 10 Jul 2021.

Growing Simulated Robots with Environmental Feedback: an Eco-Evo-Devo Approach

Helmut Hauser, Walker, K. E. & Risi, S., 10 Jul 2021, In: GECCO.

Utopian or Dystopian?: Using a ML-Assisted image generation game to empower the general public to envision the future

Rafner, J., Langsford, S., Philippsen, L., Risi, S., Hjorth, A., Simon, J., Gajdacz, M. & Sherson, J., 1 Jun 2021, *Creativity and cognition (C&C '21)*. United States: Association for Computing Machinery, (ACM International Conference Proceeding Series).

Regenerating Soft Robots through Neural Cellular Automata

Kazuya Horibe, 1 May 2021, In: EVOSTAR 2021.

Player-AI Interaction: What Neural Network Games Reveal About AI as Play

Zhu, J., Villareale, J., Javvaji, N., Risi, S., Löwe, M., Weigelt, R. & Hartevelde, C., May 2021, *CHI '21: Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 77

EvoCraft: A New Challenge for Open-Endedness

Grbic, D., Berg Palm, R., Najarro, E., Glanois, C. & Risi, S., 1 Apr 2021, In: Applications of Evolutionary Computation. 1, 15 p.

Deep Innovation Protection: Confronting the Credit Assignment Problem in Training Heterogeneous Neural Architectures

Risi, S. & Stanley, K. O., 2021, *Proceedings of the AAAI Conference on Artificial Intelligence*. 14 ed. AAAI Press, Vol. 35. p. 12391-12399 9 p.

Evolutionary Planning in Latent Space

Olesen, T. V. A. N., Nguyen, D. T. T., Berg Palm, R. & Risi, S., 2021, *International Conference on the Applications of Evolutionary Computation*. EvoStar

Fast Game Content Adaptation Through Bayesian-based Player Modelling

González-Duque, M., Berg Palm, R. & Risi, S., 2021, In: Proceedings of the 2021 IEEE Conference on Games (CoG).

Improving Object Detection in Art Images Using Only Style Transfer

Kadish, D., Risi, S. & Løvlie, A. S., 2021, In: 2021 International Joint Conference on Neural Networks (IJCNN).

Rapid Risk Minimization with Bayesian Models Through Deep Learning Approximation

Löwe, M., Lunnemann, P. & Risi, S., 2021.

Testing the Genomic Bottleneck Hypothesis in Hebbian Meta-Learning

Palm, R. B., Najarro, E. & Risi, S., 2021, In: Proceedings of Machine Learning Research. 148

Meta-Learning through Hebbian Plasticity in Random Networks

Najarro, E. & Risi, S., 7 Dec 2020, In: Advances in Neural Information Processing Systems. 33

Squeezer - A Tool for Designing Juicy Effects

Johansen, M., Pichlmair, M. & Risi, S., 2 Nov 2020, *CHI PLAY '20: Extended Abstracts of the 2020 Annual Symposium on Computer-Human Interaction in Play*. Association for Computing Machinery, p. 282-286 4 p.

iNNk: A Multi-Player Game to Deceive a Neural Network

Villareale, J., Acosta-Ruiz, A. V., Arcaro, S. A., Fox, T., Freed, E., Gray, R. C., Löwe, M., Nuchprayoon, P., Sladek, A., Weigelt, R., Li, Y., Risi, S. & Zhu, J., 1 Nov 2020, *CHI PLAY '20: Extended Abstracts of the 2020 Annual Symposium on Computer-Human Interaction in Play*. p. 33-37 4 p.

Adapting to a changing environment: Simulating the effects of noise on animal sonification

Kadish, D. & Risi, S., 14 Jul 2020, *ALIFE 2020: The 2020 Conference on Artificial Life*. Bongard, J., J. L., Hebert-Dufrésne, L., Dasari, R. & Soros, L. (eds.). 32 ed. MIT Press, p. 687-695 9 p. (Artificial Life Conference Proceedings).

Safe Reinforcement Learning through Meta-learned Instincts

Grbic, D. & Risi, S., 13 Jul 2020, *ALIFE 2020: The 2020 Conference on Artificial Life*. 32 ed. MIT Press, p. 183-291 8 p. (Artificial Life Conference Proceedings).

Evolving HyperNetworks for Game-Playing Agents

Carvelli, C., Grbic, D. & Risi, S., 8 Jul 2020, *GECCO '20: Proceedings of the 2020 Genetic and Evolutionary Computation Conference Companion*. Association for Computing Machinery, p. 71-72 2 p.

Safer reinforcement learning through evolved instincts

Grbic, D. & Risi, S., Jul 2020, *GECCO '20: Proceedings of the 2020 Genetic and Evolutionary Computation Conference Companion*. Association for Computing Machinery, p. 77-78 2 p.

CG-GAN: An Interactive Evolutionary GAN-Based Approach for Facial Composite Generation

Zaltron, N., Zurlo, L. & Risi, S., 1 Apr 2020, *Proceedings of the AAAI Conference on Artificial Intelligence*. 03 ed. Association for the Advancement of Artificial Intelligence, Vol. 34. p. 2544-2551 8 p. (Proceedings of the AAAI Conference on Artificial Intelligence).

Bootstrapping Conditional GANs for Video Game Level Generation

Torrado, R. R., Khalifa, A., Green, M. C., Justesen, N., Risi, S. & Togelius, J., 2020, *2020 IEEE Conference on Games (CoG)*. IEEE, Vol. 1. p. 41-48 8 p.

CPPN2GAN: Combining Compositional Pattern Producing Networks and GANs for Large-Scale Pattern Generation

Schrum, J., Volz, V. & Risi, S., 2020, *Proceedings of the 2020 Genetic and Evolutionary Computation Conference*. New York, NY, USA: Association for Computing Machinery, p. 139-147 (GECCO '20).

Crea.Blender: A Neural Network-Based Image Generation Game to Assess Creativity

Rafner, J., Hjorth, A., Risi, S., Philipsen, L., Dumas, C., Biskjær, M. M., Noy, L., Tylén, K., Bergenholtz, C., Lynch, J., Zana, B. & Sherson, J., 2020, *Extended Abstracts of the 2020 Annual Symposium on Computer-Human Interaction in Play*. New York, NY, USA: Association for Computing Machinery, p. 340-344

Deep learning for procedural content generation

Liu, J., Snodgrass, S., Khalifa, A., Risi, S., Yannakakis, G. N. & Togelius, J., 2020, In: *Neural Computing and Applications*. 33, p. 19-37 19 p.

Finding Game Levels with the Right Difficulty in a Few Trials through Intelligent Trial-and-Error

González-Duque, M., Berg Palm, R., Ha, D. & Risi, S., 2020, *Proceedings of the 2020 IEEE Conference on Games (CoG)*. IEEE, p. 503-510 8 p.

From Chess and Atari to StarCraft and Beyond: How Game AI is Driving the World of AI

Risi, S. & Preuss, M., 2020, In: *KI - Künstliche Intelligenz*. 34, 1, p. 7-17 11 p.

Increasing generality in machine learning through procedural content generation

Risi, S. & Togelius, J., 2020, In: *Nature Machine Intelligence*. 2, 8, p. 428-436 9 p.

Interactive Evolution and Exploration within Latent Level-Design Space of Generative Adversarial Networks

Schrum, J., Gutierrez, J., Volz, V., Liu, J., Lucas, S. & Risi, S., 2020, *Proceedings of the 2020 Genetic and Evolutionary Computation Conference*. New York, NY, USA: Association for Computing Machinery, p. 148-156

Learning a Behavioral Repertoire from Demonstrations

Justesen, N., González-Duque, M., Cabarcas, D., Mouret, J-B. & Risi, S., 2020, *Proceedings of the 2020 IEEE Conference on Games*. IEEE, p. 383-390 8 p.

Video Game Description Language Environment for Unity Machine Learning Agents

Johansen, M., Pichlmair, M. & Risi, S., 1 Aug 2019, *2019 IEEE Conference on Games (CoG)*. IEEE, 8 p.

Towards Continual Reinforcement Learning through Evolutionary Meta-Learning

Grbic, D. & Risi, S., 17 Jul 2019, *Towards Continual Reinforcement Learning through Evolutionary Meta-Learning*. 2019 ed. New York, NY, USA: Association for Computing Machinery, Vol. Proceedings of the Genetic and Evolutionary Computation Conference Companion. p. 119-120 2 p.

Learning Abstract Forward Models

Perez, D., Risi, S., Liapis, A., Preuss, M., Simon, L., Richoux, F., Burelli, P. & Nelson, M., 27 Jun 2019, National Institute of Informatics. 2 p.

An artificial life approach to studying niche differentiation in soundscape ecology

Kadish, D., Risi, S. & Beloff, L., 2019, *The 2019 Conference on Artificial Life: A Hybrid of the European Conference on Artificial Life (ECAL) and the International Conference on the Synthesis and Simulation of Living Systems (ALIFE)*. MIT Press, p. 52-59 8 p.

Blood bowl: A new board game challenge and competition for AI

Justesen, N., Uth, L. M., Jakobsen, C., Moore, P. D., Togelius, J. & Risi, S., 2019, *2019 IEEE Conference on Games (CoG)*. IEEE, p. 1-8 8 p.

Deep learning for video game playing

Justesen, N., Bontrager, P., Togelius, J. & Risi, S., 2019, In: *IEEE Transactions on Games*.

Deep Neuroevolution of Recurrent and Discrete World Models

Risi, S. & Stanley, K., 2019, *GECCO '19: Proceedings of the Genetic and Evolutionary Computation Conference*. Association for Computing Machinery, p. 456-462

MAP-Elites for noisy domains by adaptive sampling

Justesen, N., Risi, S. & Mouret, J-B., 2019, *Proceedings of the Genetic and Evolutionary Computation Conference Companion: GECCO '19*. Association for Computing Machinery, p. 121-122 2 p.

When Are We Done with Games?

Justesen, N. O., Debus, M. S. & Risi, S., 2019, *IEEE Conference on Games*. IEEE

Evolution of Fin Undulation on a Physical Knifefish-inspired Soft Robot

Veenstra, F., Jørgensen, J. & Risi, S., 15 Jul 2018, *GECCO '18: Genetic and Evolutionary Computation Conference, July 15-19, 2018, Kyoto, Japan*. Sartor, J. B., D'Hondt, T. & De Meuter, W. (eds.). New York, NY. USA: Association for Computing Machinery, 8 p.

Towards a Plant Bio-Machine

Nichele, S., Risi, S., Tufte, G. & Beloff, L., 8 Feb 2018, *IEEE Alife conference (SSCI) proceedings*. IEEE, p. 1-8 8 p. 17544442

A Robot to Shape your Natural Plant: The Machine Learning Approach to Model and Control Bio-Hybrid Systems

Wahby, M., Heinrich, M. K., Hofstadler, D. N., Zahadat, P., Risi, S., Ayres, P., Schmickl, T. & Hamann, H., 2018, *Proceedings of the Conference on Genetic and Evolutionary Computation (GECCO 2018)*. Association for Computing Machinery, p. 165-172

Automated Curriculum Learning by Rewarding Temporally Rare Events

Justesen, N. & Risi, S., 2018, *2018 IEEE Conference on Computational Intelligence and Games*. IEEE, p. 293-300 8 p.

Blood Bowl: The Next Board Game Challenge for AI

Justesen, N., Risi, S. & Togelius, J., 2018, *Blood Bowl: The Next Board Game Challenge for AI*. Association for Computing Machinery, 2 p.

Born to learn: The inspiration, progress, and future of evolved plastic artificial neural networks

Soltoggio, A., Stanley, K. O. & Risi, S., 2018, In: *Neural Networks*. 108, p. 48-67

Collaborative interactive evolution in minecraft

de Prado Salas, P. G. & Risi, S., 2018, *Proceedings of the Genetic and Evolutionary Computation Conference Companion: GECCO '18*. Association for Computing Machinery, p. 127-128 2 p.

Deep interactive evolution

Bontrager, P., Lin, W., Togelius, J. & Risi, S., 2018, *International Conference on Computational Intelligence in Music, Sound, Art and Design: EvoMUSART 2018*. Springer, p. 267-282 16 p. (Lecture Notes in Computer Science, Vol. 10783).

EuroGP 2018 panel debate: genetic programming in the era of deep neural networks

Machado, P., O'Reilly, U-M., Gori, M. & Risi, S., 2018, In: *ACM SIGEVOlution*. 11, 2, p. 3-6 4 p.

Evolutionary computation and games tutorial

Togelius, J., Risi, S. & Yannakakis, G., 2018, *Proceedings of the Genetic and Evolutionary Computation Conference Companion*. Association for Computing Machinery, p. 584-618 35 p.

Evolving in-game mood-expressive music with MetaCompose

Scirea, M., Eklund, P., Togelius, J. & Risi, S., 2018, *AM'18 Proceedings of the Audio Mostly 2018 on Sound in Immersion and Emotion*. 8 ed. Wrexham, United Kingdom: Association for Computing Machinery, Vol. 1. 8. (Audio Mostly).

Evolving Mario Levels in the Latent Space of a Deep Convolutional Generative Adversarial Network

Volz, V., Schrum, J., Liu, J., Lucas, S. M., Smith, A. & Risi, S., 2018, *Proceedings of the Genetic and Evolutionary Computation Conference: GECCO '18*. Association for Computing Machinery, p. 221-228

Explainable AI for designers: A human-centered perspective on mixed-initiative co-creation

Zhu, J., Liapis, A., Risi, S., Bidarra, R. & Youngblood, G. M., 2018, *2018 IEEE Conference on Computational Intelligence and Games (CIG)*. IEEE, p. 1-8 8 p.

HyperNTM: Evolving Scalable Neural Turing Machines Through HyperNEAT

Merrild, J., Rasmussen, M. A. & Risi, S., 2018, *International Conference on the Applications of Evolutionary Computation: EvoApplications 2018*. Springer, p. 750-766 17 p. (Lecture Notes in Computer Science, Vol. 10784).

Illuminating Generalization in Deep Reinforcement Learning through Procedural Level Generation

Justesen, N., Torrado, R. R., Bontrager, P., Khalifa, A., Togelius, J. & Risi, S., 2018.

Intrinsic Mortality Governs Evolvability

Veenstra, F., de Prado Salas, P. G., Bongard, J., Stoy, K. & Risi, S., 2018, *Artificial Life Conference Proceedings: ALIFE 2018*. MIT Press, p. 242-249 8 p.

Towards an experiment on perception of affective music generation using MetaCompose

Scirea, M., Eklund, P., Togelius, J. & Risi, S., 2018, *GECCO '18 Proceedings of the Genetic and Evolutionary Computation Conference Companion*. New York, NY, USA: Association for Computing Machinery, p. 131-132

Primal-improv: Towards co-evolutionary musical improvisation

Scirea, M., Eklund, P., Togelius, J. & Risi, S., 1 Sep 2017, *2017 9th Computer Science and Electronic Engineering (CEECE)*. IEEE, p. 172-177 6 p.

Continual Online Evolutionary Planning for In-Game Build Order Adaptation in StarCraft

Justesen, N. O. & Risi, S., 16 Jul 2017, *GECCO '17 Proceedings of the Genetic and Evolutionary Computation Conference*. Association for Computing Machinery, p. 187-194

Evolving Simulated Modular Robots

Veenstra, F., Faina, A., Støy, K. & Risi, S., 15 Jul 2017. 1 p.

Affective evolutionary music composition with MetaCompose

Scirea, M., Togelius, J., Eklund, P. & Risi, S., 12 Jun 2017, In: Genetic Programming and Evolvable Machines. p. 1-33

Evolution and Morphogenesis of Simulated Modular Robots: A Comparison Between a Direct and Generative Encoding

Veenstra, F., Faina, A., Risi, S. & Støy, K., 25 Jan 2017, *Applications of Evolutionary Computation: 20th European Conference, EvoApplications 2017, Amsterdam, The Netherlands, April 19-21, 2017, Proceedings, Part I*. Springer, 16 p. (Lecture Notes in Computer Science, Vol. 10199).

1D Printing of Recyclable Robots

Cellucci, D., MacCurdy, R., Lipson, H. & Risi, S., 2017, In: IEEE Robotics and Automation Letters. 2, 4, p. 1964-1971 8 p.

A deep learning / neuroevolution hybrid for visual control

Poulsen, A. P., Thorhauge, M., Funch, M. H. & Risi, S., 2017, *GECCO '17 Proceedings of the Genetic and Evolutionary Computation Conference Companion*. Association for Computing Machinery, p. 93-94 2 p.

Automating the Incremental Evolution of Controllers for Physical Robots

Faina, A., Jacobsen, L. T. & Risi, S., 2017, In: Artificial Life. 23, 2, p. 142-168 27 p.

CA-NEAT: Evolved Compositional Pattern Producing Networks for Cellular Automata Morphogenesis and Replication

Nichele, S., Ose, M. B., Risi, S. & Tufte, G., 2017, In: IEEE Transactions on Cognitive and Developmental Systems.

Can You Feel It?: Evaluation of Affective Expression in Music Generated by MetaCompose

Scirea, M., Eklund, P., Togelius, J. & Risi, S., 2017, In: GECCO '17. p. 211-218 8 p.

Continual and One-Shot Learning Through Neural Networks with Dynamic External Memory

Lüders, B., Schläger, M., Korach, A. & Risi, S., 2017, *European Conference on the Applications of Evolutionary Computation*. Springer, p. 886-901 16 p. (Lecture Notes in Computer Science, Vol. 10199).

DLNE: A hybridization of deep learning and neuroevolution for visual control

Poulsen, A. P., Thorhauge, M., Funch, M. H. & Risi, S., 2017, *Computational Intelligence and Games (CIG), 2017 IEEE Conference on*. IEEE Press, p. 256-263 8 p.

Interactive Evolution of Complex Behaviours Through Skill Encapsulation

González de Prado Salas, P. & Risi, S., 2017, *Applications of Evolutionary Computation. EvoApplications 2017: European Conference on the Applications of Evolutionary Computation*. Squillero, G. & Sim, K. (eds.). Springer, p. 853-869 (Lecture Notes in Computer Science, Vol. 10199).

Learning macromanagement in starcraft from replays using deep learning

Justesen, N. & Risi, S., 2017, *Computational Intelligence and Games (CIG), 2017 IEEE Conference on*. IEEE, p. 162-169 8 p.

Playing Multi-Action Adversarial Games: Online Evolutionary Planning versus Tree Search

Justesen, N., Mahlmann, T., Risi, S. & Togelius, J., 2017, In: IEEE Transactions on Computational Intelligence and AI in Games. p. 281-291 10 p.

Toward energy Autonomy in heterogeneous Modular Plant-Inspired Robots through Artificial evolution

Veenstra, F., Metayer, C., Risi, S. & Støy, K., 2017, In: Frontiers in Robotics and AI. 4, 15 p., 43.

Generating Artificial Plant Morphologies for Function and Aesthetics through Evolving L-Systems

Veenstra, F., Faina, A., Støy, K. & Risi, S., 4 Jul 2016, *Proceedings of the Artificial Life Conference 2016*. MIT Press, p. 692-699 8 p. 130

Creative Generation of 3D Objects with Deep Learning and Innovation Engines

Lehman, J. A., Risi, S. & Clune, J., 30 Jun 2016, *Proceedings of the Seventh International Conference on Computational Creativity: ICC3 2016*. Sony CSL Paris, p. 180-187

MetaCompose: A Compositional Evolutionary Music Composer

Scirea, M., Togelius, J., Eklund, P. & Risi, S., Apr 2016, *Evolutionary and Biologically Inspired Music, Sound, Art and Design: 5th International Conference, EvoMUSART 2016, Porto, Portugal, March 30 -- April 1, 2016, Proceedings*. Springer Publishing Company, p. 202-217 (Lecture Notes in Computer Science, Vol. 9596).

Accelerating the Evolution of Cognitive Behaviors Through Human-Computer Collaboration

Löwe, M. & Risi, S., 2016, *Proceedings of the Genetic and Evolutionary Computation Conference 2016*. New York, NY, USA: Association for Computing Machinery, p. 133-140 8 p.

Artefacts: Minecraft meets Collaborative Interactive Evolution

Patrascu, C. & Risi, S., 2016, *Proceedings of the 2016 IEEE Conference on Computational Intelligence and Games*. IEEE, p. 349-356

Automatic Evolution of Multimodal Behavior with Multi-Brain HyperNEAT

Schrum, J., Lehman, J. & Risi, S., 2016, *Proceedings of the 2016 on Genetic and Evolutionary Computation Conference Companion*. New York, NY, USA: Association for Computing Machinery, p. 21-22 2 p.

Breeding a Diversity of Super Mario Behaviors Through Interactive Evolution

Sørensen, P. D., Olsen, J. M. & Risi, S., 2016, *Proceedings of the 2016 IEEE Conference on Computational Intelligence and Games*. IEEE Computer Society Press, p. 357-363

Continual Learning through Evolvable Neural Turing Machines

Lüders, B., Schläger, M. & Risi, S., 2016. 5 p.

EvoCommander: A Novel Game Based on Evolving and Switching Between Artificial Brains

Jallov, D., Risi, S. & Togelius, J., 2016, In: *IEEE Transactions on Computational Intelligence and AI in Games*. 9, 2, p. 181-191 12 p.

Evolving Neural Turing Machines for Reward-based Learning

Greve, R. B., Jacobsen, E. J., Risi, S. & Greve, R. B., 2016, *Proceedings of the Genetic and Evolutionary Computation Conference 2016*. New York, NY, USA: Association for Computing Machinery, p. 117-124 8 p.

Interactive Super Mario Bros Evolution

Sørensen, P. D., Olsen, J. M. & Risi, S., 2016, *Proceedings of the 2016 on Genetic and Evolutionary Computation Conference Companion*. New York, NY, USA: Association for Computing Machinery, p. 41-42 2 p.

Towards Adaptive Evolutionary Architecture

Bak, S. HO., Rask, N. & Risi, S., 2016, *Proceedings of the 5th International Conference on Evolutionary and Biologically Inspired Music, Sound, Art and Design - Volume 9596*. New York, NY, USA: Springer Publishing Company, p. 47-62 16 p. (Lecture Notes in Informatics, Vol. 9596).

WebAL Comes of Age: A review of the first 21 years of Artificial Life on the Web

Taylor, T., Auerbach, J. E., Bongard, J., Clune, J., Hickinbotham, S., Ofria, C., Oka, M., Risi, S., Stanley, K. O. & Yosinski, J., 2016, In: *Artificial Life*. 22, 3, p. 364-407

Darwin's Avatars: a Novel Combination of Gameplay and Procedural Content Generation

Lessin, D. & Risi, S., 11 Jul 2015, *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO) 2015*. Association for Computing Machinery, p. 329-336

BrainCrafter: An investigation into human-based neural network engineering

Piskur, J., Greve, P., Togelius, J. & Risi, S., 1 May 2015, *Evolutionary Computation (CEC), 2015 IEEE Congress on. IEEE*, p. 2199-2206 8 p.

Interactive evolution of levels for a competitive multiplayer FPS

Olsted, P. T., Ma, B. & Risi, S., 1 May 2015, *Evolutionary Computation (CEC), 2015 IEEE Congress on. IEEE*, p. 1527-1534 8 p.

DrawCompileEvolve: Sparking interactive evolutionary art with human creations

Zhang, J., Taarnby, R., Liapis, A. & Risi, S., 2015, *Evolutionary and Biologically Inspired Music, Sound, Art and Design : 4th International Conference, EvoMUSART 2015, Copenhagen, Denmark, April 8-10, 2015, Proceedings*. Springer VS, Vol. 9027. p. 261-273 13 p. (Lecture Notes in Computer Science).

Evolving self-organizing simulated plant-inspired robots

Veenstra, F., Faina, A., Støy, K. & Risi, S., 2015.

Flora Robotica – Mixed Societies of Symbiotic Robot-Plant Bio-Hybrids

Hamann, H., Wahby, M., Schmickl, T., Zahadat, P., Hofstadler, D., Støy, K., Risi, S., Faina, A., Veenstra, F., Kernbach, S., Kuksin, I., Kernbach, O., Ayers, P. & Wojtaszek, P., 2015, *Computational Intelligence, 2015 IEEE Symposium Series on. IEEE*, p. 1102-1109 8 p.

Interactively Evolving Compositional Sound Synthesis Networks

Jónsson, B. Þ., Hoover, A. K. & Risi, S., 2015, *Proceedings of the 2015 Annual Conference on Genetic and Evolutionary Computation: GECCO '15*. New York, NY, USA: Association for Computing Machinery, p. 321-328 8 p.

Investigating MCTS Modifications in General Video Game Playing

Frydenberg, F., Andersen, K., Risi, S. & Togelius, J., 2015, *Proceedings of the 2015 IEEE Conference on Computational Intelligence and Games*. IEEE Computer Society Press, p. 107-113

Monte-Carlo Tree Search for Simulated Car Racing

Fischer, J., Falsted, N., Vielwerth, M., Togelius, J. & Risi, S., 2015, *Proceedings of the 10th International Conference on the Foundations of Digital Games (FDG 2015), June 22-25, 2015, Pacific Grove, CA, USA*. Association for Computing Machinery, 5 p.

Neuroevolution in Games: State of the Art and Open Challenges

Risi, S. & Togelius, J., 2015, In: *IEEE Transactions on Computational Intelligence and AI in Games*. 9, 1, p. 25-41 17 p.

Petalz: Search-based Procedural Content Generation for the Casual Gamer

Risi, S., Lehman, J., D'Ambrosio, D. B., Hall, R. & Stanley, K. O., 2015, In: *IEEE Transactions on Computational Intelligence and AI in Games*. PP, 99, p. 1-1 1 p.

Soft-Body Muscles for Evolved Virtual Creatures: The Next Step on a Bio-Mimetic Path to Meaningful Morphological Complexity

Lessin, D. & Risi, S., 2015, *Proceedings of the European Conference on Artificial Life (ECAL) 2015*. MIT Press, p. 604-611

An Anarchy of Methods: Current Trends in How Intelligence Is Abstracted in AI

Lehman, J., Clune, J. & Risi, S., 2014, In: *IEEE Intelligent Systems*. 29, 6, p. 56-62

Automatically Categorizing Procedurally Generated Content for Collecting Games

Risi, S., Lehman, J., D'Ambrosio, D. B. & Stanley, K. O., 2014, *FDG 2014 Workshop Proceedings: Proceedings of Workshops Colocated with the 9th International Conference on the Foundations of Digital Games*. New York, NY: Association for Computing Machinery, (Proceedings of the Workshop on Procedural Content Generation in Games (PCG) at the 9th International Conference on the Foundations of Digital Games (FDG-2014). ACM, New York, NY, USA).

Guided Self-organization in Indirectly Encoded and Evolving Topographic Maps

Risi, S. & Stanley, K. O., 2014, *Proceedings of the 2014 Conference on Genetic and Evolutionary Computation*. Association for Computing Machinery, p. 713-720 8 p.

Script-and Cluster-based UCT for StarCraft

Justesen, N. O., Tillman, B., Togelius, J. & Risi, S., 2014, *Computational Intelligence and Games (CIG), 2014 IEEE Conference on*. IEEE Press, p. 1-8 8 p.

Single-unit pattern generators for quadruped locomotion

Morse, G., Risi, S., Snyder, C. R. & Stanley, K. O., 6 Jul 2013, *Proceedings of the 15th annual conference on Genetic and evolutionary computation : GECCO '13*. Association for Computing Machinery, p. 719-726 8 p.

Generating Flower Images and Shapes with Compositional Pattern Producing Networks

Stanley, K. O., Risi, S., Lehman, J., Hoover, A. K. & D'Ambrosio, D., 1 Apr 2013

A Compiler for CPPNs: Transforming Phenotypic Descriptions Into Genotypic Representations

Risi, S., 2013, *2013 AAAI Fall Symposium Series - How Should Intelligence be Abstracted in AI Research..* 7 p.

Confronting the challenge of learning a flexible neural controller for a diversity of morphologies

Risi, S. & Stanley, K. O., 2013, *Proceeding of the fifteenth annual conference on Genetic and evolutionary computation conference*. Association for Computing Machinery, p. 255-262 8 p.

Encouraging reactivity to create robust machines

Lehman, J., Risi, S., D'Ambrosio, D. & Stanley, K. O., 2013, In: *Adaptive Behavior*. 21, 6, p. 484-500

Ribosomal robots: Evolved designs inspired by protein folding

Risi, S., Cellucci, D. & Lipson, H., 2013, *Proceeding of the fifteenth annual conference on Genetic and evolutionary computation conference: GECCO '13*. Association for Computing Machinery, p. 263-270 8 p.

An enhanced hypercube-based encoding for evolving the placement, density, and connectivity of neurons

Risi, S. & Stanley, K. O., 2012, In: *Artificial Life*. 18, 4, p. 331-363 33 p.

A unified approach to evolving plasticity and neural geometry

Risi, S. & Stanley, K. O., 2012, *Neural Networks (IJCNN), The 2012 International Joint Conference on*. p. 1-8 8 p.

Combining Search-Based Procedural Content Generation and Social Gaming in the Petalz Video Game.

Risi, S., Lehman, J., D'Ambrosio, D. B., Hall, R. & Stanley, K. O., 2012, *AIIDE*.

Multirobot behavior synchronization through direct neural network communication

D'Ambrosio, D. B., Goodell, S., Lehman, J., Risi, S. & Stanley, K. O., 2012, *Intelligent Robotics and Applications*. Springer , p. 603-614 12 p.

On the Benefits of Divergent Search for Evolved Representations

Lehman, J., Risi, S. & Stanley, K. O., 2012, *Proceedings of the EvoNet2012 Workshop at the Thirteenth International Conference on Artificial Life (ALIFE XIII)*. 4 p. (Proceedings of the EvoNet 2012 Workshop at ALIFE XIII).

Enhancing es-hyperneat to evolve more complex regular neural networks

Risi, S. & Stanley, K. O., 2011, *Proceedings of the 13th annual conference on Genetic and evolutionary computation*. p. 1539-1546 8 p.

Task switching in multirobot learning through indirect encoding

D'Ambrosio, D. B., Lehman, J., Risi, S. & Stanley, K. O., 2011, *Intelligent Robots and Systems (IROS), 2011 IEEE/RSJ International Conference on*. p. 2802-2809 8 p.

Evolving plastic neural networks with novelty search

Risi, S., Hughes, C. E. & Stanley, K. O., 2010, In: *Adaptive Behavior*. 18, 6, p. 470-491 22 p.

Evolving policy geometry for scalable multiagent learning

D'Ambrosio, D. B., Lehman, J., Risi, S. & Stanley, K. O., 2010, *Proceedings of the 9th International Conference on Autonomous Agents and Multiagent Systems: volume 1-Volume 1*. p. 731-738 8 p.

Evolving the placement and density of neurons in the hyperneat substrate

Risi, S., Lehman, J. & Stanley, K. O., 2010, *Proceedings of the 12th annual conference on Genetic and evolutionary computation*. p. 563-570 8 p.

Indirectly encoding neural plasticity as a pattern of local rules

Risi, S. & Stanley, K. O., 2010, *From Animals to Animats 11*. Springer, p. 533-543 11 p.

How novelty search escapes the deceptive trap of learning to learn

Risi, S., Vanderbleek, S. D., Hughes, C. E. & Stanley, K. O., 2009, *Proceedings of the 11th Annual conference on Genetic and evolutionary computation*. p. 153-160 8 p.

Visualization and clustering of tagged music data

Lewark, P., Risi, S. & Ultsch, A., 2008, *Data Analysis, Machine Learning and Applications*. Springer, p. 673-680 8 p.

Visual mining in music collections with emergent SOM

Risi, S., Mörchen, F., Ultsch, A. & Lewark, P., 2007, In: *Proceedings Workshop on Self-Organizing Maps (WSOM'07)*. p. 3-6 4 p.