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Publications

Journals

1. Graber, Colin, and Alexander Schwing. "Graph Structured Prediction Energy Networks." *Advances in Neural Information Processing Systems*. 2019.
2. Burke, Colin J., et al. "Deblending and classifying astronomical sources with Mask R-CNN deep learning." *Monthly Notices of the Royal Astronomical Society* 493.3 (2019): 3952-3965.
3. Wei, Wei, and E. A. Huerta. "Gravitational wave denoising of binary black hole mergers with deep learning." *Physics Letters B* 800 (2020): 135081.
4. Lin, Jingxiang, Unnat Jain, and Alexander Schwing. "TAB-VCR: Tags and Attributes based VCR Baselines." *Advances in Neural Information Processing Systems*. 2019.
5. Wei, Wei, et al. "Deep transfer learning for star cluster classification: I. application to the PHANGS–HST survey." *Monthly Notices of the Royal Astronomical Society* 493.3 (2020): 3178-3193.
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7. Venkatakrishnan, Ramshankar, Ashish Misra, and Volodymyr Kindratenko. "High-Level Synthesis-Based Approach for Accelerating Scientific Codes on FPGAs." *Computing in Science & Engineering* 22.4 (2020): 104-109.
8. Song, Yu, et al. "Deep learning-based automated image segmentation for concrete petrographic analysis." *Cement and Concrete Research* 135 (2020): 106118.
9. Khan, Asad, E. A. Huerta, and Arnav Das. "Physics-inspired deep learning to characterize the signal manifold of quasi-circular, spinning, non-precessing binary black hole mergers." *Physics Letters B*, Volume 808, 2020, 135628, ISSN 0370-2693, <https://doi.org/10.1016/j.physletb.2020.135628>.
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12. Moradzadeh, A., and N. R. Aluru. "Understanding simple liquids through statistical and deep learning approaches." *The Journal of Chemical Physics* 154, no. 20 (2021): 204503.
13. Huerta, E.A., Khan, A., Huang, X. et al. Accelerated, scalable and reproducible AI-driven gravitational wave detection. *Nat Astron* (2021). <https://www.nature.com/articles/s41550-021-01405-0>
14. Zhang, Xiaofan, Yuan Ma, Jinjun Xiong, Wen-mei Hwu, Volodymyr Kindratenko, and Deming Chen. "Exploring HW/SW Co-Design for Video Analysis on CPU-FPGA Heterogeneous Systems." *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems* (2021).
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16. Wei, Wei, and E. A. Huerta. "Deep learning for gravitational wave forecasting of neutron star mergers." *Physics Letters B* 816 (2021): 136185.
17. Anjum, Omer, Mohammad Almasri, Simon Garcia de Gonzalo, and Wen-mei Hwu. "An Efficient GPU Implementation and Scaling for Higher-Order 3D Stencils." *Information Sciences* (2021).
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Proceedings

1. Volodymyr Kindratenko, Dawei Mu, Yan Zhan, John Maloney, Sayed Hadi Hashemi, Benjamin Rabe, Ke Xu, Roy Campbell, Jian Peng, and William Gropp. 2020. HAL: Computer System for Scalable Deep Learning. In *Practice and Experience in Advanced Research Computing (PEARC '20)*, July 26–30, 2020, Portland, OR, USA. ACM, New York, NY, USA, 15 pages. <https://doi.org/10.1145/3311790.3396649>
2. Hashemi, Sayed Hadi, et al. "tensorflow-tracing: A Performance Tuning Framework for Production." 2019 {USENIX} Conference on Operational Machine Learning (OpML 19). 2019.
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7. Yeh, Raymond A., Yuan-Ting Hu, and Alexander G. Schwing. "Chirality Nets: Exploiting Structure in Human Pose Regression." *Conference on Advances in Neural Information Processing Systems Workshop (NeurIPS)*. 2019.
8. Graber, Colin, and Alexander Schwing. "Graph Structured Prediction Energy Net Algorithms." *Conference on Advances in Neural Information Processing Systems Workshop (NeurIPS)*. 2019.
9. Fang, Tiantian, and Alexander Schwing. "Co-Generation with GANs using AIS based HMC." *Advances in Neural Information Processing Systems*. 2019.
10. Liu, Iou-Jen, Raymond A. Yeh, and Alexander G. Schwing. "PIC: permutation invariant critic for multi-agent deep reinforcement learning." *Conference on Robot Learning*. 2020.
11. Graber, Colin, et al. "Unsupervised Discovery of Dynamic Neural Circuits." *NeurIPS 2019 Workshop Neuro AI Paper28*, (2019).
12. Carrasquilla, Juan, et al. "Probabilistic Simulation of Quantum Circuits with the Transformer." *arXiv preprint arXiv:1912.11052* (2019).
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17. Liu, Iou-Jen, Raymond Yeh, and Alexander Schwing. "High-Throughput Synchronous Deep RL." *Advances in Neural Information Processing Systems* 33 (2020).
18. Sun, Ruoyu, Tiantian Fang, and Alexander Schwing. "Towards a Better Global Loss Landscape of GANs." *Advances in Neural Information Processing Systems* 33 (2020).
19. Ren, Z., Yu, Z., Yang, X., Liu, M.Y., Schwing, A.G. and Kautz, J., 2020, August. UFO²: A Unified Framework Towards Omni-supervised Object Detection. In *European Conference on Computer Vision* (pp. 288-313). Springer, Cham.
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25. Z. Ren*, X. Zhao*, A.G. Schwing; Class-agnostic Reconstruction of Dynamic Objects From Videos; *Neural Information Processing Systems (NeurIPS)*; 2021
26. I. Gat, I. Schwartz, A.G. Schwing; Perceptual Score: What Data Modalities does your Model Perceive?; *Neural Information Processing Systems (NeurIPS)*; 2021
27. J. Aneja, A.G. Schwing, J. Kautz, A. Vahdat; A Contrastive Learning Approach for Training Variational Autoencoder Priors; *Neural Information Processing Systems (NeurIPS)*; 2021
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29. X. Zhao, H. Agrawal, D. Batra, A.G. Schwing; The Surprising Effectiveness of Visual Odometry Techniques for Embodied PointGoal Navigation; *Int.'l Conf. on Computer Vision (ICCV)*; 2021
30. U. Jain, I.-J. Liu, S. Lazebnik, A. Kembhavi, L. Weihs, A.G. Schwing; GridToPix: Training Embodied Agents With Minimal Supervision; *Int.'l Conf. on Computer Vision (ICCV)*; 2021
31. I.-J. Liu, U. Jain, R. Yeh, A.G. Schwing; Cooperative Exploration for Multi-Agent Deep Reinforcement Learning; *Int.'l Conf. on Machine Learning (ICML)*; 2021
32. Y.-T. Hu, J. Wang, R.A. Yeh, A.G. Schwing; SAIL-VOS 3D: A Synthetic Dataset and Baselines for Object Detection and 3D Mesh Reconstruction from Video Data; *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*; 2021
33. C. Graber, G. Tsai, M. Firman, G. Brostow, A.G. Schwing; Panoptic Segmentation Forecasting; *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*; 2021
34. Z. Ren, I. Misra, A.G. Schwing, R. Girdhar; 3D Spatial Recognition without Spatially Labeled 3D; *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*; 2021
35. P. Zhuang, O. Koyejo, A.G. Schwing; Enjoy Your Editing: Controllable GANs for Image Editing via Latent Space Navigation; *Int.'l Conf. on Learning Representations (ICLR)*; 2021
36. A. Misra, C. He and V. Kindratenko, "Efficient HW and SW Interface Design for Convolutional Neural Networks Using High-Level Synthesis and TensorFlow," *2021 IEEE/ACM International Workshop on Heterogeneous High-performance Reconfigurable Computing (H2RC)*, 2021, pp. 1-8, doi: 10.1109/H2RC54759.2021.00006.
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Archives

1. Gupta, Arjun, et al. "Deep Learning for Cardiologist-level Myocardial Infarction Detection in Electrocardiograms." *arXiv preprint arXiv:1912.07618* (2019).
2. Wei, Wei, et al. "Deep Transfer Learning for Star Cluster Classification: I. Application to the PHANGS-HST Survey." *arXiv preprint arXiv:1909.02024* (2019).

3. Gupta, Sidharth, et al. "Random mesh projectors for inverse problems." *arXiv preprint arXiv:1805.11718* (2018).
4. Luo, Shirui, et al. "Review and Examination of Input Feature Preparation Methods and Machine Learning Models for Turbulence Modeling." *arXiv preprint arXiv:2001.05485* (2020).
5. Liu, Iou-Jen, Raymond A. Yeh, and Alexander G. Schwing. "PIC: Permutation Invariant Critic for Multi-Agent Deep Reinforcement Learning." *arXiv preprint arXiv:1911.00025* (2019).
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8. Messaoud, Safa, Maghav Kumar, and Alexander G. Schwing. "Can We Learn Heuristics For Graphical Model Inference Using Reinforcement Learning?." *arXiv preprint arXiv:2005.01508* (2020).
9. Lin, Joshua Yao-Yu, et al. "Feature Extraction on Synthetic Black Hole Images." *arXiv preprint arXiv:2007.00794* (2020).
10. Schwartz, Lane, et al. "Neural Polysynthetic Language Modelling." *arXiv preprint arXiv:2005.05477* (2020).
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15. Lin, Joshua Yao-Yu, Sneha Pandya, Devanshi Pratap, Xin Liu, and Matias Carrasco Kind. "AGNet: Weighing Black Holes with Machine Learning." *arXiv preprint arXiv:2011.15095* (2020).
16. Luo, Shirui, and Volodymyr Kindratenko. "Hands-on with IBM Visual Insights." *Authorea Preprints* (2020).
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20. Miranda, Brando. *An Empirical Study of Meta-Learning: a step towards rigorously understanding meta-learning algorithms*. 2020.
21. Wang, Jiahong. "GTAMesh Dataset: Semantic 3D Perception Dataset." (2020).
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23. Graber, Colin, Grace Tsai, Michael Firman, Gabriel Brostow, and Alexander Schwing. "Panoptic Segmentation Forecasting." *arXiv preprint arXiv:2104.03962* (2021).
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30. Zhao, Xiaoming, Harsh Agrawal, Dhruv Batra, and Alexander Schwing. "The Surprising Effectiveness of Visual Odometry Techniques for Embodied PointGoal Navigation." *arXiv preprint arXiv:2108.11550* (2021).
31. Miranda, Brando, Yu-Xiong Wang, and Sanmi Koyejo. "Does MAML Only Work via Feature Re-use? A Data-Centric Perspective." *arXiv preprint arXiv:2112.13137* (2021).
32. Miranda, Brando, Yu-Xiong Wang, and Sanmi Koyejo. "The Curse of Zero Task Diversity: On the Failure of Transfer Learning to Outperform MAML and their Empirical Equivalence." *arXiv preprint arXiv:2112.13121* (2021).
33. Cheng, Bowen, Anwesha Choudhuri, Ishan Misra, Alexander Kirillov, Rohit Girdhar, and Alexander G. Schwing. "Mask2Former for Video Instance Segmentation." *arXiv preprint arXiv:2112.10764* (2021).
34. Khan, Asad, and E. A. Huerta. "AI and extreme scale computing to learn and infer the physics of higher order gravitational wave modes of quasi-circular, spinning, non-precessing binary black hole mergers." *arXiv preprint arXiv:2112.07669* (2021).
35. Cheng, Bowen, Ishan Misra, Alexander G. Schwing, Alexander Kirillov, and Rohit Girdhar. "Masked-attention Mask Transformer for Universal Image Segmentation." *arXiv preprint arXiv:2112.01527* (2021).
36. Moradzadeh, Alireza, Hananeh Oliaei, and Narayana R. Aluru. "Topology-based Phase Identification of Bulk, Interface, and Confined Water using Edge-Conditioned Convolutional Graph Neural Network." *arXiv preprint arXiv:2204.07633* (2022).
37. Wang, Haoxiang, Yite Wang, Ruoyu Sun, and Bo Li. "Global Convergence of MAML and Theory-Inspired Neural Architecture Search for Few-Shot Learning." *arXiv preprint arXiv:2203.09137* (2022).
38. Chaturvedi, Pranshu, Asad Khan, Minyang Tian, E. A. Huerta, and Huihuo Zheng. "Inference-optimized AI and high performance computing for gravitational wave detection at scale." *arXiv preprint arXiv:2201.11133* (2022).
39. Safarzadeh, Mohammadtaher, Asad Khan, E. A. Huerta, and Martin Wattenberg. "Interpreting a Machine Learning Model for Detecting Gravitational Waves." *arXiv preprint arXiv:2202.07399* (2022).
40. Liu, Iou-Jen, Xingdi Yuan, Marc-Alexandre Côté, Pierre-Yves Oudeyer, and Alexander G. Schwing. "Asking for Knowledge: Training RL Agents to Query External Knowledge Using Language." *arXiv preprint arXiv:2205.06111* (2022).

Thesis

1. Yuan Ma, Accelerating Convolution in Deep Neural Networks on CAPI-based FPGA, Senior Thesis, Spring 2020
2. Benjamin Rabe, Hyperparameter Tuning and its Effects on Deep Learning Performance and Generalization, MS Thesis, Spring 2020
3. Jiaying Wu, An Adaptive Pruning Algorithm for DNN Compression, MS Thesis, Spring 2020
4. Sayed Hadi Hashemi, Timed Execution in Distributed Machine Learning, PhD Thesis, Spring 2020
5. Sun, Ray. "Environmental curriculum learning for efficiently achieving superhuman play in games." PhD diss., 2020.

Technical Reports

1. [Dcase 2020 Task 2: Unsupervised Detection of Anomalous Sounds for Machine Condition Monitoring](#)
2. [Dcase 2020 Task 1: Subtask B: Low-Complexity Acoustic Scene Classification](#)

Presentations

1. [PEARC20 - Thursday, July 30 • 10:00am - 11:00am - HAL: Computer System for Scalable Deep Learning - Slides](#)
2. [HDF5 User Group Meeting 2020 - October 13-16, 2020 - tar2h5: a data convertor toolset for machine learning - Slides](#)

Posters

Software/Model repositories

1. <https://github.com/joshualin24/Deep-Learning-Cosmic-Void-2019>
2. <https://github.com/ncsa/swsuite>
3. <https://github.com/HDFGroup/tar2h5>

Benchmarks

- [Benchmark 2019](#)
- [Benchmark 2020](#)
- [MLPerf HPC v0.7: Machine Learning Training Performance Benchmark Suite for High-Performance Computing](#)