Luke de Oliveira

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Current Affiliations

Technical Lead & Principal Engineer – AI & ML, Twilio, Inc., San Francisco, CA
Visiting Affiliate, Lawrence Berkeley National Laboratory, Berkeley, CA
Advisor, Holloway, Inc., San Francisco, CA

Areas of Specialization

Deep Learning • Natural Language Processing • Generative Models • Simulation in Particle Physics

Industry Positions

2020- *Technical Lead & Principal Engineer, Twilio AI*, Twilio, Inc., San Francisco, CA, USA
2019-2020 *Technical Lead, Twilio AI*, Twilio, Inc., San Francisco, CA, USA
2018- *Advisor*, Holloway, Inc., San Francisco, CA, USA
2015-2018 *Founder & CEO*, Vai Technologies, LLC (Acquired by Twilio, Inc.), San Francisco, CA, USA
2015-2019 *Advisor*, The Hive, LLC, Palo Alto, CA, USA
2015-2017 *Advisor*, Astound/Neva, Inc., Menlo Park, CA, USA
2016 *Data Scientist*, Enlitic, Inc., San Francisco, CA, USA

Education

2016 M.Sc. in Computational and Mathematical Engineering, ICME, Stanford University
2014 B.S. in Applied Mathematics, Yale University

Academic Appointments

2018- *Visiting Affiliate*, National Energy Research Scientific Computing Center, Lawrence Berkeley National Laboratory, Berkeley, CA, USA
2016-2018 *Visiting Affiliate*, Physics Division (High Energy Particle), Lawrence Berkeley National Laboratory, Berkeley, CA, USA
2015-2016 *Course Instructor*, Stanford University, Stanford, CA, USA
2015-2016 *Member*, ICME C^2 Consulting Group, Stanford University, Stanford, CA, USA
2014-2016 *Research Affiliate*, SLAC National Accelerator Laboratory, High Energy Particle Physics Division, Menlo Park, CA, USA
2014 *Affiliate*, Université de Genève, Department of Nuclear and Particle Physics, Geneva, CH
2012-2015 *Affiliate*, ATLAS Collaboration, CERN, Geneva, CH

2011-2012 *Research Affiliate*, Yale Law School, New Haven, CT, USA

Grants, Honors & Awards

2014-2016 Stanford Graduate Engineering Fellowship, Stanford University
2014 John E. Linck III Prize, Yale University
2013 Alan S. Tetelman Fellow, Yale University
2013 Linck Fellow, Yale University

Publications & Talks

Journal Articles

2020 **de Oliveira, Luke**, Nachman, B., and Paganini, M., "Electromagnetic showers beyond shower shapes", *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, (2019) 162879. https://doi.org/10.1016/j.nima.2019.162879, arXiv/1806.05667

2018 Paganini, M., **de Oliveira, Luke**, and Nachman, B., "Accelerating Science with Generative Adversarial Networks: An Application to 3D Particle Showers in Multilayer Calorimeters", *Physical Review Letters, APS*, (2018) 97: 014021. https://doi.org/10.1103/PhysRevD.97.014021

2018 Paganini, M., **de Oliveira, Luke**, and Nachman, B., "CaloGAN: Simulating 3D high energy particle showers in multilayer electromagnetic calorimeters with generative adversarial networks", *Physical Review D, APS*, (2018) 120: 042003. https://doi.org/10.1103/PhysRevLett.120.042003

2017 **de Oliveira, Luke**, Paganini, M. and Nachman, B., "Learning Particle Physics by Example: Location-Aware Generative Adversarial Networks for Physics Synthesis", *Comput. Softw. Big Sci.*, (2017) 1: 4. https://doi.org/10.1007/s41781-017-0004-6

2016 **de Oliveira, Luke**, Kagan, M., Mackey, L. et al., "Jet-images — deep learning edition", *Journal of High Energy Physics*, (2016) 2016: 69. https://doi.org/10.1007/JHEP07(2016)069

Preprints

2019 Matton, A. and **de Oliveira, Luke**, "Emergent Properties of Finetuned Language Representation Models", arXiv/1910.10832

2019 **de Oliveira, Luke** and Láinez, A. R., "Repurposing Decoder-Transformer Language Models for Abstractive Summarization", arXiv/1909.00325

2018 HEP Software Foundation: J. Apostolakis et al., "HEP Software Foundation Community White Paper Working Group - Detector Simulation", arXiv/1803.04165

Conference & Workshop Contributions

2019 **de Oliveira, Luke** and Láinez, A. R., "Repurposing Decoder-Transformer Language Models for Abstractive Summarization", *NeurIPS 2019, Workshop on Document Intelligence*, Vancouver, BC,

Canada (Poster & Presentation)

2017 **de Oliveira, Luke**, Paganini, M., Nachman, B. "Tips and Tricks for Training GANs with Physics Constraints", *NIPS 2017, Workshop on Deep Learning in the Physical Sciences*, Long Beach, CA, USA (Poster)

2017 Paganini, M., **de Oliveira, Luke**, Nachman, B. "Survey of Machine Learning Techniques for High Energy Electromagnetic Shower Classification", *NIPS 2017, Workshop on Deep Learning in the Physical Sciences*, Long Beach, CA, USA (Poster)

2017 **de Oliveira, Luke**, Paganini, M., Nachman, B. "Controlling Physical Attributes in GAN-Accelerated Simulation of Electromagnetic Calorimeters", *Proceedings of the 18th International Workshop on Advanced Computing and Analysis Techniques in Physics Research, J. Phys. Conf. Ser.*, Seattle, WA, USA. http://dx.doi.org/10.1088/1742-6596/1085/4/042017

2016 Schwartzman, A., Kagan, M., Mackey, L., Nachman, B. and **de Oliveira, Luke**, "Image Processing, Computer Vision, and Deep Learning: new approaches to the analysis and physics interpretation of LHC events", *Proceedings of the 17th International Workshop on Advanced Computing and Analysis Techniques in Physics Research, J. Phys. Conf. Ser.*, Valparaiso, Chile. http://dx.doi.org/10.1088/1742-6596/762/1/012035

2016 Kagan, M., **de Oliveira, Luke**, Mackey, L., Nachman, B., and Schwartzman, A. "Boosted Jet Tagging with Jet-Images and Deep Neural Networks", *Proceedings of Connecting the Dots 2016, EPJ Web of Conferences, Volume 127, id.00009*, Vienna, Austria. https://doi.org/10.1051/epjconf/201612700009

Select Invited Talks

2018 "The Future of Machine Learning in High Energy Physics", Plenary Talk, *Inter-experimental Machine Learning Workshop, CERN*, Geneva, Switzerland.

2018 "Accelerating Simulation with GANs", *Workshop on Machine Learning for Particle Accelerators, SLAC National Accelerator Laboratory*, Menlo Park, CA, USA.

2018 "Adversarial Deep Learning in High Energy Physics", *SMP-J Annual Workshop, CMS Collaboration, CERN*, Geneva, Switzerland.

2017 "Introduction to Generative Adversarial Networks", *IML Machine Learning Working Group, CERN*, Geneva, Switzerland.

2017 "Learning Particle Physics by Example: Accelerating Science with Generative Adversarial Networks", *GPU Technology Conference*, San Jose, CA, USA.

2017 "Meta Learning",*Workshop on Machine Learning for Jets*, Berkeley, CA, USA.

2015 "Jet-images & Deep learning", *NIPS 2015, ALEPH Workshop*, Montréal, Canada.

2015 "A ground-up construction of deep learning", *Data Science @ LHC workshop*, Geneva, Switzerland.

2014 "Random Forests, Feature Selection, and Large-Scale Predictive Methods", *Guest Lecture, R. W. Johnson Clinical Scholars Program, Yale Medical School*, New Haven, CT, USA.

Select Contributed Talks

2017 "Generative Adversarial Networks for Simulation", *18th International Workshop on Advanced Computing and Analysis Techniques in Physics Research*, Seattle, WA, USA.

2017 "Deep Learning for Practical Natural Language Processing", *Open Data Science Conference, West*, Burlingame, CA, USA.

Teaching

2019 *Course Instructor*, "Deep Learning for Natural Language Processing", Summer Workshop Series, Stanford University

2020 *Course Instructor*, "Deep Learning for Natural Language Processing", Summer Workshop Series, Stanford University

2019 *Course Instructor*, "Sequential Models", Deep Learning for Science Summer School, Lawrence Berkeley Nation Laboratory

2018 *Course Instructor*, "Deep Learning for Natural Language Processing", Summer Workshop Series, Stanford University

2017 *Course Instructor*, "Natural Language Processing", Summer Workshop Series, Stanford University

2015-2016 *Course Instructor*, "Scientific Python (CME193)", Stanford University

Service to the Profession

2019 *Reviewer*, Proceedings of the National Academy of Science

2019 *Reviewer*, Women in Machine Learning Workshop, NeurIPS 2019

2019 *Reviewer*, Machine Learning in the Physical Sciences Workshop, NeurIPS 2019

2018 *Reviewer*, Department of Energy, Office of Science

2018 *Reviewer*, Computing and Software for Big Science *(Springer)*

2017 *Reviewer*, Nature Communications