



Eugene Brevdo

Staff Software Engineer

[Google DeepMind](#)





Biography

Eugene Brevdo is a Staff SWE at Google DeepMind. His research interests span many interconnected areas:

- Optimization under uncertainty and constraints and experimental design in the contexts of, e.g., software systems and high throughput screening in biology.
- Software systems for training and deploying ML, Bandits, and RL models.
- Machine Learning applied to optimizing large software systems (databases, datacenter scheduling, caches, compilers like LLVM and XLA/TPU).

Eugene received his PhD in Electrical Engineering from Princeton University, where his advisers were [Peter Ramadge](#) and [Ingrid Daubechies](#).

Education

-  PhD in Electrical Engineering, 2011
Princeton University
-  BSc in Electrical, Computer, and Systems Engineering, 2005
Rensselaer Polytechnic Institute

Projects

MLGO

MLGO is a framework for integrating ML techniques systematically in LLVM. It replaces human-crafted optimization heuristics in LLVM with machine learned models.



ProtNLM

ProtNLM is a new method used by UniProt to automatically annotate uncharacterized protein sequences. This method works by predicting a short textual description for proteins based solely on their amino acid sequence, using a sequence-to-sequence model.



Reverb

Reverb is an efficient and easy-to-use data storage and transport system designed for machine learning research. Reverb is primarily used as an experience replay system for distributed reinforcement learning algorithms but the system also supports multiple data structure representations such as FIFO, LIFO, and priority queues.



Synchrosqueezing Toolbox (MATLAB)

This toolbox implements several time-frequency and time-scale analysis methods, including the Forward/Inverse Discretized CWT, and CWT-based Synchrosqueezing.



TensorFlow

TensorFlow is an end-to-end open source platform for machine learning.



TensorFlow Probability

A library for probabilistic reasoning and statistical analysis.



TF Agents

A reliable, scalable and easy to use TensorFlow library for Contextual Bandits and Reinforcement Learning.



Experience



Staff Software Engineer

Google Brain + Google DeepMind

Jan 2022 – Present · California

Brain Sequin (now GDM Alchemy) team.

- Focusing on protein understanding and optimization under uncertainty.
- Multi-stage peptide library design, co-optimizing cell permeability and protein binding.
- LLM models for protein function annotation and target-conditional optimization.



Staff Software Engineer

Google Brain

Apr 2017 – Dec 2021 · California

Co-TLM of the [TF-Agents](#) team (2018 - 2021).

TLM of the Brain Learned Systems Team (2017 - 2022). Clients include Spanner, Compiler, and Cloud infrastructure teams.

- Built smarter query optimizers, cache eviction algorithms, inlining and register allocation passes.
- Grew the Learned Systems team from 1 to 7 researchers and engineers.
- Aligned engagements between Brain, Technical Infrastructure, and Cloud orgs.
- Set research direction for systems and ML engineers.



Senior Software Engineer

Google Brain

Oct 2015 – Mar 2017 · California

SWE on Brain Applied Machine Intelligence team.

- Core TensorFlow maintainer.
- Developed interfaces and support for sparse and sequential input, debugged graph control flow, implemented CPU and GPU kernels; whatever needed doing.
- Founding SWE / API designer of TF Distributions (now [Tensorflow Probability](#)).



Software Engineer

Google Research

Apr 2014 – Sep 2015 · California

Hacked on DistBelief, helped opensource TensorFlow.



Software Engineer

Lifecode, Inc.

Mar 2013 – Mar 2014 · California

Built supervised learning ML pipelines for clinical diagnosis of rare diseases from NGS assays.



Senior Data Scientist

The Climate Corporation

Mar 2013 – Mar 2014 · California

I worked on two teams:

- Computational Climatology: Statistical weather forecasting in the short-to-medium-term scale (2 weeks-2 years) using a combination of techniques from climatology, machine learning/statistics, and spatiotemporal signal processing.
- Computational Agronomy: Analyzed, assimilated, and reconciled remotely sensed weather and agricultural data. Built growth forecasts for corn, sorghum, soy, and winter wheat.

Research Intern

Siemens Corporate Research

May 2008 – Aug 2008 · Princeton, NJ

Focused on applications of Compressive Sensing to inverse problems in medical imaging.

- Developed CS-based estimator for Computational Tomography with Sinogram Occlusion.
- Developed a novel CS-based reconstruction technique for Ultrasound tomography.

Featured Publications

📄 Zhenyu Song, Kevin Chen, Nuikhil Sarda, Deniz Altinbükten, Eugene Brevdo, Jimmy Coleman, Xiao Ju, Pawel Jurczyk, Richard Schooler, Ramki Gummadi (2023). [HALP: Heuristic Aided Learned Preference Eviction Policy for YouTube Content Delivery Network](#). *20th USENIX Symposium on Networked Systems Design and Implementation, NSDI 2023, Boston, MA, April 17-19, 2023*.

Cite

URL

📄 Lyric Doshi, Vincent Zhuang, Gaurav Jain, Ryan Marcus, Haoyu Huang, Deniz Altinbükten, Eugene Brevdo, Campbell Fraser (2023). [Kepler: Robust Learning for Parametric Query Optimization](#). *Proc. ACM Manag. Data*.

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📄 S. VenkataKeerthy, Siddharth Jain, Umesh Kalvakuntla, Pranav Sai Gorantla, Rajiv Shailesh Chitale, Eugene Brevdo, Albert Cohen, Mircea Trofin, Ramakrishna Upadrasta (2023). [The Next 700 ML-Enabled Compiler Optimizations](#). *CoRR*.

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📄 Xinfeng Xie, Prakash Prabhu, Ulysse Beaugnon, Phitchaya Mangpo Phothilimthana, Sudip Roy, Azalia Mirhoseini, Eugene Brevdo, James Laudon, Yanqi Zhou (2022). [A Transferable Approach for Partitioning Machine Learning Models on Multi-Chip-Modules](#). *Proceedings of Machine Learning and Systems 2022, MLSys 2022, Santa Clara, CA, USA, August 29 - September 1, 2022*.

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📄 Yingjie Miao, Xingyou Song, John D. Co-Reyes, Daiyi Peng, Summer Yue, Eugene Brevdo, Aleksandra Faust (2022). [Differentiable Architecture Search for Reinforcement Learning](#). *International Conference on Automated Machine Learning, AutoML 2022, 25-27 July 2022, Johns Hopkins University, Baltimore, MD, USA*.

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📄 Andreea Gane, Maxwell L Bileschi, David Dohan, Elena Speretta, Amélie Héliou, Laetitia Meng-Papaxanthos, Hermann Zellner, Eugene Brevdo, Ankur Parikh, Maria J Martin, Sandra Orchard, Lucy J Colwell (2022). [ProtNLM: Model-based Natural Language Protein Annotation](#).

PDF

Cite

📄 Mircea Trofin, Yundi Qian, Eugene Brevdo, Zinan Lin, Krzysztof Choromanski, David Li (2021). [MLGO: a Machine Learning Guided Compiler Optimizations Framework](#). *CoRR*.

Cite

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📄 Albin Cassirer, Gabriel Barth-Maron, Eugene Brevdo, Sabela Ramos, Toby Boyd, Thibault Sottiaux, Manuel Kroiss (2021). [Reverb: A Framework For Experience Replay](#). *CoRR*.

Cite

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📄 Yuan Yu, Martín Abadi, Paul Barham, Eugene Brevdo, Mike Burrows, Andy Davis, Jeff Dean, Sanjay Ghemawat, Tim Harley, Peter Hawkins, Michael Isard, Manjunath Kudlur, Rajat Monga, Derek Gordon Murray, Xiaoqiang Zheng (2018). [Dynamic control flow in large-scale machine learning](#). *Proceedings of the Thirteenth EuroSys Conference, EuroSys 2018, Porto, Portugal, April 23-26, 2018*.

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📄 Yuan Yu, Martín Abadi, Paul Barham, Eugene Brevdo, Mike Burrows, Andy Davis, Jeff Dean, Sanjay Ghemawat, Tim Harley, Peter Hawkins, Michael Isard, Manjunath Kudlur, Rajat Monga, Derek Gordon Murray, Xiaoqiang Zheng (2018). [Dynamic Control Flow in Large-Scale Machine Learning](#). *CoRR*.

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📄 Ashish Vaswani, Samy Bengio, Eugene Brevdo, François Chollet, Aidan N. Gomez, Stephan Gouws, Llion Jones, Lukasz Kaiser, Nal Kalchbrenner, Niki Parmar, Ryan Sepassi, Noam Shazeer, Jakob Uszkoreit (2018). [Tensor2Tensor for Neural Machine Translation](#). *Proceedings of the 13th Conference of the Association for Machine Translation in the Americas, AMTA 2018, Boston, MA, USA, March 17-21, 2018 - Volume 1: Research Papers*.

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📄 Dustin Tran, Matthew D. Hoffman, Rif A. Saurous, Eugene Brevdo, Kevin Murphy, David M. Blei (2017). [Deep Probabilistic Programming](#). *5th International Conference on Learning Representations, ICLR 2017, Toulon, France, April 24-26, 2017, Conference*

Track Proceedings.

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Joshua V. Dillon, Ian Langmore, Dustin Tran, Eugene Brevdo, Srinivas Vasudevan, Dave Moore, Brian Patton, Alex Alemi, Matthew D. Hoffman, Rif A. Saurous (2017). [TensorFlow Distributions](#). *CoRR*.

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Martín Abadi, Ashish Agarwal, Paul Barham, Eugene Brevdo, Zhifeng Chen, Craig Citro, Gregory S. Corrado, Andy Davis, Jeffrey Dean, Matthieu Devin, Sanjay Ghemawat, Ian J. Goodfellow, Andrew Harp, Geoffrey Irving, Michael Isard, Yangqing Jia, Rafal Józefowicz, Lukasz Kaiser, Manjunath Kudlur, Josh Levenberg, Dan Mané, Rajat Monga, Sherry Moore, Derek Gordon Murray, Chris Olah, Mike Schuster, Jonathon Shlens, Benoit Steiner, Ilya Sutskever, Kunal Talwar, Paul A. Tucker, Vincent Vanhoucke, Vijay Vasudevan, Fernanda B. Viégas, Oriol Vinyals, Pete Warden, Martin Wattenberg, Martin Wicke, Yuan Yu, Xiaoqiang Zheng (2016). [TensorFlow: Large-Scale Machine Learning on Heterogeneous Distributed Systems](#). *CoRR*.

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Gaurav Thakur, Eugene Brevdo, Neven S. Fuckar, Hau-Tieng Wu (2013). [The Synchronsqueezing algorithm for time-varying spectral analysis: Robustness properties and new paleoclimate applications](#). *Signal Process.*

Cite DOI URL

Sina Jafarpour, Gungor Polatkan, Eugene Brevdo, Shannon M. Hughes, Andrei Brasoveanu, Ingrid Daubechies (2009). [Stylistic analysis of paintings using wavelets and machine learning](#). *17th European Signal Processing Conference, EUSIPCO 2009, Glasgow, Scotland, UK, August 24-28, 2009*.

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Ella Hendriks, Igor J. Berezchnoy, Eugene Brevdo, Shannon M. Hughes, Ingrid Daubechies, Jia Li, Eric O. Postma, James Z. Wang (2008). [Image processing for artist identification](#). *IEEE Signal Process. Mag.*

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