Brandon Amos

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Education

o Ph.D. in Computer Science, Carnegie Mellon University (0.00/0.00)   Aug 2014 – May 2019
o M.S. in Computer Science, Carnegie Mellon University (0.00/0.00)   Aug 2014 – May 2016
o B.S. in Computer Science, Virginia Tech (3.99/4.00)   Aug 2011 – May 2014
o Northside High School (Roanoke, Virginia)   Aug 2007 – May 2011

Experience

o Research Scientist, Facebook AI   May 2019 – Present
o Research Intern, Intel Labs   June 2018 – Sept 2018
o Research Intern, Google DeepMind   May 2017 – Oct 2017
o Data Scientist Intern, Adobe Research   May 2014 – Aug 2014
o Software Engineer Intern, Snowplow Analytics   Dec 2013 – Jan 2014
o Software Engineer Intern, Qualcomm   May 2013 – Aug 2013
o Software Engineer Intern, Phoenix Integration   May 2012 – Aug 2012
o Network Administrator Intern, Sunapsys   Jan 2011 – Aug 2011

Selected Publications   Google Scholar ID: d8gdZR4AAAAJ

[1]   A. Agrawal, **B. Amos**, S. Barratt, S. Boyd, S. Diamond, J. Z. Kolter, "Differentiable Convex Optimization Layers," in *NeurIPS*, 2019.

[2]   **B. Amos** and D. Yarats, "The Differentiable Cross-Entropy Method," *arXiv preprint arXiv:1909.12830*, 2019. [Online]. Available: https://arxiv.org/abs/1909.12830.

[3]   **B. Amos**, V. Koltun, J. Z. Kolter, "The Limited Multi-Label Projection Layer," *arXiv preprint arXiv:1906.08707*, 2019. [Online]. Available: https://arxiv.org/abs/1906.08707.

[4]   **B. Amos**, "Differentiable Optimization-Based Modeling for Machine Learning," PhD thesis, Carnegie Mellon University, May 2019. [Online]. Available: https://github.com/bamos/thesis/raw/master/bamos_thesis.pdf.

[5]   **B. Amos**, I. D. J. Rodriguez, J. Sacks, B. Boots, J. Z. Kolter, "Differentiable MPC for End-to-end Planning and Control," in *NeurIPS*, 2018. [Online]. Available: https://arxiv.org/abs/1810.13400.

[6]   N. Brown, T. Sandholm, **B. Amos**, "Depth-limited solving for imperfect-information games," in *NeurIPS*, 2018. [Online]. Available: http://arxiv.org/abs/1805.08195.

[7]   **B. Amos**, L. Dinh, S. Cabi, T. Rothörl, S. G. Colmenarejo, A. Muldal, T. Erez, Y. Tassa, N. Freitas, M. Denil, "Learning Awareness Models," in *International Conference on Learning Representations*, 2018. [Online]. Available: https://openreview.net/forum?id=r1HhRfWRZ.

[8]   P. L. Donti, **B. Amos**, J. Z. Kolter, "Task-based End-to-end Model Learning," in *NeurIPS*, 2017. [Online]. Available: http://arxiv.org/abs/1703.04529.

[9]   **B. Amos** and J. Z. Kolter, "OptNet: Differentiable Optimization as a Layer in Neural Networks," in *ICML*, 2017. [Online]. Available: http://arxiv.org/abs/1703.00443.

[10] **B. Amos**, L. Xu, J. Z. Kolter, "Input Convex Neural Networks," in *ICML*, 2017. [Online]. Available: http://arxiv.org/abs/1609.07152.

[11] H. Zhao, T. Adel, G. Gordon, **B. Amos**, "Collapsed Variational Inference for Sum-Product Networks," in *ICML*, 2016. [Online]. Available: http://www.cs.cmu.edu/~hzhao1/papers/ICML2016/BL-SPN-main.pdf.

[12] **B. Amos**, B. Ludwiczuk, M. Satyanarayanan, "OpenFace: A general-purpose face recognition library with mobile applications," Technical Report CMU-CS-16-118, CMU School of Computer Science, Tech. Rep., 2016. [Online]. Available: http://reports-archive.adm.cs.cmu.edu/anon/anon/2016/CMU-CS-16-118.pdf.

[13] **B. Amos**, D. Easterling, L. Watson, W. Thacker, B. Castle, M. Trosset, "QNSTOP-QuasiNewton Algorithm for Stochastic Optimization," 2014. [Online]. Available: https://vtechworks.lib.vt.edu/bitstream/handle/10919/49672/qnTOMS14.pdf.

Teaching Experience

o Graduate AI (CMU 15-780), TA   S2017
o Distributed Systems (CMU 15-440/640), TA   S2016
o Software Design and Data Structures (VT CS 2114), TA   S2013

Honors & Awards

o NSF Graduate Research Fellowship   2016 − 2019
o Eight undergraduate scholarships   2011 − 2014

Service

Reviewer	ICML 2018, NeurIPS 2018, NeurIPS Deep RL Workshop 2018, ICLR 2019 (outstanding reviewer), ICML 2019, ICCV 2019
Admissions	CMU CSD MS 2014-2015

Skills

Languages	C, C++, Fortran, Haskell, Java, Lua, Make, *Mathematica*, Python, R, Scala
Frameworks	NumPy, Pandas, PyTorch, SciPy, TensorFlow, Torch7
Systems	Linux, OSX

All Publications   Google Scholar ID: d8gdZR4AAAAJ

Preprints and Tech Reports...

[P1] **B. Amos** and D. Yarats, "The Differentiable Cross-Entropy Method," *arXiv preprint arXiv:1909.12830*, 2019. [Online]. Available: https://arxiv.org/abs/1909.12830.

[P2] E. Grefenstette, **B. Amos**, D. Yarats, P. M. Htut, A. Molchanov, F. Meier, D. Kiela, K. Cho, S. Chintala, "Generalized Inner Loop Meta-Learning," *arXiv preprint arXiv:1910.01727*, 2019. [Online]. Available: https://arxiv.org/abs/1910.01727.

[P3] D. Yarats, A. Zhang, I. Kostrikov, **B. Amos**, J. Pineau, R. Fergus, "Improving Sample Efficiency in Model-Free Reinforcement Learning from Images," *arXiv preprint arXiv:1910.01741*, 2019. [Online]. Available: https://arxiv.org/abs/1910.01741.

[P4] **B. Amos**, V. Koltun, J. Z. Kolter, "The Limited Multi-Label Projection Layer," *arXiv preprint arXiv:1906.08707*, 2019. [Online]. Available: https://arxiv.org/abs/1906.08707.

[P5] **B. Amos**, B. Ludwiczuk, M. Satyanarayanan, "Openface: A general-purpose face recognition library with mobile applications," Technical Report CMU-CS-16-118, CMU School of Computer Science, Tech. Rep., 2016. [Online]. Available: http://reports-archive.adm.cs.cmu.edu/anon/anon/2016/CMU-CS-16-118.pdf.

[P6] Y. Gao, W. Hu, K. Ha, **B. Amos**, P. Pillai, M. Satyanarayanan, "Are cloudlets necessary?" Technical Report CMU-CS-15-139, CMU School of Computer Science, Tech. Rep., 2015. [Online]. Available: http://reports-archive.adm.cs.cmu.edu/anon/anon/2015/CMU-CS-15-139.pdf.

[P7] K. Ha, Y. Abe, Z. Chen, W. Hu, **B. Amos**, P. Pillai, M. Satyanarayanan, "Adaptive vm handoff across cloudlets," Technical Report CMU-CS-15-113, CMU School of Computer Science, Tech. Rep., 2015. [Online]. Available: http://ra.adm.cs.cmu.edu/anon/2015/CMU-CS-15-113.pdf.

[P8] **B. Amos**, D. Easterling, L. Watson, W. Thacker, B. Castle, M. Trosset, "QNSTOP-QuasiNewton Algorithm for Stochastic Optimization," 2014. [Online]. Available: https://vtechworks.lib.vt.edu/bitstream/handle/10919/49672/qnTOMS14.pdf.

Conference Proceedings

[C1] A. Agrawal, **B. Amos**, S. Barratt, S. Boyd, S. Diamond, J. Z. Kolter, "Differentiable Convex Optimization Layers," in *NeurIPS*, 2019.

[C2] **B. Amos**, I. D. J. Rodriguez, J. Sacks, B. Boots, J. Z. Kolter, "Differentiable MPC for End-to-end Planning and Control," in *NeurIPS*, 2018.

[C3] N. Brown, T. Sandholm, **B. Amos**, "Depth-limited solving for imperfect-information games," in *NeurIPS*, 2018. [Online]. Available: http://arxiv.org/abs/1805.08195.

[C4] **B. Amos**, L. Dinh, S. Cabi, T. Rothörl, S. G. Colmenarejo, A. Muldal, T. Erez, Y. Tassa, N. Freitas, M. Denil, "Learning awareness models," in *International Conference on Learning Representations*, 2018. [Online]. Available: https://openreview.net/forum?id=r1HhRfWRZ.

[C5] J. Wang, **B. Amos**, A. Das, P. Pillai, N. Sadeh, M. Satyanarayanan, "A scalable and privacy-aware iot service for live video analytics," in *Proceedings of the 8th ACM on Multimedia Systems Conference*, ACM, 2017, pp. 38–49.

[C6] P. L. Donti, **B. Amos**, J. Z. Kolter, "Task-based end-to-end model learning," in *NeurIPS*, 2017. [Online]. Available: http://arxiv.org/abs/1703.04529.

[C7] **B. Amos** and J. Z. Kolter, "OptNet: Differentiable Optimization as a Layer in Neural Networks," in *ICML*, 2017. [Online]. Available: http://arxiv.org/abs/1703.00443.

[C8] **B. Amos**, L. Xu, J. Z. Kolter, "Input convex neural networks," in *ICML*, 2017. [Online]. Available: http://arxiv.org/abs/1609.07152.

[C9] H. Zhao, T. Adel, G. Gordon, **B. Amos**, "Collapsed Variational Inference for Sum-Product Networks," in *ICML*, 2016. [Online]. Available: http://www.cs.cmu.edu/~hzhao1/papers/ICML2016/BL-SPN-main.pdf.

Journal Articles

[J1] M. Chen, **B. Amos**, L. T. Watson, J. Tyson, Y. Cao, C. Shaffer, M. Trosset, C. Oguz, G. Kakoti, "Quasi-newton stochastic optimization algorithm for parameter estimation of a stochastic model of the budding yeast cell cycle," *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 2017.

Workshop, Symposium, and Short Papers

[W1] K. Ha, Y. Abe, T. Eiszler, Z. Chen, W. Hu, **B. Amos**, R. Upadhyaya, P. Pillai, M. Satyanarayanan, "You can teach elephants to dance: Agile vm handoff for edge computing," in *Proceedings of the Second ACM/IEEE Symposium on Edge Computing*, ACM, 2017, p. 12.

[W2] Z. Chen, W. Hu, J. Wang, S. Zhao, **B. Amos**, G. Wu, K. Ha, K. Elgazzar, P. Pillai, R. Klatzky, D. Siewiorek, M. Satyanarayanan, "An empirical study of latency in an emerging class of edge computing applications for wearable cognitive assistance," in *Proceedings of the Second ACM/IEEE Symposium on Edge Computing*, ACM, 2017, p. 12.

[W3] W. Hu, Y. Gao, K. Ha, J. Wang, **B. Amos**, Z. Chen, P. Pillai, M. Satyanarayanan, "Quantifying the impact of edge computing on mobile applications," in *Proceedings of the 7th ACM SIGOPS Asia-Pacific Workshop on Systems*, ACM, 2016, p. 5.

[W4] N. A. J. Davies, N. Taft, M. Satyanarayanan, S. Clinch, **B. Amos**, "Privacy mediators: helping IoT cross the chasm," in *HotMobile*, 2016. [Online]. Available: http://eprints.lancs.ac.uk/78255/1/44691.pdf.

[W5] Z. Chen, L. Jiang, W. Hu, K. Ha, **B. Amos**, P. Pillai, A. Hauptmann, M. Satyanarayanan, "Early Implementation Experience with Wearable Cognitive Assistance Applications," in *WearSys*, 2015. [Online]. Available: http://www.cs.cmu.edu/~satya/docdir/chen-wearsys2015.pdf.

[W6] W. Hu, **B. Amos**, Z. Chen, K. Ha, W. Richter, P. Pillai, B. Gilbert, J. Harkes, M. Satyanarayanan, "The Case for Offload Shaping," in *HotMobile*, 2015. [Online]. Available: http://www.cs.cmu.edu/~satya/docdir/hu-hotmobile2015.pdf.

[W7] **B. Amos** and D. Tompkins, "Performance study of Spindle, a web analytics query engine implemented in Spark," in *IEEE CloudCom*, 2014. [Online]. Available: http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7037709.

[W8] T. Andrew, **B. Amos**, D. Easterling, C. Oguz, W. Baumann, J. Tyson, L. Watson, "Global Parameter Estimation for a Eukaryotic Cell Cycle Model in Systems Biology," in *Summer Simulation Multiconference, Society for Modeling and Simulation International*, 2014. [Online]. Available: http://dl.acm.org/citation.cfm?id=2685662.

[W9] **B. Amos**, D. Easterling, L. Watson, B. Castle, M. Trosset, W. Thacker, "Fortran 95 implementation of QNSTOP for global and stochastic optimization," in *Spring Simulation Multiconference, High Performance Computer Symposium, Society for Modeling and Simulation International*, 2014. [Online]. Available: http://dl.acm.org/citation.cfm?id=2663525.

[W10] **B. Amos**, H. Turner, J. White, "Applying machine learning classifiers to dynamic Android malware detection at scale," in *IWCMC Security, Trust and Privacy Symposium*, 2013. [Online]. Available: http://bamos.github.io/data/papers/amos-iwcmc2013.pdf.

Magazine Articles

[M1] M. Satyanarayanan, P. Simoens, Y. Xiao, P. Pillai, Z. Chen, K. Ha, W. Hu, **B. Amos**, "Edge analytics in the internet of things," *IEEE Pervasive Computing*, no. 2, pp. 24–31, 2015. [Online]. Available: https://www.cs.cmu.edu/~satya/docdir/satya-edge2015.pdf.

[M2] H. Turner, J. White, J. A. Camelio, C. Williams, **B. Amos**, R. Parker, "Bad Parts: Are Our Manufacturing Systems at Risk of Silent Cyberattacks?" *Security & Privacy, IEEE*, vol. 13, no. 3, pp. 40–47, 2015. [Online]. Available: http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7118094.