

CONTACT

MTA-SZTE Research Group on Artificial Intelligence
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EDUCATION

- 2017 **Ph.D degree**
University of Szeged, Hungary
Title of thesis: Gossip-Based Machine Learning in Fully Distributed Environments
- 2009 – 2012 **University of Szeged, Faculty of Science**
Department of Informatics
Ph.D candidate, Advisor: Márk Jelasity
Topic: Fully Distributed (P2P) Machine Learning
- 2003 – 2009 **University of Szeged, Faculty of Science**
Department of Informatics
Graduated in Computer Science (MSC)
Specializing in Artificial Intelligence

EMPLOYMENT

- 2008 – **Lecturer**
MTA-SZTE Research Group on Artificial Intelligence

PROJECTS

- 2017 – **Researcher**
MTA-SZTE Research Group on Artificial Intelligence
IoLT – Internet of Living Things
- 2013 – 2014 **Researcher**
MTA-SZTE Research Group on Artificial Intelligence
FuturICT.hu – Infocommunicational technologies and the society of the future
- 2009 – 2013 **Researcher**
MTA-SZTE Research Group on Artificial Intelligence
QLectives – Quality Collectives

COMPUTER SKILLS

Most experienced Java
Experienced C, C++, Matlab, Octave, Shell script, awk, python
Algorithms I have a joint work on a fully distributed machine learning framework
<https://github.com/isthegedus/Gossip-Learning-Framework>

LANGUAGE

Hungarian native
English intermediate oral and writing
German basic oral and writing

TEACHING

Assistant teacher for
2009, 2010, 2012 Programming I.
2009 – Artificial Intelligence I.
2008 Artificial Intelligence II.

PERSONAL

Date of birth: 18. 04. 1985
Place of birth: Békéscsaba, Hungary

PUBLICATIONS

- [1] István Hegedűs, Gábor Danner, and Márk Jelasity. Decentralized learning works: An empirical comparison of gossip learning and federated learning. *Journal of Parallel and Distributed Computing*, 148:109 – 124, 2021.
- [2] István Megyeri, István Hegedűs, and Márk Jelasity. Robust classification combined with robust out-of-distribution detection: An empirical analysis. In *2021 International Joint Conference on Neural Networks (IJCNN)*. IEEE, 2021.
- [3] Gábor Danner, István Hegedűs, and Márk Jelasity. Decentralized machine learning using compressed push-pull averaging. In *Proceedings of the 1st International Workshop on Distributed Infrastructure for Common Good, DICG'20*, pages 31–36, New York, NY, USA, 2020. Association for Computing Machinery.
- [4] István Hegedűs, Gábor Danner, and Márk Jelasity. Decentralized recommendation based on matrix factorization: A comparison of gossip and federated learning. In Peggy Cellier and Kurt Driessens, editors, *Machine Learning and Knowledge Discovery in Databases*, pages 317–332, Cham, 2020. Springer International Publishing.
- [5] István Megyeri, István Hegedűs, and Márk Jelasity. Adversarial robustness of model sets. In *2020 International Joint Conference on Neural Networks (IJCNN)*, pages 1–8. IEEE, 2020.
- [6] István Megyeri, István Hegedűs, and Márk Jelasity. Attacking model sets with adversarial examples. In *Proceedings of the 28th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN)*, 2020.
- [7] István Hegedűs, Gábor Danner, and Márk Jelasity. Gossip learning as a decentralized alternative to federated learning. In José Pereira and Laura Ricci, editors, *Distributed Applications and Interoperable Systems*, pages 74–90, Cham, 2019. Springer International Publishing.
- [8] István Megyeri, István Hegedűs, and Márk Jelasity. Adversarial robustness of linear models: Regularization and dimensionality. In *Proceedings of the 27th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN)*, 2019.
- [9] Gábor Danner, Árpád Berta, István Hegedűs, and Márk Jelasity. Robust fully distributed minibatch gradient descent with privacy preservation. *Security and Communication Networks*, 2018, 2018.
- [10] István Hegedűs, Árpád Berta, and Márk Jelasity. Robust decentralized differentially private stochastic gradient descent. *Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (JoWUA)*, 7(2):20–40, June 2016.
- [11] István Hegedűs, Árpád Berta, Levente Kocsis, András A. Benczúr, and Márk Jelasity. Robust decentralized low-rank matrix decomposition. *ACM Trans. Intell. Syst. Technol.*, 7(4):62:1–62:24, May 2016.
- [12] Árpád Berta, István Hegedűs, and Márk Jelasity. Dimension reduction methods for collaborative mobile gossip learning. In *2016 24th Euromicro International Conference on Parallel, Distributed, and Network-Based Processing (PDP)*, pages 393–397, Feb 2016.
- [13] István Hegedűs and Márk Jelasity. Distributed differentially private stochastic gradient descent: An empirical study. In *2016 24th Euromicro International Conference on Parallel, Distributed, and Network-Based Processing (PDP)*, pages 566–573, Feb 2016.
- [14] Árpád Berta, István Hegedűs, and Róbert Ormándi. Lightning fast asynchronous distributed k-means clustering. In *22th European Symposium on Artificial Neural Networks, ESANN 2014*, pages 99–104, 2014.
- [15] István Hegedűs, Márk Jelasity, Levente Kocsis, and András A. Benczúr. Fully distributed robust singular value decomposition. In *Proceedings of the 14th IEEE Fourteenth International Conference on Peer-to-Peer Computing (P2P)*, P2P'14. IEEE, 2014.
- [16] István Hegedűs, Róbert Ormándi, and Márk Jelasity. Massively distributed concept drift handling in large networks. *Advances in Complex Systems*, 16(4&5):1350021, 2013.
- [17] Róbert Ormándi, István Hegedűs, and Márk Jelasity. Gossip learning with linear models on fully distributed data. *Concurrency and Computation: Practice and Experience*, 25(4):556–571, 2013.
- [18] Balázs Szörényi, Róbert Busa-Fekete, István Hegedűs, Ormándi Róbert, Jelasity Márk, and Kégl Balázs. Gossip-based distributed stochastic bandit algorithms. In *Proceedings of The 30th International Conference on Machine Learning*, volume 28(3) of *ICML'13*, pages 19–27. JMLR Workshop and Conference Proceedings, 2013.
- [19] István Hegedűs, Lehel Nyers, and Róbert Ormándi. Detecting concept drift in fully distributed environments. In *2012 IEEE 10th Jubilee International Symposium on Intelligent Systems and Informatics, SISY'12*, pages 183–188. IEEE, 2012.

- [20] István Hegedűs, Busa-Fekete Róbert, Ormándi Róbert, Jelasity Márk, and Kégl Balázs. Peer-to-peer multi-class boosting. In Christos Kaklamanis, Theodore Papatheodorou, and Paul Spirakis, editors, *Euro-Par 2012 Parallel Processing*, volume 7484 of *Lecture Notes in Computer Science*, pages 389–400. Springer Berlin / Heidelberg, 2012.
- [21] István Hegedűs, Ormándi Róbert, and Jelasity Márk. Gossip-based learning under drifting concepts in fully distributed networks. In *2012 IEEE Sixth International Conference on Self-Adaptive and Self-Organizing Systems, SASO'12*, pages 79–88. IEEE, 2012.
- [22] Róbert Ormándi, István Hegedűs, and Márk Jelasity. Asynchronous peer-to-peer data mining with stochastic gradient descent. In *Proceedings of the 17th international conference on Parallel processing - Volume Part I, Euro-Par'11*, pages 528–540, Berlin, Heidelberg, 2011. Springer-Verlag.
- [23] Richárd Farkas, Gábor Berend, István Hegedűs, András Kárpáti, and Balázs Krich. Automatic free-text-tagging of online news archives. In *Proceeding of the 2010 conference on ECAI 2010: 19th European Conference on Artificial Intelligence*, pages 529–534, Amsterdam, The Netherlands, The Netherlands, 2010. IOS Press.
- [24] István Hegedűs, Róbert Ormándi, Richárd Farkas, and Márk Jelasity. Novel balanced feature representation for wikipedia vandalism detection task - lab report for pan at clef 2010. In Martin Braschler, Donna Harman, and Emanuele Pianta, editors, *CLEF (Notebook Papers/LABs/Workshops)*, 2010.
- [25] Róbert Ormándi, István Hegedűs, Kornél Csernai, and Márk Jelasity. Towards inferring ratings from user behavior in bittorrent communities. In *Proceedings of the 2010 19th IEEE International Workshops on Enabling Technologies: Infrastructures for Collaborative Enterprises, WETICE '10*, pages 217–222, Washington, DC, USA, 2010. IEEE Computer Society.
- [26] Róbert Ormándi, István Hegedűs, and Richárd Farkas. Opinion mining by transformation-based domain adaptation. In *Proceedings of the 13th international conference on Text, speech and dialogue, TSD'10*, pages 157–164, Berlin, Heidelberg, 2010. Springer-Verlag.
- [27] Róbert Ormándi, István Hegedűs, and Márk Jelasity. Overlay management for fully distributed user-based collaborative filtering. In *Proceedings of the 16th international Euro-Par conference on Parallel processing: Part I, EuroPar'10*, pages 446–457, Berlin, Heidelberg, 2010. Springer-Verlag.
- [28] Richárd Farkas, György Szarvas, István Hegedűs, Attila Almási, Veronika Vincze, Róbert Ormándi, and Róbert Busa-Fekete. Semi-automated construction of decision rules to predict morbidities from clinical texts. *Journal of the American Medical Informatics Association*, 16(4):601–605, 2009.