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Boglárka Ecsedi

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RESEARCH INTERESTS

My interests include *representation learning, model merging, decentralized training, LLM reasoning* and *safety*. I am committed to advancing deep learning techniques for challenging or resource-constrained domains and tasks through *specialized architectures* and *new learning paradigms*. My goal is to develop and democratize AI models and training methods that enhance the efficacy and efficiency of data representation and processing in highly complex or challenging datasets and data modalities.

EDUCATION

University of Toronto – Toronto, ON, Canada — September 2025 – Present
Doctor of Philosophy (PhD) in Computer Science, Direct Entry — Departmental Fellowship Recipient
Advisor: Colin Raffel
Teaching Assistant: CSC413H1/CSC2516H: Neural Networks and Deep Learning (Fall 2025)

Georgia Institute of Technology – Atlanta, GA, USA — August 2021 – May 2025
Bachelor of Science in Computer Science — 'Stipendium Peregrinum' Full-ride Scholarship Recipient
Teaching Assistant: CS 6476 Graduate Computer Vision (Fall 2024)

ACADEMIC RESEARCH EXPERIENCE

R3 Group, Department of Computer Science, University of Toronto | Vector Institute — Toronto, ON, Canada
Ph.D. Candidate — September 2025 – Present

Collaboratively working on model merging for instruction fine-tuning for large language models, positioning model merging as a more robust alternative to multi-task fine-tuning to achieve better generalization capabilities on held-out out-of-domain tasks.

AUTON Lab, Machine Learning Department, Carnegie Mellon University — Pittsburgh, PA, USA
Predoctoral Researcher — June – August 2025

Under the supervision of Prof. Barnabás Póczos, developed a masked diffusion model to generate sequences of brushstroke instructions for image synthesis, adapting language diffusion techniques to discretized stroke parameters.

Hoffman Group, School of Interactive Computing, College of Computing, Georgia Tech — Atlanta, GA, USA
Research Assistant — January 2023 – May 2025

Developed representation learning and model merging techniques for LoRA fine-tuned transformer models. Completed senior thesis on the scaling behavior of model merging methods. Previously worked on Sim2Real domain adaptation and generalization.

Center for Medical Physics and Biomedical Engineering, Medical University of Vienna — Vienna, Austria
Research Fellow — July 2020 – August 2025

Worked on developing a novel neural network (DEBI-NN) for small data applications in medicine. Leading a project on investigating the regularization properties of DEBI-NNs. Previously worked on cancer diagnostics using radiomics and machine learning methods for the quantitative analysis of hybrid imaging (PET/CT, PET/MRI) data.

BioCiphers & Pardi Vaccine Group, Perelman School of Medicine, University of Pennsylvania — Philadelphia, PA, USA
Summer Research Intern — June – August 2024

Lead a collaborative project on developing deep learning models to increase mRNA stability for optimized mRNA vaccine design and improved mRNA therapeutics. Fine-tuned and optimized (m)RNA-pretrained LLMs with LoRA adapters for stability prediction.

Contextual Computing Group, Georgia Tech — Atlanta, GA, USA
Research Assistant — August 2021 – May 2022

Collaboratively worked on 'PopSign' (popsign.org), a mobile application to aid hearing impaired children in learning the American Sign Language (ASL). Contributed to data collection and the advancement of the Hidden Markov model to translate ASL signs.

Science Internship Program at the University of California Santa Cruz, AVIS Group — Santa Cruz, CA, USA
Research Intern — 2019 – 2020

Identified hazardous rip currents in real time using a Faster-RCNN-based model using oriented bounding box-based object detection. Collected and annotated 600+ images for our rip current detection dataset.

INDUSTRY EXPERIENCE

TandemAI — Boston, MA, USA
Machine Learning Intern — June – August 2023

Developed and evaluated machine learning models for molecular property prediction tasks for small molecules focusing on permeability and solubility. Implemented a new feature extractor based on a physics-based permeability model 'PerMM'.

HyperScaler SW Team, Intel Corporation — Hillsboro, OR, USA
Machine Learning Intern — May – August 2022

Developed a dynamic data eviction policy in the open-source 'CacheLib' caching engine framework to advance multi-tiered memory systems. Improved baseline eviction strategy's allocate latency by an average of 33.35% and find latency by 7.06%.

Dedicaid GmbH. — Vienna, Austria
Software Engineer Consultant — May – July 2021

Developed and validated Dedicaid's fuzzy radiomics engine for clinical use in tumor characterization. Implemented 187 features following the definitions of the Imaging Biomarker Standardization Guidelines (IBSI).

PUBLICATIONS & CONFERENCES

Genetic Algorithm vs. Gradient Descent for Training a Neural Network Architecture Dedicated to Low Data Regimes in Small Medical Datasets — Journal Article (in review)
A. Boukhari, **B. Ecsedi**, L. Papp, M. Hatt — 2026

Impact of Regularization in Optimizing Distance-Encoding Biomorphic-Informational Neural Networks for Small Nuclear Medicine Datasets — Journal Article
EANM Innovation, 100008 — 2025
B. Ecsedi, A. Boukhari, C.P. Spielvogel, D. Haberl, Zs. Ritter, R.A. Bundschuh, C. Lapa, M. Hacker, M. Hatt, L. Papp

Scaling Laws in Model Merging: Investigating the Scaling Behavior of Merging LoRA Models — BSc Thesis
Georgia Institute of Technology — 2025
B. Ecsedi

Model merging with SVD to Tie the KnOTS — Poster Presentation
The Thirteenth International Conference on Learning Representations (ICLR 2025) — April 24–28, 2025
G. Stoica, P. Ramesh, **B. Ecsedi**, L. Choshen, J. Hoffman

Clinician-driven automated data preprocessing in nuclear medicine AI environments — Journal Article
European Journal of Nuclear Medicine and Molecular Imaging — 2025
D. Krajnc, C. Spielvogel, **B. Ecsedi**, Zs. Ritter, H. Alizadeh, M. Hacker, L. Papp

In the search of optimal hyperparameter and network configurations of the novel DEBI-NN neural network for increased generalizability in small medical datasets — Oral Presentation
37th Annual Congress of the European Association of Nuclear Medicine (EANM) — October 19–23, 2024
B. Ecsedi, A. Boukhari, D. Haberl, C. Spielvogel, Zs. Ritter, H. Alizadeh, M. Hatt, L. Papp — Hamburg, Germany

DEBI-NN Architecture Evaluation: Implications of Dataset Imbalance and Spatial Dropout on Performance — Oral Presentation
37th Annual Congress of the European Association of Nuclear Medicine (EANM) — October 19–23, 2024
A. Boukhari, **B. Ecsedi**, D. Haberl, C. Spielvogel, M. Hatt, L. Papp — Hamburg, Germany

Imaging Tumor Metabolism and Its Heterogeneity: Special Focus on Radiomics and AI — Book Chapter
Interdisciplinary Cancer Research 1-26, Springer — October 18, 2024
L. Papp, D. Haberl, **B. Ecsedi**, M. Hatt, E. Lopci

Incremental Role of Radiomics and Artificial Intelligence — Book Chapter
Advanced Imaging and Therapy in Neuro-Oncology 161-172, Springer Nature Switzerland — August 02, 2024
L. Papp, C. Spielvogel, D. Haberl, **B. Ecsedi**

AUGCAL: Improving Sim2Real Adaptation by Uncertainty Calibration on Augmented Synthetic Images — Poster Presentation
The Twelfth International Conference on Learning Representations (ICLR 2024) — May 7–11, 2024
P. Chattopadhyay, B. Goyal, **B. Ecsedi**, V. Prabhu, J. Hoffman

DEBI-NN: Distance-Encoding Biomorphic-Informational Neural Networks in PET Radiomics — Oral Presentation
36th Annual Congress of the European Association of Nuclear Medicine (EANM) — September 9–13, 2023
B. Ecsedi, D. Haberl, C. P. Spielvogel, T. Traub-Weidinger, M. Hacker, L. Papp — Vienna, Austria

DEBI-NN: Distance-Encoding Biomorphic-Informational Neural Networks in Medical Applications Poster Presentation
AI+Science Summer School, University of Chicago Data Science Institute & IMSI July 17–21, 2023

DEBI-NN: Distance-encoding biomorphic-informational neural networks for minimizing the number of trainable parameters
Neural Networks 167, 517-532. Journal Article, 2023
L. Papp, D. Haberl, **B. Ecsedi**, C. Spielvogel, D. Krajnc, M. Grahovac, S. Moradi, W. Drexler

Machine learning predictive performance evaluation of conventional and fuzzy radiomics in clinical cancer imaging cohorts
European Journal of Nuclear Medicine and Molecular Imaging Journal Article, 2023
M. Grahovac, C. P. Spielvogel, D. Krajnc, **B. Ecsedi**, T. Traub-Weidinger, S. Rasul, K. Kluge, M. Zhao, X. Li, M. Hacker, A. Haug, L. Papp

Sex-specific radiomic features of L-[S-methyl-11C] methionine PET in patients with newly-diagnosed gliomas in relation to IDH1 predictability Journal Article
Frontiers in Oncology 13, 986788 2023
L. Papp, S. Rasul, C. P. Spielvogel, D. Krajnc, N. Poetsch, A. Woehrer, E-M. Patronas, **B. Ecsedi**, J. Furtner, M. Mitterhauser, I. Rausch, G. Widhalm, T. Beyer, M. Hacker, T. Traub-Weidinger

Automated data preparation for in vivo tumor characterization with machine learning Journal Article
Frontiers in Oncology 12, 1017911 2022
D. Krajnc, C. P. Spielvogel, M. Grahovac, **B. Ecsedi**, S. Rasul, N. Poetsch, T. Traub-Weidinger, A. R. Haug, Z. Ritter, H. Alizadeh, M. Hacker, T. Beyer, L. Papp

Multi-lesion radiomics of PET/CT for non-invasive survival stratification and histologic tumor risk profiling in patients with lung adenocarcinoma Journal Article
European Radiology 32, 7056–7067 2022
M. Zhao, K. Kluge, L. Papp, M. Grahovac, S. Yang, C. Jiang, D. Krajnc, C. Spielvogel, **B. Ecsedi**, A. Haug, S. Wang, M. Hacker, W. Zhang, X. Li

Supervised machine learning enables non-invasive lesion characterization in primary prostate cancer with [^{68}Ga]Ga-PSMA-11 PET/MRI Journal Article
European Journal of Nuclear Medicine and Molecular Imaging 48, 1795–1805 2021
L. Papp, C. P. Spielvogel, B. Grubmüller, M. Grahovac, D. Krajnc, **B. Ecsedi**, R. A.M. Sareshgi, D. Mohamad, M. Hamboeck, I. Rausch, M. Mitterhauser, W. Wadsak, A. R. Haug, L. Kenner, P. Mazal, M. Susani, S. Hartenbach, P. Baltzer, T. H. Helbich, G. Kramer, S.F. Shariat, T. Beyer, M. Hartenbach, M. Hacker

Breast Tumor Characterization Using [^{18}F]FDG-PET/CT Imaging Combined with Data Preprocessing and Radiomics Journal Article
Cancers 13*,* 1249 2021
D. Krajnc, L. Papp, T. S. Nakuz, H. F. Magometschnigg, M. Grahovac, C. P. Spielvogel, **B. Ecsedi**, Z. Bago-Horvath, A. Haug, G. Karanikas, T. Beyer, M. Hacker, T. H. Helbich, K. Pinker

AWARDS, SCHOLARSHIPS, AND ACCOMPLISHMENTS

President's Undergraduate Research Award (PURA) at Georgia Tech ($1500)**,** Awardee 2024
Dean's List at Georgia Tech 2021 – 2025
'Stipendium Peregrinum' Hungarian Presidential Scholarship ($50,000/year)**,** Awardee 2021 – 2025
Richard Tapia Conference Scholarship of the College of Computing at Georgia Tech, Scholarship Recipient 2022
Grace Hopper Conference Scholarship of the College of Computing at Georgia Tech, Scholarship Recipient 2021
EU Contest for Young Scientists (EUCYS), Special Award of the European Commission's Joint Research Centre 2021
Regeneron International Science and Engineering Fair (ISEF) ($400) 3rd place President's Scholarship Award by IEEE 2021
29th and 30th Hungarian Scientific and Innovation Talent Contest for Youth (2 x $1000)**,** 1st prize 2020, 2021
35th Hungarian National Scientific Students' Associations Conference (OTDK), Honorable mentions 2021
20th Hungarian National Conference of Researching Students (TUDOK), Grand Prize 2020
Award for Talented Hungarian Youth ("Felfedezettjeink") by MATEHETSZ ($400)**,** Grand Award 2021
10th Hungarian National Bolyai Youth Award ($1500)**,** 1st Prize 2021
Award for the Nation's Young Talents Hungary ($1200-1500/year)**,** Scholarship Recipient 2018, 2019, 2020
Hungarian Templeton Program, Jr Templeton Fellow 2016 – 2017

SELECTED TALKS AND CAMPAIGN PARTICIPATIONS

John von Neumann Series: The New Frontier, Scientific Committee Member — March 28, 2026
Columbia University Pupin Hall, New York, NY

John von Neumann Series: Visionary Scientists, Co-Host — October 11, 2024
Liberty Science Center, Jersey City, NJ

John von Neumann Series: Frontiers of Sciences, "Student Perspectives" panel discussion — March 14, 2024
Temple University Charles Library, Philadelphia, PA

John von Neumann Series: Neumann 120, "Student Perspectives" panel discussion
NYU Langone Health Science Building, New York, NY — November 9, 2023

Cutting Edge Fields Campaign Video of EducationUSA, short interview — October 2023
https://www.youtube.com/watch?v=TNCCz4InssE

#SHEU LEADS Campaign of the European Commission, short interview — June 2022
https://youth.europa.eu/stories/boglarka-ecsedi_en

Side event of the 66th session of the Commission on the Status of Women (CSW) at the Permanent Mission of Hungary to the United Nations, presentation — March 15, 2022
Consulate General of Hungary in New York, New York, NY

"Women on a Difficult Path – Hungarian Women in Business and Science", panel discussion — December 7, 2021
Consulate General of Hungary in New York, New York, NY

FameLab International Hungarian National Finals, lecture titled "*Do you trust machines or the experience of thousands of doctors?*"
Hungarian Academy of Sciences, Budapest, Hungary — September 16, 2020

TEDx Debrecen, talk titled "*Alkotó változás" ("Creating change")* — October 14, 2017
Debrecen, Hungary

PROFESSIONAL ORGANIZATIONS

Women in AI Research Canada (WiAIR), Member — 2025 – Present

Hungarian Young Professional Engagement (HYPE) Network, Hungarian American Coalition, Co-founder — 2024 – 2025

Coda AI Synapse Workshop, Machine Learning Center at Georgia Tech, Member — 2023 – 2025

Hungarian Machine Learning Journal Club (led by Ferenc Huszár), Member — 2021 – Present

Society of Women Engineers at Georgia Tech, Member — 2021 – 2023

Dennis Gabor Award (NOVOFER Foundation), Youth Ambassador — 2022 – 2023

Association of Hungarian Women in Science (NaTE), Ambassador — 2019 – 2021

New York Academy of Sciences, Young Member — 2018 – 2021