Mohammad-Javad Darvishi-Bayazi

Montreal, Quebec, Canada
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Education

University of Montreal (Université de Montréal - FaubertLab - Mila) **2019 – Present**
Doctor of Philosophy in Biomedical Engineering *Montreal, Canada*

- Thesis title: Robust Machine Learning Models in Human State Assessment
- Supervisors: Jocelyn Faubert (UdeM, FaubertLab), Irina Rish (UdeM, Mila)

Research Interest

- Artificial Intelligence (AI)
- Machine Learning (ML)
- Deep Learning (DL)
- Representation Learning
- Self-Supervised Learning (SSL)
- Out of Distribution Generalization
- Transfer Learning
- Cognitive Neuroscience
- AI for Health
- Brain-Computer Interface (BCI)
- Information retrieval
- Human in Loop

Publications

- **Darvishi Bayazi, M. J.**, ..., Faubert, J., & Rish, I. (2023). **Amplifying Pathological Detection in EEG Signaling Pathways through Cross-Dataset Transfer Learning**. CIBM, [Link, IF:7.7, Acceptance Rate:13%]
- Rasul, K., Ashok, A., ..., **Darvishi Bayazi, M. J.**, ..., & Rish, I. (2024). **Lag-Llama: Towards Foundation Models for Probabilistic Time Series Forecasting**. [Link]
- **Darvishi Bayazi, M. J.**, Ghaemi, M. S., Faubert, J., & Rish, I. (2024). **EEG Signals Unveil Distinct Sex-Specific Patterns in Human Cohorts with Limited Implications for Pathological Diagnosis**. [Link - Under review at PNAS]
- **Darvishi Bayazi, M. J.**, Law, A., Romero, S. M., Jennings, S., Rish, I., & Faubert, J. (2023) **Beyond performance: The role of task demand, effort, and individual differences in ab initio pilots.** Scientific Reports.[Link, IF:4.9]
- Gagnon-Audet, J. C., Ahuja, K., **Darvishi-Bayazi, M. J.**, Dumas, G., & Rish, I. (2023) **WOODS: Benchmarks for Out-of-Distribution Generalization in Time Series Tasks**. TMLR, ICLR 2024. [Link, Featured]
- **Darvishi Bayazi, M. J.**, Motie Nasrabadi, A., & Dubé, C. (2021). **Frequency-specific network effective connectivity: ERP analysis of recognition memory process by directed connectivity esti.** MBEC, [Link]
- Albuquerque I, Monteiro J, **Darvishi M**, Falk TH, & Mitliagkas I. (2019) **Generalizing to unseen domains via distribution matching**. arXiv preprint arXiv:1911.00804. [Link]
- Aghamohammadi-Sereshki, A., **Bayazi, M. J. D.**, Ghomsheh, F. T., & Amirabdollahian, F. (2019). **Investigation of fatigue using different EMG features.** In 2019 IEEE 16th ICORR. IEEE.(Link]
- Ghaffari, H., Yoonessi, A., **Darvishi, M. J.**, & Ahmadi, A. (2018). **Normal electrical activity of the brain in obsessive-compulsive patients after anodal stimulation of the left dorsolateral prefrontal cortex.** Basic and clinical neuroscience, 9(2), 135. [Link]

Honors & Awards

Artificial Intelligence Applications in Healthcare	**2021**
Microsoft Diversity Award	**2020**
Bourse d'exemption des droits de scolarité supplémentaires	**2019 – 2020**
Bourse de recrutement 2019 FESP — Institut de génie biomédical	**2019**
Master's Thesis Research Grants from Cognitive Science and Technologies Council	**2018**
Distinguished Student, Ranked 1^{th} among all graduated students of Biomedical Engineering department	**2018**
Ministry of Science and Technology scholarship (7 years, BSc, MSc)	**2010 – 2017**

Work Experience

Hummingbird - AI startup **July, 2022 – Present**
CEO *Montréal, Canada*

Université de Montréal **Jan. 2019 – Present**
Graduate Research Assistant at Mila - Quebec AI Institute and FaubertLab *Montreal, Canada*

National Brain Mapping Laboratory (NBML) **2017 – 2018**
Signal Processing Engineer

Relevant Coursework

- Deep Learning
- Generative AI with LLMs
- Statistical Pattern Recognition
- Artificial Neural Network
- Digital Signal Processing
- Digital Image Processing
- Biomedical Signal Processing
- Nonlinear Dynamics and Chaos
- Biomedical Systems Modeling
- Microprocessors

Teaching Activity

UdeM/Mila **Jan. 2022 – May 2022**
Teaching Assistant at IFT 6135 - Representation Learning - SSL, NLP, CV *Montreal, Canada*

Ivado/Mila **Mar. 2021 – Apr. 2021**
Teaching Assistant at Deep Learning Spring School *Montreal, Canada*

Projects

Foundation (large-scale) models for time series (TS), *NLP, TS* **Sep 2022 – Present**

- Scaling behaviour of TS transformers
- Transfer Learning from LLMs to TS
- Developing SSL methods for TS fundamental models
- Open sourcing Time-series FoMo

Robust algorithms for spurious correlation in ML NLP, *Computer Vision* **Jan 2023 – Present**

- Performance of Large Language and Multimodal Models (LLM, LMM) (Text-Image)
- Developing methods for extracting robust features
- Concept visualization and human alignment

Artificial vs Neurological Neural Networks - Models Vs Human **Oct. 2023 – Present**

- Alignment and interoperability
- Analyzing Behaviour of Vision-Language Models (VLMs) and human observation
- Improving AI models

Technical Skills

Languages: Python, C, Matlab, R, Bash
Developer Tools: Git, PyTest, Docker, Google Cloud Platform, AWS, VSCode, PyCharm
Python Libraries: PyTorch, TensorFlow, MNE-python, pandas, NumPy, Matplotlib — Psychtoolbox, Simulink, GUIs, Signal/Image Processing
Matlab Libraries: EEGLAB, FieldTrip, SPM, Psychtoolbox, Simulink, GUIs,
Frameworks: Wandb, Tensorboard, Hugging Face, Hydra, Slurm, Cluster, HPC, WordPress
Field: Computer Vision, Generative AI, Large Language Models, Foundation Models, Time Series

Leadership / Extracurricular

SIGHT Montreal **Jan. 2023 – Present**
President *IEEE*

- Organizing an event for supporting Turkey earthquake, Link to the website

SIGHT Montreal **Jan. 2021 – Dec. 2022**
Vice-president *IEEE*

- Organized the AI against COVID-19: Screening X-ray Images
- Raised 20K$^+$ CAD from Microsoft Canada, Details and outcomes

SIGHT Montreal **Sep. 2019 – Dec. 2020**
Webmaster *IEEE*

- Designed and launched the website of the group, Link to the website

1st and 2nd IBCIC **Jan. 2017 – 2018**
Vice-Chair of the Executive Committee *NBML*

- Designed a BCI competition and recorded the EEG signals, TV Report

Languages

English, Proficient | French, Beginner