Dr. Amir Dehsarvi

Ludwig-Maximilians-University Munich Medical Center
amir.dehsarvi@med.uni-muenchen.de
Mobile no.: +49 151 459 88208
amirdehsarvi.github.io

I am a machine learning/deep learning scientist, with ample experience working within various research positions at The Ludwig-Maximilians-University Munich Medical Center, The University of York, The University of Aberdeen, and at The Trinity College Dublin, in addition to working in diverse biomedical companies (Chief Technology Officer at *ClearSky Medical Diagnostics Ltd.*, a machine learning and image processing engineer at *smartR.ai*, and as a Professional Engineer at *My Therapy Tools Ltd.* – EU Horizon 2020). My research focuses on the application of machine learning/deep learning for the analysis of biomedical (brain imaging, movement, speech, etc.) data for disease diagnosis/target identification and validation (Parkinson's disease, Alzheimer's disease, autism, depression, etc.), using different types of large, complex, biomedical datasets (e.g., brain imaging, movement, and speech), in which I lead the development of novel end-to-end analyses. In my current position at the LMU Hospital, I am working with Dr. Franzmeier on developing cutting-edge pre-processing and processing pipelines for the analysis of multimodal brain imaging (MRI, fMRI, PET, DTI, etc.).

Additionally, I have been working with Prof. Smith, Dr. Moriarty, Dr. Paton, and Dr. Dutta on a project focusing on objective assessment of depression from rsfMRI brain scans from a UK-Biobank cohort utilising white-box machine learning. Further, I have been working with Dr. Waiter and Prof. Basu on the analysis of cognitive and multimodal brain imaging data to investigate the underlying mechanisms of rheumatoid arthritis related fatigue in the brain. Moreover, I have also been involved with Dr. de Looze and Prof. Reilly in the analysis of a combination of speech and brain imaging features for the classification of Alzheimer's disease patients from patients with mild cognitive impairment, and from healthy participants, aiming to identify speech markers and their underlying neural correlates (brain structure and functional connectivity). Furthermore, under the supervision of Prof. Smith, my doctoral thesis examined the classification of resting state fMRI data (timeseries analysis and DCM analysis) and movement data, applying different classification techniques (Cartesian Genetic Programming, Artificial Neural Networks, Support Vector Machines, etc.) on extracted features, including validation and k-fold cross-validation methods as well as data balancing techniques. This research focused on the diagnosis and monitoring of diseases (Parkinson's disease, autism, etc.), including the classification of Parkinson's disease patients from healthy controls with an accuracy of 92%. I have also classified open resting state fMRI data for participants following treatment with Modafinil versus a placebo.

Research Interests
Machine Learning, Deep Learning, Classification, Cartesian Genetic Programming, Evolutionary Algorithms, Neuroimaging data analysis, Mediation Analysis, and Neurodegenerative Diseases Diagnosis (Biomarkers) and Monitoring.

Technical Skills
Machine Learning, Deep Learning, Git, Neuroimaging data analysis software packages, MATLAB, C, R, Python, Shell, AI-based medical devices, Simatic Manager, Easyveep, Keil uVision, ORCAD, Proteus, Model Sim, Questa Sim, Xilinx Software package, ESystem, and Praat.

Current Positions
- 01.03.2022 to date: **Postdoctoral Researcher**, The Institute for Stroke and Dementia Research (ISD), Ludwig-Maximilians-Universität München (LMU), University of Munich (Germany).
- 10.08.2021 to date (31.07.2024): **Honorary Research Fellow**, Aberdeen Biomedical Imaging Centre, University of Aberdeen (UK).
- 2021 to date: SINAPSE-IA Deputy Lead.

- 2020 to date: **EMS Technical and Data Coordinator** for four different longitudinal clinical studies (Exenatide-PD3, AZA-PD, and two based in Ruijin, China) examining potential disease modifying treatments for Parkinson's disease.
- 01.07.2018 to date: **Chief Technology Officer**, ClearSky Medical Diagnostics Ltd., a spinout company from the University of York (UK), which specialises in medical devices for the diagnosis and monitoring of Parkinson's disease, Alzheimer's disease, and a range of other neurodegenerative conditions.

Work History

- 01.10.2021 to 31.01.2022: **Postdoctoral Research Associate**, University of York (UK), supervised by Professor Stephen L. Smith, and collaborating with Dr. Andrew Moriarty. Using a proven machine learning approach developed previously, in this project, we used resting brain scans from a large existing dataset (the UK Biobank) to generate new algorithms that can identify participants with depression from healthy volunteers.
- 13.01.2020 to 31.07.2021: **Research Fellow**, Aberdeen Biomedical Imaging Centre, University of Aberdeen (UK), supervised by Dr. Gordon Waiter, and collaborating with Dr. Neil Basu. This is a multicentre and multidisciplinary large project titled The Lessening the Impact of Fatigue Trial (LIFT), which unravels the mechanisms of chronic fatigue. My work focuses on the analysis and understanding of a multimodal MRI/fMRI brain study, using machine learning techniques, in order to identify potential central neurobiological correlates of rheumatoid arthritis related fatigue and to then characterise the most plausible mediators of fatigue which may be feasibly targeted in the future.
- 01.06.2021-16.07.2021: **Machine Learning and Image Processing Engineer**, smartR.ai, located in the Silicon Valley, smartR.ai is experienced in delivering solutions in the embedded marketspace. The company has worked on Machine Vision, Robotics, Fintech, Medical, and Consumer products for customers worldwide.
- 2017-2020: **EMS Technical and Data Coordinator** for PD-STAT research study, Simvastatin as a Neuroprotective Treatment for Parkinson's disease, a trial of 235 participants from 23 participating NHS hospitals across the UK.
- 01.02.2019-01.08.2019: **Post-Doctoral Researcher in Neuroimaging**, The Neural Engineering Group at the University of Dublin (Ireland), supervised by Dr. Céline de Looze and Professor Richard Reilly. I investigated the impact cognitive impairment may have on a person's ability to communicate and how, in turn, such cognitive and speech difficulties may affect the quality of their day-to-day interactions.
- 2014-2018: **Technical Officer**, ClearSky Medical Diagnostics Ltd., a spinout company which specialises in medical devices for the diagnosis and monitoring of Parkinson's disease, Alzheimer's disease and a range of other neurodegenerative conditions.
- 2016-2017: **Professional Engineer, My Therapy Tools Ltd.**, a start-up company involved in the Horizon 2020 EU programme with the project "Acquired brain injury telerehabilitation system with high impact in patient's wellbeing at limited cost" under SME instrument phase 1 funding scheme.
- 2010-2012: **Control Engineer**, working in 'Padideh Control Engineering' Office. Programming and installing PLC devices.

Teaching and Supervision

- 2022: **Amgen Scholar Supervisor**
- 2021: **Programme Leader** for SINAPSE/MathWorks MATLAB Training course.
- 2014-2017: **Lab leader and postgraduate teaching assistant**: teaching, demonstrating, and marking for undergraduate and postgraduate students, Department of Electronic Engineering. BSc and MSc modules include Electronics for Medicine, Maths and C Programming, Digital & Analogue Electronics Labs, Computer Architecture Workshops, Electronics for Music Technology, among others.

Education

- 2014-2018: PhD Electronic Engineering, University of York (UK). Supervision: [Professor Stephen L. Smith](#). *CGP Classification of Resting-State fMRI: Towards a Brain Imaging Biomarker for Parkinson's Disease.*
- 2017: Translate: Me – Innovation Bootcamp, Translate: Medical Technologies (UK).
- 2015: Higher Education Academy Associate Fellow Status, following completion of York Learning and Teaching Award, University of York (UK): 1/3 of a PG Certificate in Higher Education.
- 2013: MSc Digital Signal Processing, University of York (UK).
- 2010: BSc Applied Science Electronics, University of Science and Arts of Yazd (Iran).

Publications

De Looze C, Dehsarvi A, Crosby L, et al. Structural Correlates of Overt Sentence Reading in Mild Cognitive Impairment and Mild-to-Moderate Alzheimer's Disease. *Current Alzheimer Research*. 2022;19. doi: 10.2174/1567205019666220805110248

Dehsarvi A, South Palomares J. K. & Smith, S. L. Towards Automated Monitoring of Parkinson's Disease Following Drug Treatment. 2022; In: *El Yacoubi, M., Granger, E., Yuen, P.C., Pal, U., Vincent, N. (eds) Pattern Recognition and Artificial Intelligence. ICPRAI 2022. Lecture Notes in Computer Science, vol 13364. Springer, Cham*. doi: 10.1007/978-3-031-09282-4_17

De Looze C, Dehsarvi A, Crosby L, et al. Cognitive and Structural Correlates of Conversational Speech Timing in Mild Cognitive Impairment and Mild-to-Moderate Alzheimer's Disease: Relevance for Early Detection Approaches. 2021; *Front Aging Neurosci*. 2021; 13 (April): 1-17. doi:10.3389/fnagi.2021.637404

Dehsarvi A, Smith SL. Classification of resting-state fMRI for olfactory dysfunction in Parkinson's disease using evolutionary algorithms. In: *Proceedings of the Genetic and Evolutionary Computation Conference Companion on - GECCO '18*. ACM Press; 2018:264-265. doi:10.1145/3205651.3205681

Dehsarvi, A., & Smith, S. L. (under review, *NeuroImage: Clinical*). Classification of Resting-State fMRI using Evolutionary Algorithms: Towards a Brain Imaging Biomarker for Parkinson's Disease ([preprint](#)).

Conference Presentations

Dehsarvi A, South Palomares J. K. & Smith, S. L. (2022). Towards Automated Monitoring of Parkinson's Disease Following Drug Treatment, International Conference on Pattern Recognition and Artificial Intelligence (ICPRAI), Paris (France).

Dehsarvi, A., & Smith, S. (2018). Evolutionary Algorithms Meet fMRI: Classification of Resting-State fMRI for Olfactory Dysfunction in Parkinson's Disease using Evolutionary Algorithms, The Genetic and Evolutionary Computation Conference (GECCO), Kyoto (Japan).

Dehsarvi, A., & Smith, S. (2016). Evolutionary Algorithms Meet fMRI: Diagnosis of Parkinson's disease, Parkinson's UK Research Conference, Leeds (UK).

Awards and Grants

- 2022: DEMON Network Pilot Grant (UK): £10,000.
- 2020: Roland Sutton Academic Trust Grant (UK): £23,744.
- 2017: Translate: Me - Innovation Bootcamp First Place Award: £1,000.
- 2016: Departmental Teaching Awards, University of York (UK).
- 2015-2016: Departmental Bursaries and ClearSky Bursaries: £3,500.
- 2015: Postgraduate Studentship Award, University of York (UK): £3,000.

Membership and Service Roles

- 2023: Conference committee member of EvoApplications*, 26th European Conference on the Applications of Evolutionary and bio-inspired Computation, part of evo*2023, in Brno (Czech Republic).
- 2022: Conference committee member of ICONIP 2022, 29th International Conference on Neural Information Processing, in New Delhi (India).
- 2022: Conference committee member of EvoApplications*, 25th European Conference on the Applications of Evolutionary and bio-inspired Computation, part of evo*2022, in Madrid (Spain).
- 2021: Reviewer for the journal of Frontiers in Human Neuroscience.
- 2021: Reviewer for the journal of Genetic Programming and Evolvable Machines.
- 2021: Conference committee member of EvoApplications*, 24th European Conference on the Applications of Evolutionary and bio-inspired Computation, part of evo*2021, held virtually.
- 2020: Conference committee member of EvoApplications*, 23rd European Conference on the Applications of Evolutionary and bio-inspired Computation, part of evo*2020, held virtually.
- 2020: Conference committee member of SocProS 2020, The 10th International Conference on Soft Computing for Problem Solving, held in Indore (India).
- 2017-2019: Association for Computing Machinery member.
- 2014-2018: IEEE student member.
- 2016: Conference committee member of ICSAE 2016, The International Conference for Students on Applied Engineering, held in Newcastle upon Tyne (UK).
- 2016: Conference Chair of PsyPAG Conference 2016, The 31st Annual Psychology Postgraduate Affairs Group Conference, held in York (UK).
- 2016: Conference committee member of York Doctoral Symposium, University of York (UK).
- 2014-2016: Postgraduate Representative at The Department of Electronic Engineering, University of York (UK).

Outreach Activities and Presentations

- 2022: Neurohack 2022, DEMON Network (Virtual).
- 2021: Runner up in Group Project in the Biomarkers for Neurodegenerative Diseases course held by The University of Gothenburg (Sweden) and University College London (UK).
- 2021: Representing SINAPSE at Scottish Universities Physics Alliance (SUPA) Virtual Gathering (UK).
- 2020: PD-STAT Dissemination Event (UK).
- 2018: Growing MedTech Translation: a celebration of Translate and the launch of Grow MedTech (UK).
- 2018: 5th Physics Industry Recruitment and Placement Fair with Q&A Panel Discussion on Medical Physics and Healthcare Innovation (UK).
- 2017: Brainhack 2017, Department of Psychology, University of York (UK).
- 2017: Parkinson's UK Community Visit and Research Presentations (UK).
- 2016: Yorkshire's Venturefest (UK).
- 2016: Automation and Analytical Management Group of the Royal Society of Chemistry - Sensors 2016 - Wearable Smart Sensors and Technologies Conference with Exhibition and Posters (UK).
- 2015, 2016: York Festival of Ideas: Science Out of the Lab (UK).
- 2015: European Researchers' Night in York (UK).
- 2014: Three Minute Thesis Competition in York (UK): Finalist. Competitors had 3 min to communicate the impact of their research to the public.

References

- **Dr. Nicolai Franzmeier**: Institute for Stroke and Dementia Research (ISD), Ludwig-Maximilians-University Munich Medical Center, Germany, nicolai.franzmeier@med.uni-muenchen.de, Tel: +49 (0)89 4400 46162

- **Professor Dr. Martin Dichgans**: Institute for Stroke and Dementia Research (ISD), Ludwig-Maximilians-University Munich Medical Center, Germany, isd@med.uni-muenchen.de, Tel: +49 (0)89 4400 46019
- **Professor Stephen L. Smith**: Department of Electronic Engineering, University of York, UK, stephen.smith@york.ac.uk, Tel: +44 (0)1904 32 2351
- **Dr. Gordon Waiter**: The Institute of Medical Sciences, University of Aberdeen, UK, g.waiter@abdn.ac.uk, Tel: +44 (0)1224 43 8364