Rasmus Malik Hoeegh Lindrup

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EDUCATION

Technical University of Denmark (DTU), Kongens Lyngby, Denmark

- Industrial PhD with WSAudiology — May 2019 – Jan 2023
  - Deep learning-based representation learning (unsupervised learning, generative modelling), especially of sequential data, such as time-series, using variational inference in hierarchical latent variable models. Thesis title: "On Learning Useful Variational Autoencoder Representations".
- M.Sc. in Biomedical Engineering (Honours Programme) — Aug 2016 – Jun 2018
  - Specializing in biomedical signal processing & machine learning. Thesis: "Machine Learning and Early Biomarkers in Stroke Treatment" (grade: 12—highest grade/A), abroad at Stanford. Weighted grade average: 10.8.
- B.Sc. in Engineering in Medicine and Technology — Aug 2013 – Jun 2016
  - Thesis on errors in noise reduction algorithm: "Analysis of Estimated Binary Mask Errors" (grade: 12—highest grade/A). Weighted grade average: 11.2.

RESEARCH EXPERIENCE

Postdoctoral Scholar, UC Berkeley CBE/BAIR & ICSI — Apr 2023 – (ongoing)
- Research on using deep generative models for probabilistic modelling in scientific problems at University of California (UC), Berkeley, Dept. of Chemical and Biomolecular Engineering (CBE), Berkeley Artificial Intelligence Research Lab (BAIR) & International Computer Science Institute (ICSI)

Machine Learning Engineer, WS Audiology — Jun 2021 – Sep 2021, Oct 2022 – Feb 2023
- Machine learning research and development, especially deep learning audio modelling (1st period: full time, short-term leave from PhD).

Research Assistant, DTU Section for Cognitive Systems — Sep 2018 – Apr 2019, Mar 2020 – May 2020
- Second period: development of deep learning system (CoronaMonitor) enabling characterization of coughs for diagnostics and monitoring of COVID-19 in collaboration with Zealand University Hospital and Rigshospitalet (full time, short-term leave from PhD). See Rieger et al. (2020) in publications.
- First period: development of educational material for introductory machine learning course, teaching at continuing education course on machine learning, and research in modelling of EEG using directional statistics. See Olsen et al. (2022) in publications.

Honours Programme, DTU Biomedical Engineering — Aug 2016 – Jul 2019
- Study research projects: "Archetypal Analysis using Directional Statistics" with Section for Cognitive Systems, "Using wearable sensors to determine knee function" (see Hansen et al. (2017) in publications) with Biomedical Signal Processing Group in collaboration with Gentofte Hospital (Department of Orthopaedic Surgery), "Neural networks for improved hearing loss compensation" with Hearing Systems Group in collaboration with Bose Corporation.

Student Research Assistant, DTU Hearing Systems Group — Aug 2015 –Feb 2017
- Conducting speech intelligibility experiments and researching cochlear implant listener speech intelligibility. See Kressner et al. (2017) in publications.

INTERNATIONAL RESEARCH STAYS

UC Berkeley & ICSI, California, United States — Mar 2022 – Sep 2022
- External stay (during PhD studies in Denmark), research on neural differential equations in latent variable models for time-series modelling at ICSI & UC Berkeley, Department of Electrical Engineering and Computer Sciences.

Stanford School of Medicine, California, United States — Feb 2018 – Jul 2018
- External stay (during Master's studies in Denmark), research on how biomedical signals measured during sleep can be analyzed using machine learning for both (i) early detection of stroke and (ii) sub-acute stroke risk assessment/treatment guidance. Collaboration with Stanford Sleep Medicine Center, Technical University of Denmark, and Danish Center for Sleep Medicine.

TESP Robotics, Sendai, Japan — Jul 2017 –Aug 2017
- Tohoku Engineering Summer Programme (TESP): lectures in robotics in a variety of fields (including biomedical robots) from researchers at Tohoku, and a short-term research project on the development of robot with self-balancing and robot-robot interaction capabilities.

EWH Summer School, Okhaldhunga, Nepal — Jun 2016 –Sep 2016
- Engineering World Health (EWH) deployment for two months in low-resource hospital in a remote mountain area (Okhaldhunga Community Hospital) doing maintenance, education, and needs finding/early design. Prior technical training in repair and maintenance of hospital equipment, as well as training in basic Nepali language and cultural norms.

AWARDS & SCHOLARSHIPS

Research Pitch Battle Winner, Danish Sound Cluster, — 2021
- Competition on research communication at the Danish Sound Day presenting work on probabilistic deep learning for hearing aid speech separation. Prize of 8k DKK (approximately 1k EUR travel grant) for scientific/research purposes.

Industrial PhD scholarship, Innovation Fund Denmark,   2019
- 0.46 million DKK (approximately 60k EUR) funding for half of PhD salary and travel expenses. Remaining budget for PhD funded by WSAudiology.

World Image Grant, Danish Foreign Ministry (Danida)   2016
- Grant of 50000 DKK (approximately 6.7k EUR) for the production of a documentary for an alternative view on a developing country. Documentary (set in Nepal) entitled: Defective Donations (DA: Defekte Donationer).

TEACHING EXPERIENCE

Guest Lecturer, UC Berkeley, "Introduction to Machine Learning" (CS 189/289A)   Nov 2023
- Gave two lectures on graph neural networks and rotational equivariance

Supervisor, DTU (Cognitive Systems & Hearing Systems) & UC Berkeley   Sep 2019 – (ongoing)
- Supervisor of five undergraduate research projects on latent stochastic differential equations in weather forecasting at UC Berkeley.
- Supervisor of Master's and Bachelor's thesis projects at DTU: "Automatic Sleep Staging Using Deep Neural Networks and Ear-EEG" (with company UNEEG), "Imposing structure in latent spaces for musical representation learning" (with company MoodAgent), "Creating Light Using Generative Adversarial Networks", "Comparison of Variational Autoencoders and Generative Adversarial Networks with respect to Data Generation" (with company uizard).
- Teaching/organization of regular and continuing education courses: "Introduction to Machine Learning", "Deep Unsupervised Learning", and "Technical Audiology and Experimental Hearing Science".

Teaching Assistant, DTU Compute   Aug 2015 – Dec 2015, Sep 2018 –Dec 2018
- "Introduction to Machine Learning and Data Mining".
- "Advanced Engineering Mathematics 2".

Student Guest Lecturer, DTU Electro   Aug 2015
- In course "Introduction to Biomedical Engineering 1" on machine learning for control of prosthetics.

PUBLICATIONS & PRE-PRINTS

[*] **SHARED CO-FIRST AUTHORSHIP**

- Olsen, K., **Høegh Lindrup**, R. M., , & Mørup, M. (2024). Think Global Adapt Local: Learning Locally Adaptive Kernel Density Estimators. *International Conference on Artificial Intelligence and Statistics. PMLR, 2024. (accepted, to appear in)*.

- **Høegh Lindrup**, R. M., Krishnapriyan, A. S., Hodgkinson, L., & Mahoney, M. W. (2022). Hierarchical Variational Auto-Encoders using Latent Neural Stochastic Differential Equations. *Pre-print, part of PhD thesis*.

- **Høegh Lindrup**, R. M., Jespersen, C. B., Mølgaard, L. L., Kressner, A. A., Mørup, M., & Nielsen, J. B. B. (2022). Rate-Distortion Trade-offs in Variational Autoencoder Representations for Sequential Acquisition Active Learning. *Submitted/under review, part of PhD thesis*.

- **Høegh Lindrup**, R. M., Nielsen, J. B. B., Kressner, A. A., & Mørup, M. (2022). Improving Speaker Separation Generalization with Variational Inference. *Submitted/under review, part of PhD thesis*.

- Olsen[*], A. S., **Høegh**[*]**, R. M. Th.**, Hinrich, J. L., Madsen, K. H., & Mørup, M. (2022). Combining electro- and magnetoencephalography data using directional archetypal analysis. *Front. Neurosci.*, *16*. doi: 10.3389/fnins.2022.911034

- Rieger[*], L., **Høegh**[*]**, R. M. Th.**, & Hansen, L. K. (2020). Client Adaptation improves Federated Learning with Simulated Non-IID Clients. *In International Workshop on Federated Learning for User Privacy and Data Confidentiality in Conjunction with ICML 2020.* (Submission was chosen for Long/Technical Talk)

- **Høegh, R. M. Th.**, Nielsen, J. B. B., & Mørup, M. (2019). Latent representation linear speaker recognition using deep transfer learning. *In International Symposium on Auditory and Audiological Research (ISAAR) 2019, Nyborg, Denmark, August 2019*.

- Kressner, A. A., May, T., **Høegh, R. M. Th.**, Juhl, K. A., Bentsen, T., & Dau, T. (2017). Investigating the effects of noise-estimation errors in simulated cochlear implant speech intelligibility. *In International Symposium on Auditory and Audiological Research (ISAAR) 2017, Nyborg, Denmark, August 2017*.

- Hansen[*], M. C., **Høegh**[*]**, R. M. Th.**, Mortensen, J. F., Sørensen, H. B. D., & Odgaard, A. (2017). Using inertial wearable sensors to determine knee function in knee arthroplasty patients. A pilot study. *Dansk Ortipædisk Selskab (DOS) Bulletin, DOS Kongressen 2017, Copenhagen, Denmark, October 2017*.

- **Høegh**[*]**, R. M. Th.**, Juhl[*], K. A., & Kressner, A. A. (2016). Structure of Speech in Binary Masking. *Dansk Medicoteknisk Selskab Landsmøde 2016, Vejle, Brædstrup, September 2016*.

PROFESSIONAL AFFILIATIONS & CAMPUS ACTIVITIES

Biomedical Engineering programme at DTU   2014–2018
- Student Faculty, Member (2014–2018), and seat (2015 – 2016) in governing body for Polytechnical Association.
- Start of Studies Coordinator (2014 –2015).

EWH at DTU   2013 – 2018
- Member (2013 – 2018), Deployment & Fundraising Coordinator (2015 – 2016), and Boardmember, Projects & Workshops Responsible (2016 – 2018).

Member of Danish Society for Biomedical Technology   2013 – 2018