

## Master thesis: Transfer-Learning for Personalized ECG Delineation



### Description:

The objective is to employ transfer learning to personalize and improve Electrocardiogram (ECG) delineation. ECG wave identification is a pivotal aspect of cardiac health diagnostics. While deep neural network classifiers are commonly used for ECG wave identification, this research seeks to fine-tune pre-trained ECG classifiers with individual Holter ECG data, ensuring tailored and superior classification performance for each patient, thereby enhancing the accuracy and reliability of ECG-based diagnostics. The work will be carried out at the Center for Medical Physics and Biomedical Engineering of the Medical University of Vienna in the Research Group Cardiovascular Systems and Dynamics.

### Relevant Knowledge/Experience Preferable:

- Basic foundation in deep learning and neural networks.
- Familiarity with ECG data and its characteristics.
- Experience with Python and deep learning frameworks (e.g., TensorFlow, PyTorch).
- Prior exposure to transfer learning is a plus.

### How to Apply:

Interested candidates are requested to send their CV and a short description of themselves to DI Laurenz Berger [laurenz.berger@meduniwien.ac.at](mailto:laurenz.berger@meduniwien.ac.at), DI Dr. Max Haberbusch [max.haberbusch@meduniwien.ac.at](mailto:max.haberbusch@meduniwien.ac.at) and Assoc. Prof. DI Dr. Francesco Moscato [francesco.moscato@meduniwien.ac.at](mailto:francesco.moscato@meduniwien.ac.at)

### Time Frame:

Earliest start date: October 2023

Approx. duration: 6 months

### Suggested Literature:

- Jimenez-Perez, G., Alcaine, A. & Camara, O. Delineation of the electrocardiogram with a mixed-quality-annotations dataset using convolutional neural networks. *Sci. Reports* 2021 11:11, 1–11.
- Hannun, A. Y. *et al.* Cardiologist-level arrhythmia detection and classification in ambulatory electrocardiograms using a deep neural network. *Nat. Med.* 2019 25:25, 65–69.
- Berger L. *et al.* Generative adversarial networks in electrocardiogram synthesis: Recent developments and challenges. *Artif Intell Med.* 2023 Sep:143:102632.