Logbook

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1 Week 1 (27-02 / 03-03)

- Reading of the following papers:
  1. Masked Autoencoders that Listen:
     https://arxiv.org/pdf/2207.06405.pdf
  2. Masked Autoencoders Are Scalable Vision Learners:
     https://arxiv.org/pdf/2111.06377.pdf
  3. data2vec: A General Framework for Self-supervised Learning in Speech,Vision and Language:
     https://arxiv.org/pdf/2202.03555.pdf

2 Week 2 (04-03 / 10-03)

- Reading of the following papers:
  1. Q-PPG: Energy-Efficient PPG-Based Heart RateMonitoring on Wearable Devices:
     https://ieeexplore.ieee.org/document/9583926
  2. Multi-Head Cross-Attention PPG and motion signal fusion for heartrate estimation:
     https://arxiv.org/pdf/2210.11415.pdf
  3. Embedding Temporal Convolutional Networks for Energy-efficientPPG-based Heart Rate Monitoring:
     https://arxiv.org/pdf/2203.04396.pdf
- Code analysis of Masked AutoEncoder that Listen:
  https://github.com/facebookresearch/AudioMAE
- Code analysis of Heart Rate Detection on the PPG-DALIA dataset (benchmark):
  https://github.com/eml-eda/pytorch-benchmarks
- Code analysis of Q-PPG: Energy-Efficient PPG-based Heart Rate Monitoring on Wearable Devices:
  https://github.com/eml-eda/q-ppg

3 Weeks 3...10 (10-03 / 28-04)

- Training frequency + time experiment on PPG-DaLia:
  1. Convert audios into spectograms
  2. Understand the best configuration for the correct sampling using `torchaudio.transforms.MelSpectrogram`
  3. Plot spectrogram heatmaps
  4. Pretrain spectograms to reconstruct the input signal using `Vision Trasformer` (encoder + decoder)
  5. Finetune spectograms to predict heart rate estimation using `Vision Trasformer` (encoder + final linear layer)
- Training time experiment on PPG-DaLia
  1. Plot audio heatmaps
  2. Pretrain audios to reconstruct the input signal using `Vision Trasformer` (encoder + decoder)
  3. Finetune audios to predict heart rate estimation using `Vision Trasformer` (encoder + final linear layer)

You can find the relative code on here:
https://github.com/FlavioPatti/Benchmark_hr_detection