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| Ref | Author | Year | Title | Dataset  Description | Methods | Results | Pros | Cons | Future Work |
| [1] | Almadani et al. | 2023 | FHSU-NETR: Transformer-Based Deep Learning Model for the Detection of  Fetal Heart Sounds in Phonocardiography | Real data: 20 healthy pregnant women recorded at Tohoku University Hospital, Japan using a 4-channel abdominal PCG harness.  - Synthetic data: ~380,000 PCG samples combining fetal, maternal, and breathing sounds generated to provide ground-truth for supervised training. | 1)Transformer-based U-Net architecture (FHSU-NETR) comprising three linked 1D UNetR blocks for fetal heart, maternal heart, and breathing sound extraction. Model trained on synthetic PCG and validated against real fetal ECG ground-truth. | Achieved mean heart rate difference = 2.72 bpm compared with fetal ECG. | 1)Works directly on raw PCG without pre-filtering.  2)Does not require reference maternal or fetal signals.  3)Highly generalizable due to large synthetic training data. | 1)Slightly higher mean error than some optimized classical methods (e.g., wavelet-based 0.21–1.3 bpm).  2)Evaluation limited to 20 participants — relatively small real dataset. |  |
| [2] | Kong et al. | 2024 | Analysis on fetal phonocardiography segmentation problem by hybridized  classifier | PhysioNet Challenge 2016,  Springer data,  custom fetal PCG simulation  Dataset link: https://physionet.org/content/ch  allenge-2016/1.0.0/, https://ag-datasets-89f20  3ac-44ed-4a06-9395-1e069e8e662d.s3-us-west2.amazonaws.com/springer\_dataset.mat,  https  ://github.com/lingping-fuzzy/FPCG-Segmenta  tion-Problem-by-Hybridized-Classifier/tree/ma  in | Fourier Synchrosqueezed Transform.  Transformer neural network,  Random forest with XGBoost,  Hybridized decision rule |  |  |  |  |
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Reference:

1. Almadani, Murad & Alkhodari, Mohanad & Ghosh, Samit & Hadjileontiadis, Leontios & Khandoker, Ahsan. (2024). Extraction of fetal heart beat sounds in abdominal phonocardiograms using deep attention transformer network. 10.21203/rs.3.rs-3786850/v1.
2. Kong, Lingping & Barnová, Kateřina & Jaros, Rene & Mirjalili, Seyedali & Snasel, Vaclav & Pan, Jeng-Shyang & Martinek, Radek. (2024). Analysis on fetal phonocardiography segmentation problem by hybridized classifier. Engineering Applications of Artificial Intelligence. 135. 108621. 10.1016/j.engappai.2024.108621.