

## DAFTAR PUSTAKA

- [1] T. Taylor, “Heart,” 2020. [Online]. Available: <https://www.innerbody.com/image/card01.html#full-description>
- [2] E. Delgado-Trejos, A. F. Quiceno-Manrique, J. I. Godino-Llorente, M. Blanco-Velasco, and G. Castellanos-Dominguez, “Digital auscultation analysis for heart murmur detection,” *Annals of Biomedical Engineering*, vol. 37, no. 2, pp. 337–353, 2009.
- [3] A. K. Abbas and R. Bassam, “Phonocardiography Signal Processing,” *Synthesis Lectures on Biomedical Engineering*, vol. 31, no. May, pp. 1–189, 2009.
- [4] K. Maganti, V. H. Rigolin, M. E. Sarano, and R. O. Bonow, “Valvular heart disease: Diagnosis and management,” *Mayo Clinic Proceedings*, vol. 85, no. 5, pp. 483–500, 2010. [Online]. Available: <http://dx.doi.org/10.4065/mcp.2009.0706>
- [5] C. M. Otto, R. A. Nishimura, R. O. Bonow, B. A. Carabello, J. P. Rwin, F. Gentile, H. Jneid, r. V. Krieger, M. Mack, C. McLeod, P. T. O’Gara, V. H. Rigolin, T. M. Sundt, A. Thompson, and C. Toly, *2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines*, 2021, vol. 143, no. 5.
- [6] P. M. Shah, “Tricuspid and Pulmonary Valve Disease Evaluation and Management,” *Revista Española de Cardiología (English Edition)*, vol. 63, no. 11, pp. 1349–1365, 2010. [Online]. Available: [http://dx.doi.org/10.1016/S1885-5857\(10\)70259-0](http://dx.doi.org/10.1016/S1885-5857(10)70259-0)
- [7] W. Zhang, J. Han, and S. Deng, “Heart sound classification based on scaled spectrogram and tensor decomposition,” *Expert Systems with Applications*, vol. 84, pp. 220–231, 2017.
- [8] S. Behbahani, “A hybrid algorithm for heart sounds segmentation based on phonocardiogram,” *Journal of Medical Engineering and Technology*, vol. 43, no. 6, pp. 363–377, 2019. [Online]. Available: <https://doi.org/10.1080/03091902.2019.1676321>
- [9] S. Ismail, I. Siddiqi, and U. Akram, “Localization and classification of heart beats in phonocardiography signals —a comprehensive review,” *Eurasip Journal on Advances in Signal Processing*, vol. 2018, no. 1, 2018.
- [10] D. Gradolewski, G. Magenes, S. Johansson, and W. J. Kulesza, “A wavelet transform-based neural network denoising algorithm for mobile phonocardiography,” *Sensors (Switzerland)*, vol. 19, no. 4, pp. 1–18, 2019.

- [11] M. A. COLOMINAS, G. SCHLOTTHAUER, M. E. TORRES, and P. FLANDRIN, “Noise-Assisted Emd Methods in Action,” *Advances in Adaptive Data Analysis*, vol. 04, no. 04, p. 1250025, 2012.
- [12] J. A. Jimenez, M. A. Becerra, and E. Delgado-Trejos, “Heart murmur detection using ensemble empirical mode decomposition and derivations of the mel-frequency cepstral coefficients on 4-area phonocardiographic signals,” *Computing in Cardiology*, vol. 41, no. January, pp. 493–496, 2014.
- [13] Q. Wu, M. Liu, S. Ding, L. Pan, and X. Liu, “Heart Sound Classification Method Based on Complete Empirical Mode Decomposition with Adaptive Noise Permutation Entropy,” *Journal of Physics: Conference Series*, vol. 2173, no. 1, 2022.
- [14] H. Takada, T. Ogawa, and H. Matsumoto, “Blind signal separation for heart sound and lung sound from auscultatory sound based on the high order statistics,” *2017 International Symposium on Intelligent Signal Processing and Communication Systems, ISPACS 2017 - Proceedings*, vol. 2018-Janua, pp. 201–205, 2017.
- [15] M. Samieinasab and R. Sameni, “Fetal Phonocardiogram Extraction using Single Channel Blind Source Separation,” pp. 78–83, 2015.
- [16] S. Jabbari, “Source separation from single-channel abdominal phonocardiographic signals based on independent component analysis,” *Biomedical Engineering Letters*, vol. 11, no. 1, pp. 55–67, 2021. [Online]. Available: <https://doi.org/10.1007/s13534-021-00182-z>
- [17] A. Ganguly and M. Sharma, “Detection of pathological heart murmurs by feature extraction of phonocardiogram signals,” *Journal of Applied and Advanced Research*, vol. 2, no. 4, pp. 200–205, 2017.
- [18] O. El Badlaoui and A. Hammouch, “Phonocardiogram classification based on MFCC extraction,” *2017 IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications, CIVEMSA 2017 - Proceedings*, pp. 217–221, 2017.
- [19] P. Dhar, S. Dutta, and V. Mukherjee, “Cross-wavelet assisted convolution neural network (AlexNet) approach for phonocardiogram signals classification,” *Biomedical Signal Processing and Control*, vol. 63, no. August 2020, p. 102142, 2021. [Online]. Available: <https://doi.org/10.1016/j.bspc.2020.102142>
- [20] A. Yadav, M. K. Dutta, C. M. Travieso, and J. B. Alonso, “Automatic Classification of Normal and Abnormal PCG Recording Heart Sound Recording Using Fourier Transform,” *2018 IEEE International Work Conference on Bioinspired Intelligence, IWOBI 2018 - Proceedings*, pp. 1–9, 2018.

- [21] S. Varshney and S. Singh, "Computation of biological murmurs in phonocardiogram signals using fast fourier discrete wavelet transform," *Proceedings of International Conference on Computation, Automation and Knowledge Management, ICCAKM 2020*, pp. 234–240, 2020.
- [22] F. Firuzbakht, A. Fallah, S. Rashidi, and E. R. Khoshnood, "Abnormal Heart Sound Diagnosis Based on Phonocardiogram Signal Processing," *26th Iranian Conference on Electrical Engineering, ICEE 2018*, pp. 1450–1455, 2018.
- [23] P. Gopika, V. Sowmya, E. A. Gopalakrishnan, and K. P. Soman, "Performance improvement of deep learning architectures for phonocardiogram signal classification using fast fourier transform," *Proceedings of the 2019 9th International Conference on Advances in Computing and Communication, ICACC 2019*, pp. 290–294, 2019.
- [24] J. JUSAK, I. PUSPASARI, and W. I. KUSUMAWATI, "A Semi-automatic Heart Sounds Identification Model and Its Implementation in Internet of Things Devices," *Advances in Electrical and Computer Engineering*, vol. 21, no. 1, pp. 45–56, 2021.
- [25] K. H. Tsai, W. C. Wang, C. H. Cheng, C. Y. Tsai, J. K. Wang, T. H. Lin, S. H. Fang, L. C. Chen, and Y. Tsao, "Blind monaural source separation on heart and lung sounds based on periodic-coded deep autoencoder," *IEEE Journal of Biomedical and Health Informatics*, vol. 24, no. 11, pp. 3203–3214, 2020.
- [26] J. Pedrosa, A. Castro, and T. T. Vinhoza, "Automatic heart sound segmentation and murmur detection in pediatric phonocardiograms," *2014 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, EMBC 2014*, vol. 2012, pp. 2294–2297, 2014.
- [27] A. Atbi, S. M. Debbal, F. Meziani, and A. Meziane, "Separation of heart sounds and heart murmurs by Hilbert transform envelopogram," *Journal of Medical Engineering and Technology*, vol. 37, no. 6, pp. 375–387, 2013.
- [28] J. Jusak and I. Puspasari, "Wireless tele-auscultation for phonocardiograph signal recording through Zigbee networks," *APWiMob 2015 - IEEE Asia Pacific Conference on Wireless and Mobile*, pp. 95–100, 2016.
- [29] A. Arslan and O. Yildiz, "Automated auscultative diagnosis system for evaluation of phonocardiogram signals associated with heart murmur diseases," *Gazi University Journal of Science*, vol. 31, no. 1, pp. 112–124, 2018.
- [30] H. Ren, H. Jin, C. Chen, H. Ghayvat, and W. Chen, "A Novel Cardiac Auscultation Monitoring System Based on Wireless Sensing for Healthcare," *IEEE Journal of Translational Engineering in Health and Medicine*, vol. 6, no. c, p. 1, 2018.

- [31] N. Giordano and M. Knaflitz, "A novel method for measuring the timing of heart sound components through digital phonocardiography," *Sensors (Switzerland)*, vol. 19, no. 8, 2019.
- [32] J. Li, L. Ke, Q. Du, X. Ding, X. Chen, and D. Wang, "Heart Sound Signal Classification Algorithm: A Combination of Wavelet Scattering Transform and Twin Support Vector Machine," *IEEE Access*, vol. 7, pp. 179 339–179 348, 2019.
- [33] I. Puspasari, W. I. Kusumawati, E. S. Oktarina, and J. Jusak, "A New Heart Sound Signal Identification Approach Suitable for Smart Healthcare Systems," *2019 2nd International Conference on Applied Engineering (ICAE)*, pp. 1–6, 2019.
- [34] N. Giordano and M. Knaflitz, "A Method for the Estimation of the Timing of Heart Sound Components Through Blind Source Separation in Multi-Source Phonocardiography," *IEEE Medical Measurements and Applications, MeMeA 2020 - Conference Proceedings*, 2020.
- [35] D. Mandal, A. Maity, and I. Saha Misra, "Low Cost Portable Solution for Real-Time Complete Detection and Analysis of Heart Sound Components," *Wireless Personal Communications*, no. 0123456789, 2019. [Online]. Available: <https://doi.org/10.1007/s11277-019-06287-0>
- [36] S. Li, F. Li, S. Tang, and W. Xiong, "A Review of Computer-Aided Heart Sound Detection Techniques," *BioMed Research International*, vol. 2020, 2020.
- [37] S. Behbahani, "A hybrid algorithm for heart sounds segmentation based on phonocardiogram," *Journal of Medical Engineering and Technology*, vol. 43, no. 6, pp. 363–377, 2019. [Online]. Available: <https://doi.org/10.1080/03091902.2019.1676321>
- [38] J. X. Low and K. W. Choo, "IoT-enabled Heart Monitoring Device with Signal De-noising and Segmentation using Discrete Wavelet Transform," *2018 15th International Conference on Control, Automation, Robotics and Vision, ICARCV 2018*, pp. 119–124, 2018.
- [39] Z. Wang, J. Wei, X. Li, Z. Liu, and F. Su, "Adaptive SVR Denoising Algorithm for Fetal Monitoring System," *2018 10th International Conference on Wireless Communications and Signal Processing, WCSP 2018*, pp. 1–5, 2018.
- [40] S. Gao, Y. Zheng, and X. Guo, "Gated recurrent unit-based heart sound analysis for heart failure screening," *BioMedical Engineering Online*, vol. 19, no. 1, pp. 1–18, 2020. [Online]. Available: <https://doi.org/10.1186/s12938-020-0747-x>
- [41] S. Mohanty, K. K. Gupta, and K. S. Raju, "Vibro-acoustic fault analysis of bearing using FFT, EMD, EEMD and CEEMDAN and their implications," *Lecture Notes in Electrical Engineering*, vol. 387, pp. 281–292, 2016.

- [42] J. S. Coviello, *Auscultation skills: Breath heart sounds: Fifth edition*, J. S. Coviello, Ed. Wolters Kluwer, 2013.
- [43] S. M. Debbal and F. Bereksi-Reguig, "Computerized heart sounds analysis," *Computers in Biology and Medicine*, vol. 38, no. 2, pp. 263–280, 2008.
- [44] F. Essentials and A. J. Taylor, *Learning Cardiac Auscultation*, 1st ed., A. J. Taylor, Ed. Columbia, USA: Springer, 2015.
- [45] A. Ukil and U. K. Roy, "Smart cardiac health management in iot through heart sound signal analytics and robust noise filtering," *IEEE International Symposium on Personal, Indoor and Mobile Radio Communications, PIMRC*, vol. 2017-Octob, pp. 1–5, 2018.
- [46] N. E. Huang, Z. Shen, S. R. Long, M. C. Wu, H. H. Snin, Q. Zheng, N. C. Yen, C. C. Tung, and H. H. Liu, "The empirical mode decomposition and the Hubert spectrum for nonlinear and non-stationary time series analysis," *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, vol. 454, no. 1971, pp. 903–995, 1998.
- [47] A. Zeiler, R. Faltermeier, I. R. Keck, A. M. Tomé, C. G. Puntonet, and E. W. Lang, "Empirical mode decomposition - An introduction," *Proceedings of the International Joint Conference on Neural Networks*, no. July, 2010.
- [48] J. Li, L. Feng, and R. Escobar, "A New Blind Source Separation Algorithm Framework for Noisy Mixing Model Based on the Energy Concentration Characteristic in Signal Transform Domain," *Mathematical Problems in Engineering*, vol. 2021, 2021.
- [49] B. Schölkopf and A. J. Smola, *A Tutorial Introduction*, 2018.
- [50] D. N. Rutledge and D. Jouan-Rimbaud Bouveresse, "Independent Components Analysis with the JADE algorithm," *TrAC - Trends in Analytical Chemistry*, vol. 50, pp. 22–32, 2013. [Online]. Available: <http://dx.doi.org/10.1016/j.trac.2013.03.013>
- [51] Y. Liu, C. C. Poon, and Y. T. Zhang, "Heart sound segmentation algorithm based on heart sound envelopgram," *Proceedings of the 30th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, EMBS'08 - "Personalized Healthcare through Technology"*, vol. 24, pp. 1308–1310, 2008.
- [52] Michigan, "Heart Sound Murmur Library," 2022. [Online]. Available: [https://www.med.umich.edu/lrc/psb\\_open/html/repo/primer\\_heartsound/primer\\_heartsound.html](https://www.med.umich.edu/lrc/psb_open/html/repo/primer_heartsound/primer_heartsound.html)
- [53] A. Gharehbaghi, M. Borga, B. J. Sjöberg, and P. Ask, "A novel method for discrimination between innocent and pathological heart murmurs," *Medical Engineering and Physics*, vol. 37, no. 7, pp. 674–682, 2015.



- [54] T. T. H. Le, J. Kim, and H. Kim, "Classification performance using gated recurrent unit Recurrent Neural Network on energy disaggregation," *Proceedings - International Conference on Machine Learning and Cybernetics*, vol. 1, no. July, pp. 105–110, 2016.
- [55] K. Tarek, D. Abderrazek, B. M. Khemissi, D. M. Cherif, C. Lilia, and O. Nouredine, "Comparative study between cyclostationary analysis, EMD, and CEEMDAN for the vibratory diagnosis of rotating machines in industrial environment," *International Journal of Advanced Manufacturing Technology*, vol. 109, no. 9-12, pp. 2747–2775, 2020.
- [56] G. D. Clifford, C. Liu, B. Moody, D. Springer, I. Silva, Q. Li, and R. G. Mark, "Classification of normal/abnormal heart sound recordings: The PhysioNet/Computing in Cardiology Challenge 2016," *Computing in Cardiology*, vol. 43, pp. 609–612, 2016.
- [57] J. H. Oliveira, F. Renna, P. Costa, D. Nogueira, C. Oliveira, C. Ferreira, A. Jorge, S. Mattos, T. Hatem, T. Tavares, A. Elola, A. Rad, R. Sameni, G. D. Clifford, and M. T. Coimbra, "The CirCor DigiScope Dataset: From Murmur Detection to Murmur Classification," *IEEE Journal of Biomedical and Health Informatics*, vol. 26, no. 6, pp. 2524–2535, 2021.
- [58] Y. Lei, Z. Liu, J. Ouazri, and J. Lin, "A fault diagnosis method of rolling element bearings based on CEEMDAN," *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science*, vol. 231, no. 10, pp. 1804–1815, 2017.
- [59] S. Riyanto, A. Purwanto, and Supardi, "Algoritma Fast Fourier Transform (FFT) Decimation In Time (DIT) dengan Resolusi 1/10 Hertz," *Seminar Nasional Penelitian, Pendidikan, dan Penerapan MIPA*, pp. 223 – 231, 2009.
- [60] Z. Ullah, X. Wang, Y. Chen, T. Zhang, H. Ju, and Y. Zhao, "Time-Domain Output Data Identification Model for Pipeline Flaw Detection Using Blind Source Separation Technique Complexity Pursuit," *Acoustics 2019*, vol. 1, pp. 199–219, 2019.
- [61] M. Z. Suboh, R. Jaafar, N. A. Nayan, and N. H. Harun, "Shannon energy application for detection of ECG R-peak using bandpass filter and stockwell transform methods," *Advances in Electrical and Computer Engineering*, vol. 20, no. 3, pp. 41–48, 2020.
- [62] R. S. Mangrulkar and R. D. Judge, "Heart Sound Murmur Library," 2015. [Online]. Available: [https://www.med.umich.edu/lrc/psb\\_open/html/repo/primer\\_heartsound/primer\\_heartsound.html](https://www.med.umich.edu/lrc/psb_open/html/repo/primer_heartsound/primer_heartsound.html)
- [63] P. Flandrin, E. Torres, and M. A. Colominas, "A COMPLETE ENSEMBLE EMPIRICAL MODE DECOMPOSITION Laboratorio de Señales y Dinámicas," 2015.

amias no Lineales , Universidad Nacional de Entre R ´ Laboratoire de Physi-  
que ( UMR CNRS 5672 ), Ecole Normale Sup ´ erieure de Lyon , France,” pp.  
4144–4147, 2011.

- [64] M. A. Colominas, G. Schlotthauer, and M. E. Torres, “Improved complete ensemble EMD: A suitable tool for biomedical signal processing,” *Biomedical Signal Processing and Control*, vol. 14, no. 1, pp. 19–29, 2014. [Online]. Available: <http://dx.doi.org/10.1016/j.bspc.2014.06.009>
- [65] W. Wei, G. Zhan, X. Wang, P. Zhang, and Y. Yan, “A novel method for automatic heart murmur diagnosis using phonocardiogram,” *ACM International Conference Proceeding Series*, 2019.