

References

- [1] Water-to-Cloud, 2020. [Online]. Available: <http://thoreau.uchicago.edu/>
- [2] Calculating NSF Water Quality Index, 2020. [Online]. Available: http://home.eng.iastate.edu/dslutz/dmrwqn/water_quality_index_calc.htm
- [3] A. Charef, A. Ghauch, P. Baussand, and M. Martin-Bouyer, “Water quality monitoring using a smart sensing system,” *Measurement*, 2000, vol. 28, no. 3, pp. 219–224.
- [4] N. Vijayakumar, Ramya, and R, “The real time monitoring of water quality in iot environment,” in *2015 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS)*. IEEE, 2015, pp. 1–5.
- [5] M. U. M. A. C. . C. S. R. S. Sharmila, R. Sushma, “Water pollution monitoring system using iot,” in *ICDSMLA 2020*. Springer Singapore, 2022, pp. 1163–1170.
- [6] Q. Chen, G. Cheng, Y. Fang, Y. Liu, Z. Zhang, Y. Gao, and B. K. Horn, “Real-time learning-based monitoring system for water contamination,” in *2018 4th International Conference on Universal Village (UV)*. IEEE, 2018, pp. 1–5.
- [7] Z. Chaczko, A. Kale, J. J. Santana-Rodríguez, and C. P. Suárez-Araujo, “Towards an iot based system for detection and monitoring of microplastics in aquatic environments,” in *2018 IEEE 22nd International Conference on Intelligent Engineering Systems (INES)*. IEEE, 2018, pp. 000 057–000 062.
- [8] K. Warnakulasooriya, Y. P. Jayasuriya, and B. Sudantha, “Generic iot framework for environmental sensing researches: Portable iot enabled weather station,” in *2018 International Conference on System Science and Engineering (ICSSE)*. IEEE, 2018, pp. 1–5.
- [9] S. I. Mirzadeh, M. Farajtabar, A. Li, N. Levine, A. Matsukawa, and H. Ghasemzadeh, “Improved knowledge distillation via teacher assistant,” in *Pro-*

- ceedings of the AAAI conference on artificial intelligence*, vol. 34, no. 04, 2020, pp. 5191–5198.
- [10] G. Hinton, O. Vinyals, and J. Dean, “Distilling the knowledge in a neural network,” *arXiv preprint arXiv:1503.02531*, 2015.
- [11] H. Zhao, X. Sun, J. Dong, C. Chen, and Z. Dong, “Highlight every step: Knowledge distillation via collaborative teaching,” *IEEE Transactions on Cybernetics*, 2020, vol. 52, no. 4, pp. 2070–2081.
- [12] G. Zhou, Y. Fan, R. Cui, W. Bian, X. Zhu, and K. Gai, “Rocket launching: A universal and efficient framework for training well-performing light net,” in *Proceedings of the AAAI Conference on Artificial Intelligence*, vol. 32, no. 1, 2018.
- [13] “LoRa Alliance,” 2019. [Online]. Available: <http://www.lora-alliance.org/lorawan-white-papers>
- [14] Semtech, 2023. [Online]. Available: <https://lora-alliance.org/about-lorawan>
- [15] A. Augustin, J. Yi, T. Clausen, and W. M. Townsley, “A study of lora long range low power networks for the internet of things,” *Sensors*, 2016, vol. 16, no. 9.
- [16] A. Waret, M. Kaneko, A. Guitton, and N. El Rachkidy, “Lora throughput analysis with imperfect spreading factor orthogonality,” *IEEE wireless communications letters*, 2018, vol. 8, no. 2, pp. 408–411.
- [17] J. Y. Halpern, “Alternative semantics for unawareness,” *Games and Economic Behavior*, 2001, vol. 37, no. 2, pp. 321–339.
- [18] R. Myerson, “Game theory. usa: Harvard university press,” 2013.
- [19] M. Tennenholtz, “Competitive safety analysis: Robust decision-making in multi-agent systems,” *Journal of Artificial Intelligence Research*, 2002, vol. 17, pp. 363–378.
- [20] Z. Zhang and M. Sabuncu, “Generalized cross entropy loss for training deep neural networks with noisy labels,” *Advances in neural information processing systems*, 2018, vol. 31.
- [21] Q. Kang, X. Chen, S. Li, and M. Zhou, “A noise-filtered under-sampling scheme for imbalanced classification,” *IEEE transactions on cybernetics*, 2016, vol. 47, no. 12, pp. 4263–4274.

- [22] E. Malach and S. Shalev-Shwartz, “Decoupling” when to update” from” how to update”,” *Advances in neural information processing systems*, 2017, vol. 30.
- [23] D. Hendrycks, M. Mazeika, D. Wilson, and K. Gimpel, “Using trusted data to train deep networks on labels corrupted by severe noise,” *Advances in neural information processing systems*, 2018, vol. 31.
- [24] D. Tanaka, D. Ikami, T. Yamasaki, and K. Aizawa, “Joint optimization framework for learning with noisy labels,” in *Proceedings of the IEEE conference on computer vision and pattern recognition*, 2018, pp. 5552–5560.
- [25] K. Yi and J. Wu, “Probabilistic end-to-end noise correction for learning with noisy labels,” in *Proceedings of the IEEE/CVF conference on computer vision and pattern recognition*, 2019, pp. 7017–7025.
- [26] H. Wei, L. Feng, X. Chen, and B. An, “Combating noisy labels by agreement: A joint training method with co-regularization,” in *Proceedings of the IEEE/CVF conference on computer vision and pattern recognition*, 2020, pp. 13 726–13 735.
- [27] G. S. Menon, M. V. Ramesh, and P. Divya, “A low cost wireless sensor network for water quality monitoring in natural water bodies,” in *Proc. GHTC*, 2017, pp. 1–8.
- [28] S. Randhawa, R. B. Guruprasad, S. R. Balivada, P. Hirani, and S. Guha, “Bluewater eye: using satellite as a low cost water pollution sensor: analytics for deriving long term pollution insights based on mapping water turbidity,” in *Remote Sensing for Agriculture, Ecosystems, and Hydrology XX*, vol. 10783, 2018, pp. 107 831:1–107 831:13.
- [29] A. Gupta, R. Pal, R. Mishra, H. P. Gupta, T. Dutta, and P. Hirani, “Game theory based early classification of rivers using time series data,” in *Proc. of WF-IoT*, 2019, pp. 686–691.
- [30] M. Cheng, Z. Guo, H. Dang, Y. He, G. Zhi, J. Chen, Y. Zhang, W. Zhang, and F. Meng, “Assessment of the evolution of nitrate deposition using remote sensing data over the yangtze river delta, china,” *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 2016, vol. 9, no. 8, pp. 3535–3545.

- [31] E. A. Kadir, A. Siswanto, S. L. Rosa, A. Syukur, H. Irie, and M. Othman, "Smart sensor node of wsns for river water pollution monitoring system," in *2019 International Conference on Advanced Communication Technologies and Networking (CommNet)*. IEEE, 2019, pp. 1–5.
- [32] X. Zhang, A. Andreyev, C. Zumpf, M. C. Negri, S. Guha, and M. Ghosh, "Thoreau: A subterranean wireless sensing network for agriculture and the environment," in *Proc. INFOCOM WKSHPS*, 2017, pp. 78–84.
- [33] Y. Wang, Y. Wang, X. Zhang, D. Wang, and J. Yan, "Modeling of pollutant distribution based on mobile sensor networks," *Environmental Science and Pollution Research*, 2020, pp. 1–12.
- [34] I. Yim, J. Shin, H. Lee, S. Park, G. Nam, T. Kang, K. H. Cho, and Y. Cha, "Deep learning-based retrieval of cyanobacteria pigment in inland water for in-situ and airborne hyperspectral data," *Ecological Indicators*, 2020, vol. 110, pp. 105 879:1–105 879:9.
- [35] J. Rising, "Decision-making and integrated assessment models of the water-energy-food nexus," *Water Security*, 2020, vol. 9, pp. 100 056:1–100 056:12.
- [36] M. El Baba, P. Kayastha, M. Huysmans, and F. De Smedt, "Evaluation of the groundwater quality using the water quality index and geostatistical analysis in the dier al-balah governorate, gaza strip, palestine," *Water*, 2020, vol. 12, no. 1, pp. 262:1–262:14.
- [37] O. Tamarin, M. Rube, J. L. Lachaud, V. Raimbault, D. Rebière, and C. Dejous, "Mobile acoustic wave platform deployment in the amazon river: Impact of the water sample on the love wave sensor response," *Sensors*, 2020, vol. 20, no. 1, pp. 72:1–72:14.
- [38] X. Zhu, H. Guo, J. J. Huang, S. Tian, W. Xu, and Y. Mai, "An ensemble machine learning model for water quality estimation in coastal area based on remote sensing imagery," *Journal of Environmental Management*, 2022, vol. 323, p. 116187.
- [39] M. R. Goodarzi, A. R. R. Niknam, A. Barzkar, M. Niazkar, Y. Zare Mehrjerdi, M. J. Abedi, and M. Heydari Pour, "Water quality index estimations using machine learning algorithms: a case study of yazd-ardakan plain, iran," *Water*, 2023, vol. 15, no. 10, p. 1876.

- [40] U. Mohseni, C. B. Pande, S. C. Pal, and F. Alshehri, "Prediction of weighted arithmetic water quality index for urban water quality using ensemble machine learning model," *Chemosphere*, 2024, vol. 352, p. 141393.
- [41] A. N. Prasad, K. A. Mamun, F. R. Islam, and H. Haqva, "Smart water quality monitoring system," in *Proc. APWC*, 2015, pp. 1–6.
- [42] M. Cheng, Z. Guo, H. Dang, Y. He, G. Zhi, J. Chen, Y. Zhang, W. Zhang, and F. Meng, "Assessment of the evolution of nitrate deposition using remote sensing data over the yangtze river delta, china," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 2016, vol. 9, no. 8, pp. 3535–3545.
- [43] E. A. Kadir, A. Siswanto, S. L. Rosa, A. Syukur, H. Irie, and M. Othman, "Smart sensor node of wsns for river water pollution monitoring system," in *Proc. Comm-Net*, 2019, pp. 1–5.
- [44] Y. Chebud, G. M. Naja, R. G. Rivero, and A. M. Melesse, "Water quality monitoring using remote sensing and an artificial neural network," *Water, Air, & Soil Pollution*, 2012, vol. 223, no. 8, pp. 4875–4887.
- [45] M. J. Diamantopoulou, D. M. Papamichail, and V. Z. Antonopoulos, "The use of a neural network technique for the prediction of water quality parameters," *Operational Research*, 2005, vol. 5, pp. 115–125.
- [46] J. Zhang, H. Qiu, X. Li, J. Niu, M. B. Nevers, X. Hu, and M. S. Phanikumar, "Real-time nowcasting of microbiological water quality at recreational beaches: a wavelet and artificial neural network-based hybrid modeling approach," *Environmental science & technology*, 2018, vol. 52, no. 15, pp. 8446–8455.
- [47] W. Tian, Z. Liao, and J. Zhang, "An optimization of artificial neural network model for predicting chlorophyll dynamics," *Ecological Modelling*, 2017, vol. 364, pp. 42–52.
- [48] J. Taipalmaa, N. Passalis, and J. Raitoharju, "Different color spaces in deep learning-based water segmentation for autonomous marine operations," in *Proc. ICIP*, 2020, pp. 3169–3173.
- [49] K. Gu, Y. Zhang, and J. Qiao, "Random forest ensemble for river turbidity measurement from space remote sensing data," *IEEE Transactions on Instrumentation and Measurement*, 2020, vol. 69, no. 11, pp. 9028–9036.

- [50] T. P. Lambrou, C. C. Anastasiou, C. G. Panayiotou, and M. M. Polycarpou, "A low-cost sensor network for real-time monitoring and contamination detection in drinking water distribution systems," *IEEE Sensors Journal*, 2014, vol. 14, no. 8, pp. 2765–2772.
- [51] S. Mondal, S. Karuppuswami, and P. Chahal, "Id integrated batteryless wireless digital ph sensor," *IEEE Sensors Journal*, 2019, vol. 19, no. 24, pp. 12 079–12 086.
- [52] Y. Wang, S. M. S. M. Rajib, C. Collins, and B. Grieve, "Low-cost turbidity sensor for low-power wireless monitoring of fresh-water courses," *IEEE Sensors Journal*, 2018, vol. 18, no. 11, pp. 4689–4696.
- [53] R. F. Rahmat, Athmanathan, M. F. Syahputra, and M. S. Lydia, "Real time monitoring system for water pollution in lake toba," in *Proc. ICIC*, 2016, pp. 383–388.
- [54] M. N. Mohammed, S. Al-Zubaidi, S. H. Kamarul Bahrain, M. Zaenudin, and M. I. Abdullah, "Design and development of river cleaning robot using iot technology," in *Proc. CSPA*, 2020, pp. 84–87.
- [55] R. F. Rahmat, M. F. Syahputra, M. S. Lydia *et al.*, "Real time monitoring system for water pollution in lake toba," in *2016 International Conference on Informatics and Computing (ICIC)*. IEEE, 2016, pp. 383–388.
- [56] M. Mohammed, S. Al-Zubaidi, S. H. K. Bahrain, M. Zaenudin, and M. I. Abdullah, "Design and development of river cleaning robot using iot technology," in *2020 16th IEEE International Colloquium on Signal Processing & Its Applications (CSPA)*. IEEE, 2020, pp. 84–87.
- [57] J. Dong, G. Wang, H. Yan, J. Xu, and X. Zhang, "A survey of smart water quality monitoring system," *Environmental Science and Pollution Research*, 2015, vol. 22, no. 7, pp. 4893–4906.
- [58] K. Singh, P. Kumar, and B. K. Singh, "An associative relational impact of water quality on crop yield: A comprehensive index analysis using liss-iii sensor," *IEEE Sensors Journal*, 2013, vol. 13, no. 12, pp. 4912–4917.
- [59] M. Cheng, Z. Guo, H. Dang, Y. He, G. Zhi, J. Chen, Y. Zhang, W. Zhang, and F. Meng, "Assessment of the evolution of nitrate deposition using remote sensing data over the yangtze river delta, china," *IEEE Journal of Selected Topics in*

- Applied Earth Observations and Remote Sensing*, 2016, vol. 9, no. 8, pp. 3535–3545.
- [60] J. Benesty, J. Chen, Y. Huang, and I. Cohen, “Pearson correlation coefficient,” in *Proc. NRSP*, 2009, pp. 1–4.
- [61] A. D. Sutadian, N. Muttill, A. G. Yilmaz, and B. Perera, “Development of river water quality indices—a review,” *Environmental monitoring and assessment*, 2016, vol. 188, no. 1, pp. 1–58.
- [62] A. D. Sutadian, N. Muttill, A. G. Yilmaz, A. Gokhan, and B. Perera, “Using the analytic hierarchy process to identify parameter weights for developing a water quality index,” *Ecological indicators*, 2017, vol. 75, pp. 220–233.
- [63] A. Sargaonkar and V. Deshpande, “Development of an overall index of pollution for surface water based on a general classification scheme in indian context,” *Environmental monitoring and assessment*, 2003, vol. 89, no. 1, pp. 43–67.
- [64] Central Pollution Control Board, 2020. [Online]. Available: <https://cpcb.nic.in/water-pollution/>
- [65] T. Blu, P. Thévenaz, and M. Unser, “Linear interpolation revitalized,” *IEEE Transactions on Image Processing*, 2004, vol. 13, no. 5, pp. 710–719.
- [66] J. Wang, Y. Chen, S. Hao, X. Peng, and L. Hu, “Deep learning for sensor-based activity recognition: A survey,” *Pattern Recognition Letters*, 2019, vol. 119, pp. 3–11.
- [67] Y. Qin, H. Luo, F. Zhao, C. Wang, J. Wang, and Y. Zhang, “Toward transportation mode recognition using deep convolutional and long short-term memory recurrent neural networks,” *IEEE Access*, 2019, vol. 7, pp. 142 353–142 367.
- [68] Z. Zhang and M. Sabuncu, “Generalized cross entropy loss for training deep neural networks with noisy labels,” in *Proc. NIPS*, 2018, pp. 8778–8788.
- [69] N. Natarajan, I. S. Dhillon, P. K. Ravikumar, and A. Tewari, “Learning with noisy labels,” 2013, pp. 1196–1204.
- [70] B. Frénay and M. Verleysen, “Classification in the presence of label noise: a survey,” *IEEE transactions on neural networks and learning systems*, 2013, vol. 25, no. 5, pp. 845–869.

- [71] N. R. Chopde and M. Nichat, “Landmark based shortest path detection by using A* and Haversine formula,” *International Journal of Innovative Research in Computer and Communication Engineering*, 2013, vol. 1, no. 2, pp. 298–302.
- [72] M. Hu, H. Han, S. Shan, and X. Chen, “Weakly supervised image classification through noise regularization,” in *Proc. CVPR*, 2019, pp. 11 517–11 525.
- [73] G. S. Menon, M. V. Ramesh, and P. Divya, “A low cost wireless sensor network for water quality monitoring in natural water bodies,” in *2017 IEEE Global Humanitarian Technology Conference (GHTC)*. IEEE, 2017, pp. 1–8.
- [74] D. Sikeridis, E. E. Tsiropoulou, M. Devetsikiotis, and S. Papavassiliou, “Energy-efficient orchestration in wireless powered internet of things infrastructures,” *IEEE Transactions on Green Communications and Networking*, 2019, vol. 3, no. 2, pp. 317–328.
- [75] F. Shirin Abkenar and A. Jamalipour, “Energy optimization in association-free fog-iot networks,” *IEEE Transactions on Green Communications and Networking*, 2020, vol. 4, no. 2, pp. 404–412.
- [76] R. Mishra, H. P. Gupta, and T. Dutta, “A survey on deep neural network compression: Challenges, overview, and solutions,” *arXiv preprint arXiv:2010.03954*, 2020.
- [77] C. Wang, G. Yang, G. Papanastasiou, H. Zhang, J. Rodrigues, and V. Albuquerque, “Industrial cyber-physical systems-based cloud iot edge for federated heterogeneous distillation,” *IEEE Transactions on Industrial Informatics*, 2020, pp. 1–1.
- [78] H. Xue, W. Jiang, C. Miao, Y. Yuan, F. Ma, X. Ma, Y. Wang, S. Yao, W. Xu, A. Zhang *et al.*, “Deepfusion: A deep learning framework for the fusion of heterogeneous sensory data,” in *Proc. MobiHoc*, 2019, pp. 151–160.
- [79] Z. Chen, L. Zhang, Z. Cao, and J. Guo, “Distilling the knowledge from hand-crafted features for human activity recognition,” *IEEE Transactions on Industrial Informatics*, 2018, vol. 14, no. 10, pp. 4334–4342.
- [80] X. Shen, X. Wang, and M. Jia, “Design and Implementation of Traffic Information Detection Equipment Based on Bluetooth Communication,” in *Proc. ITNEC*, 2017, pp. 1595–1601.

-
- [81] X. Xing, J. Song, L. Lin, M. Tian, and Z. Lei, "Development of Intelligent Information Monitoring System in Greenhouse Based on Wireless Sensor Network," in *Proc. ICISCE*, 2017, pp. 970–974.
- [82] A. Diaz-Zayas, C. A. Garcia-Perez, A. M. Recio-Perez, and P. Merino, "3GPP Standards to Deliver LTE Connectivity for IoT," in *Proc. IoTDI*, 2016, pp. 283–288.
- [83] J. P. Shanmuga Sundaram, W. Du, and Z. Zhao, "A survey on lora networking: Research problems, current solutions, and open issues," *IEEE Communications Surveys Tutorials*, 2020, vol. 22, no. 1, pp. 371–388.
- [84] J. Nie, J. Luo, Z. Xiong, D. Niyato, and P. Wang, "A stackelberg game approach toward socially-aware incentive mechanisms for mobile crowdsensing," *IEEE Transaction on Wireless Communication*, 2019, vol. 18, no. 1, pp. 2056–2064.
- [85] X. Feng, Z. Zheng, D. Cansever, A. Swami, and P. Mohapatra, "A signaling game model for moving target defense," 2017, vol. 18, no. 1, pp. 2056–2064.
- [86] L. Shi, L. Zhao, G. Zheng, Z. Han, and Y. Ye, "Incentive design for cache-enabled d2d underlaid cellular networks using stackelberg game," *IEEE Transactions on Vehicular Technology*, 2019, vol. 68, no. 1, pp. 765–779.
- [87] X. Xu, D. Feng, and W. X. Zheng, "A fast algorithm for nonunitary joint diagonalization and its application to blind source separation," *IEEE Transactions on Signal Processing*, 2011, vol. 59, no. 7, pp. 3457–3463.

LIST OF PUBLICATIONS

- **Swati Chopade**, Hari Prabhat Gupta, Rahul Mishra, Aman Oswal, Preti Kumari, and Tanima Dutta, “A Sensors based River Water Quality Assessment System using Deep Neural Network,” *IEEE Internet of Things Journal Journal*, vol. 9, no. 16, pp. 14375-14384, 2022, doi:10.1109/JIOT.2021.3078892.
- **Swati Chopade**, Hari Prabhat Gupta, Rahul Mishra, Preti Kumari, and Tanima Dutta, “An Energy-efficient River Water Pollution Monitoring System in Internet of Things,” *IEEE Transactions on Green Communications and Networking*, vol. 5, no. 2, pp. 693-702, June 2021, doi:10.1109/TGCN.2021.3062470.
- **Swati Chopade**, Hari Prabhat Gupta, and Tanima Dutta, “Survey on Sensors and Smart Devices for IoT Enabled Intelligent Healthcare System,” *Multimedia Tools and Applications, Springer Nature, Wireless Personal Communications*, vol. 131, no. 3, pp. 1957-1995, 2023.
- Hari Prabhat Gupta, **Swati Chopade**, Tanima Dutta, “Computational Intelligence in Agriculture,” *Emerging Computing Paradigms: Principles, Advances and Applications*, Year 2022, Book Chapter, Publisher: Wiley.