

## DAFTAR PUSTAKA

- Ait Si Ali, A., Djelouat, H., Amira, A., Bensaali, F., Benammar, M., & Bermak, A. (2017). Electronic nose system on the Zynq SoC platform. *Microprocessors and Microsystems*, 53, 145–156. <https://doi.org/10.1016/j.micpro.2017.07.012>
- Ajiboye, A. T., Opadiji, J. F., Yusuf, A. O., & Popoola, J. O. (2021). Analytical determination of load resistance value for MQ-series gas sensors : MQ-6 as case study. *TELKOMNIKA*, 19(2), 575–582. <https://doi.org/10.12928/TELKOMNIKA.v19i2.17427>
- Arroyo, P., Meléndez, F., Suárez, J. I., Herrero, J. L., Rodríguez, S., & Lozano, J. (2020). Electronic nose with digital gas sensors connected via bluetooth to a smartphone for air quality measurements. *Sensors (Switzerland)*, 20(3). <https://doi.org/10.3390/s20030786>
- Asnawati, Febiola, S., Ningsih, Q., & Siswoyo, S. (2023). the Effect of Testing Chamber on the Response Patterns of an Array of Gas Sensors in Sensing Robusta Coffee Aroma From Bangsalsari and Sidomulyo, Jember. *JKPK (Jurnal Kimia Dan Pendidikan Kimia)*, 8(1), 2023.
- Astuti, S. D., Muhamad, A. B., Rahmatillah, A., Yaqubi, A. K., & Susilo, Y. (2023). *Electronic Nose ( E-Nose ) for Quality Detection of Tuna ( Thunnus thynnus ) Contaminated Bacteria*. 11(1), 52–65. <https://doi.org/10.20473/ijtid.v11i1.39206>
- Bakhshipour, A., Zareiforush, H., & Bagheri, I. (2020). Application of decision trees and fuzzy inference system for quality classification and modeling of black and green tea based on visual features. *Journal of Food Measurement and Characterization*, 14(3), 1402–1416. <https://doi.org/10.1007/s11694-020-00390-8>
- Bloom, N., & Reenen, J. Van. (2013). introduction to basic electricity and electronics technology. In *NBER Working Papers*. <http://www.nber.org/papers/w16019>
- Boeker, P. (2014). On “Electronic Nose” methodology. *Sensors and Actuators, B: Chemical*, 204, 2–17. <https://doi.org/10.1016/j.snb.2014.07.087>
- Bonah, E., Huang, X., Aheto, J. H., & Osaе, R. (2020). Application of electronic nose as a non-invasive technique for odor fingerprinting and detection of bacterial foodborne pathogens: a review. *Journal of Food Science and Technology*, 57(6), 1977–1990. <https://doi.org/10.1007/s13197-019-04143-4>
- Burlachenko, J., Kruglenko, I., Snopok, B., & Persaud, K. (2016). Sample handling for electronic nose technology: State of the art and future trends. *TrAC - Trends in Analytical Chemistry*, 82, 222–236. <https://doi.org/10.1016/j.trac.2016.06.007>

- Cervantes, J., Garcia-Lamont, F., Rodríguez-Mazahua, L., & Lopez, A. (2020). A comprehensive survey on support vector machine classification: Applications, challenges and trends. *Neurocomputing*, 408(xxxx), 189–215. <https://doi.org/10.1016/j.neucom.2019.10.118>
- Chauhan, T., Rawat, S., Malik, S., & Singh, P. (2021). Supervised and Unsupervised Machine Learning based Review on Diabetes Care. *2021 7th International Conference on Advanced Computing and Communication Systems, ICACCS 2021*, 581–585. <https://doi.org/10.1109/ICACCS51430.2021.9442021>
- Chen, L., Liu, F., Yang, Y., Tu, Z., Lin, J., Ye, Y., & Xu, P. (2021). Oxygen-enriched fermentation improves the taste of black tea by reducing the bitter and astringent metabolites. *Food Research International*, 148(June), 110613. <https://doi.org/10.1016/j.foodres.2021.110613>
- Chen, Q., Liu, A., Zhao, J., & Ouyang, Q. (2013). Classification of tea category using a portable electronic nose based on an odor imaging sensor array. *Journal of Pharmaceutical and Biomedical Analysis*, 84, 77–83. <https://doi.org/10.1016/j.jpba.2013.05.046>
- Cristianini, N., & Shawe-Taylor, J. (2013). *An Introduction to Support Vector Machines and Other Kernel-based Learning Methods-Cambridge University Press*. Cambridge University Press. <https://doi.org/https://doi.org/10.1017/CBO9780511801389>
- Dai, Y., Zhi, R., Zhao, L., Gao, H., Shi, B., & Wang, H. (2015). Longjing tea quality classification by fusion of features collected from E-nose. *Chemometrics and Intelligent Laboratory Systems*, 144, 63–70. <https://doi.org/10.1016/j.chemolab.2015.03.010>
- Dey, A. (2018). Semiconductor metal oxide gas sensors: A review. *Materials Science and Engineering: B*, 229(July 2017), 206–217. <https://doi.org/10.1016/j.mseb.2017.12.036>
- Dwivedi, A. K. (2018). Performance evaluation of different machine learning techniques for prediction of heart disease. *Neural Computing and Applications*, 29(10), 685–693. <https://doi.org/10.1007/s00521-016-2604-1>
- Estakhroyeh, H. R., Rashedi, E., & Mehran, M. (2018). Design and Construction of Electronic Nose for Multi-purpose Applications by Sensor Array Arrangement Using IBGSA. *Journal of Intelligent and Robotic Systems: Theory and Applications*, 92(2), 205–221. <https://doi.org/10.1007/s10846-017-0759-3>
- Fang, Q. T., Luo, W. W., Zheng, Y. N., Ye, Y., Hu, M. J., Zheng, X. Q., Lu, J. L., Liang, Y. R., & Ye, J. H. (2022). Identification of Key Aroma Compounds Responsible for the Floral Ascents of Green and Black Teas from Different Tea Cultivars. *Molecules*, 27(9). <https://doi.org/10.3390/molecules27092809>

- Fu, J., Huang, C., Xing, J., & Zheng, J. (2012). Pattern classification using an olfactory model with PCA feature selection in electronic noses: Study and application. *Sensors*, *12*(3), 2818–2830. <https://doi.org/10.3390/s120302818>
- Fu, L., You, S., Li, G., Li, X., & Fan, Z. (2023). Application of Semiconductor Metal Oxide in Chemiresistive Methane Gas Sensor: Recent Developments and Future Perspectives. *Molecules*, *28*(18). <https://doi.org/10.3390/molecules28186710>
- Ghosh, S., Dasgupta, A., & Swetapadma, A. (2019). A study on support vector machine based linear and non-linear pattern classification. *Proceedings of the International Conference on Intelligent Sustainable Systems, ICISS 2019, Iciss*, 24–28. <https://doi.org/10.1109/ISS1.2019.8908018>
- Goel, N. (2023). Metal oxide semiconductors for gas sensing. *Engineering Reports, July 2022*, 1–22. <https://doi.org/10.1002/eng2.12604>
- Guo, X., Ho, C. T., Schwab, W., & Wan, X. (2021). Aroma profiles of green tea made with fresh tea leaves plucked in summer. *Food Chemistry*, *363*(January), 130328. <https://doi.org/10.1016/j.foodchem.2021.130328>
- Guo, X., Peng, C., Zhang, S., Yan, J., Duan, S., Wang, L., Jia, P., & Tian, F. (2015). A novel feature extraction approach using window function capturing and QPSO-SVM for enhancing electronic nose performance. *Sensors (Switzerland)*, *15*(7), 15198–15217. <https://doi.org/10.3390/s150715198>
- Han, Z. X., Rana, M. M., Liu, G. F., Gao, M. J., Li, D. X., Wu, F. G., Li, X. B., Wan, X. C., & Wei, S. (2016). Green tea flavour determinants and their changes over manufacturing processes. *Food Chemistry*, *212*, 739–748. <https://doi.org/10.1016/j.foodchem.2016.06.049>
- Hariyanto, Sarno, R., & Wijaya, D. R. (2017). 2017 International Conference on Information & Communication Technology and System (ICTS). *Detection of Diabetes from Gas Analysis of Human Breath Using E-Nose*, *0*, 241–246.
- Heaney, M. B. (2003). Electrical Conductivity and Resistivity. Electrical Measurement, Signal Processing, and Displays. *Academia.Edu*, 7-1 7-14. [https://www.academia.edu/29112469/Electrical\\_Conductivity\\_and\\_Resistivity](https://www.academia.edu/29112469/Electrical_Conductivity_and_Resistivity)
- James, G., Daniela Witten, Hastie, T., & Tibshirani, R. (2013). *Springer Texts in Statistics An Introduction to Statistical Learning with application in R*.
- Jia, W., Liang, G., Jiang, Z., & Wang, J. (2019). Advances in Electronic Nose Development for Application to Agricultural Products. *Food Analytical Methods*, *12*(10), 2226–2240. <https://doi.org/10.1007/s12161-019-01552-1>
- Jiménez-López, I., Molina-Quiroga, J., & Gutiérrez, J. M. (2023). *Classification of Teas Using Different Feature Extraction Methods from Signals of a Lab-Made Electronic Nose*. 20. <https://doi.org/10.3390/csac2023-14933>

- Jolvis Pou, K. R. (2016). Fermentation: The Key Step in the Processing of Black Tea. *Journal of Biosystems Engineering*, 41(2), 85–92. <https://doi.org/10.5307/jbe.2016.41.2.085>
- Karakaya, D., Ulucan, O., & Turkan, M. (2020). Electronic Nose and Its Applications: A Survey. *International Journal of Automation and Computing*, 17(2), 179–209. <https://doi.org/10.1007/s11633-019-1212-9>
- Kenji, S. (2011). *Artificial Neural Networks: Methodological Advances and Biomedical Applications - Google Kitaplar* (Issue April 2011).
- Krstinić, D., Braović, M., Šerić, L., & Božić-Štulić, D. (2020). Multi-label Classifier Performance Evaluation with Confusion Matrix. *Computer Science & Information Technology*, 1, 01–14. <https://doi.org/10.5121/csit.2020.100801>
- Li, Y., Yang, K., He, Z., Liu, Z., Lu, J., Zhao, D., Zheng, J., & Qian, M. C. (2023). Can Electronic Nose Replace Human Nose?—An Investigation of E-Nose Sensor Responses to Volatile Compounds in Alcoholic Beverages. *ACS Omega*, 8(18), 16356–16363. <https://doi.org/10.1021/acsomega.3c01140>
- Lin, Y., Wang, Y., Huang, Y., Song, H., & Yang, P. (2023). Aroma Identification and Classification in 18 Kinds of Teas (*Camellia sinensis*) by Sensory Evaluation, HS-SPME-GC-IMS/GC × GC-MS, and Chemometrics. *Foods*, 12(13). <https://doi.org/10.3390/foods12132433>
- Lintang, C. A., Widodo, T. W., & Lelono, D. (2016). Rancang Bangun Electronic Nose untuk Mendeteksi Tingkat Kebusukan Ikan Air Tawar. *IJEIS (Indonesian Journal of Electronics and Instrumentation Systems)*, 6(2), 129. <https://doi.org/10.22146/ijeis.15251>
- Loutfi, A., Coradeschi, S., Mani, G. K., Shankar, P., & Rayappan, J. B. B. (2015). Electronic noses for food quality: A review. *Journal of Food Engineering*, 144, 103–111. <https://doi.org/10.1016/j.jfoodeng.2014.07.019>
- Lu, X., Wang, J., Lu, G., Lin, B., Chang, M., & He, W. (2019). Quality level identification of West Lake Longjing green tea using electronic nose. *Sensors and Actuators, B: Chemical*, 301(April), 127056. <https://doi.org/10.1016/j.snb.2019.127056>
- Mada Sanjaya, W. S., Roziqin, A., Taqwim, A., Sintia, P., Alamsyah, F., Putra, T. F., Mubasyir, F. H., Gustamal, S., Temiesela, A. W., Fauzi Badru Zaman, M., Sari, N. A. M. P., & Anggraeni, D. (2023). Electronic Nose for Tea Identification Detection based on Machine Learning K-Nearest Neighbors Method and Raspberry Pi 4. *Proceeding - 2023 2nd International Conference on Computer System, Information Technology, and Electrical Engineering: Sustainable Development for Smart Innovation System, COSITE 2023*, 55–60. <https://doi.org/10.1109/COSITE60233.2023.10250144>

- Ningsih, F. (2022). Pengaruh Variasi Cylindrical Chamber Design dalam Mendeteksi Aroma Kopi Robusta Sidomulyo dan Bangsalsari Jember terhadap Pola Respon Sensor Gas Array. In *Repository.Unej.Ac.Id*. <https://repository.unej.ac.id/handle/123456789/106475>
- Obaid, H. S., Dheyab, S. A., & Sabry, S. S. (2019). The impact of data pre-processing techniques and dimensionality reduction on the accuracy of machine learning. *2019 9th Annual Information Technology, Electromechanical Engineering and Microelectronics Conference (IEMECON)*, 279–283. <https://doi.org/https://doi.org/10.1109/IEMECONX.2019.8877011>
- Osisanwo, Akinsola, Awodele, Hinmikaiye, Olakanmi, & Akinjobi. (2017). Supervised Machine Learning Algorithms: Classification and Comparison. *International Journal of Computer Trends and Technology*, 48(3), 128–138. <https://doi.org/10.14445/22312803/ijctt-v48p126>
- Pamungkas, R., Sukanli, P., Fathona, I. W., & Abrar. (2019). *Design of Electrical Testing Device for I-V Curve and Real Time Response Curve*. 6(2), 5351–5357.
- Park, S. Y., Kim, Y., Kim, T., Eom, T. H., Kim, S. Y., & Jang, H. W. (2019). Chemoresistive materials for electronic nose: Progress, perspectives, and challenges. *InfoMat*, 1(3), 289–316. <https://doi.org/10.1002/inf2.12029>
- Patel, H. K., Austin, R. H., & Barber, J. (2014). The Electronic Nose: Artificial Olfaction Technology. In *Biological and Medical Physics, Biomedical Engineering*. <http://link.springer.com/10.1007/978-81-322-1548-6>
- Qin, Z., Pang, X., Chen, D., Cheng, H., Hu, X., & Wu, J. (2013). Evaluation of Chinese tea by the electronic nose and gas chromatography-mass spectrometry: Correlation with sensory properties and classification according to grade level. *Food Research International*, 53(2), 864–874. <https://doi.org/10.1016/j.foodres.2013.02.005>
- Qiu, X., Wang, J., Yu, X., Lv, S., Wu, Y., Wang, C., Gao, X., Li, J., Zhang, W., Zhao, P., & Meng, Q. (2017). Aroma formation in Dianhong black tea: Effects of baking. *International Journal of Food Properties*, 20(11), 2724–2735. <https://doi.org/10.1080/10942912.2016.1249797>
- Raghavendra, S., & Deka, P. C. (2014). Support vector machine applications in the field of hydrology: A review. *Applied Soft Computing Journal*, 19, 372–386. <https://doi.org/10.1016/j.asoc.2014.02.002>
- Raju, P., & Li, Q. (2022). Review—Semiconductor Materials and Devices for Gas Sensors. *Journal of The Electrochemical Society*, 169(5), 057518. <https://doi.org/10.1149/1945-7111/ac6e0a>
- Robbiani, S., Lotesoriere, B. J., Dellacà, R. L., & Capelli, L. (2023). Physical Confounding Factors Affecting Gas Sensors Response: A Review on Effects

- and Compensation Strategies for Electronic Nose Applications. *Chemosensors*, 11(10). <https://doi.org/10.3390/chemosensors11100514>
- Sabilla, S. I., Sarno, R., & Siswantoro, J. (2017). Estimating Gas Concentration using Artificial Neural Network for Electronic Nose. *Procedia Computer Science*, 124, 181–188. <https://doi.org/10.1016/j.procs.2017.12.145>
- Scott, S. M., James, D., & Ali, Z. (2006). Data analysis for electronic nose systems. *Microchimica Acta*, 156(3–4), 183–207. <https://doi.org/10.1007/s00604-006-0623-9>
- Soofi, A., & Awan, A. (2017). Classification Techniques in Machine Learning: Applications and Issues. *Journal of Basic & Applied Sciences*, 13, 459–465. <https://setpublisher.com/index.php/jbas/article/view/1715>
- Srivastava, D., Kesarwani, A., Dubey, S., Paul Kuria, K., Ochieng Robinson, O., Mutava Gabriel, M., & Shrestha, R. (2020). Monitoring Temperature and Humidity using Arduino Nano and Module-DHT11 Sensor with Real Time DS3231 Data Logger and LCD Display. *International Journal of Scientific & Engineering Research*, 9(12), 518–521. [https://www.researchgate.net/profile/Rajesh-Shrestha-4/publication/344087453\\_Study\\_and\\_Control\\_of\\_DHT11\\_Using\\_Atmega328P\\_Microcontroller/links/5f635202458515b7cf39b9ea/Study-and-Control-of-DHT11-Using-Atmega328P-Microcontroller.pdf](https://www.researchgate.net/profile/Rajesh-Shrestha-4/publication/344087453_Study_and_Control_of_DHT11_Using_Atmega328P_Microcontroller/links/5f635202458515b7cf39b9ea/Study-and-Control-of-DHT11-Using-Atmega328P-Microcontroller.pdf)
- Sunil, T. T., Chaudhuri, S., & Mishra, V. (2015). Optimal selection of SAW sensors for E-Nose applications. *Sensors and Actuators, B: Chemical*, 219, 238–244. <https://doi.org/10.1016/j.snb.2015.04.107>
- Suthaharan, S. (2016). Machine Learning Models and Algorithms for Big Data Classification: Thinking with Examples for Effective Learning. In *Springer International Publishing* (1st editio). Springer International Publishing. <https://doi.org/10.1007/978-1-4899-7641-3>
- Tan, J., & Xu, J. (2020). Applications of electronic nose (e-nose) and electronic tongue (e-tongue) in food quality-related properties determination: A review. *Artificial Intelligence in Agriculture*, 4, 104–115. <https://doi.org/10.1016/j.aiia.2020.06.003>
- Tang, G. Y., Meng, X., Gan, R. Y., Zhao, C. N., Liu, Q., Feng, Y. Bin, Li, S., Wei, X. L., Atanasov, A. G., Corke, H., & Li, H. Bin. (2019). Health functions and related molecular mechanisms of tea components: An update review. *International Journal of Molecular Sciences*, 20(24), 1–42. <https://doi.org/10.3390/ijms20246196>
- Telaumbanua, M., Novita, D. D., Triyono, S., & Saragih, C. (2021). Tipe Chamber Dan Posisi Sensor E-Nose Untuk Mendeteksi Aroma Biji Kopi Robusta Menggunakan Mikrokontroler. *Jurnal Ilmiah Rekayasa Pertanian Dan Biosistem*, 9(1), 84–95. <https://doi.org/10.29303/jrpb.v9i1.237>

- Theodoridis, T., & Kraemer, J. (2014). *Introduction to Audio Analysis*. Elsevier Ltd.
- Viccione, G., Zarra, T., Giuliani, S., Naddeo, V., & Belgiorno, V. (2012). Performance study of e-nose measurement chamber for environmental odour monitoring. *Chemical Engineering Transactions*, *30*, 109–114. <https://doi.org/10.3303/CET1230019>
- Wang, C., Yin, L., Zhang, L., Xiang, D., & Gao, R. (2010). Metal oxide gas sensors: Sensitivity and influencing factors. *Sensors*, *10*(3), 2088–2106. <https://doi.org/10.3390/s100302088>
- Wang, S., Yang, X., Zhang, Y., Phillips, P., Yang, J., & Yuan, T. F. (2015). Identification of green, oolong and black teas in China via wavelet packet entropy and fuzzy support vector machine. *Entropy*, *17*(10), 6663–6682. <https://doi.org/10.3390/e17106663>
- Widodo, S. (2019). Review Sensor Gas Berbasis Metal Oksida Semikonduktor Untuk Mendeteksi Gas Polutan Yang Selektif Dan Sensitif. In *Techno-Socio Ekonomika* (Vol. 12, Issue 2, pp. 92–112). <https://doi.org/10.32897/techno.2019.12.2.1>
- Xu, M., Wang, J., & Zhu, L. (2021). Tea quality evaluation by applying E-nose combined with chemometrics methods. *Journal of Food Science and Technology*, *58*(4), 1549–1561. <https://doi.org/10.1007/s13197-020-04667-0>
- Yan, J., Guo, X., Duan, S., Jia, P., Wang, L., Peng, C., & Zhang, S. (2015). Electronic nose feature extraction methods: A review. *Sensors (Switzerland)*, *15*(11), 27804–27831. <https://doi.org/10.3390/s151127804>
- Ye, Z., Liu, Y., & Li, Q. (2021). Recent progress in smart electronic nose technologies enabled with machine learning methods. *Sensors*, *21*(22), 23–26. <https://doi.org/10.3390/s21227620>
- Yin, Y., & Zhao, Y. (2019). A feature selection strategy of E-nose data based on PCA coupled with Wilks  $\Lambda$ -statistic for discrimination of vinegar samples. *Journal of Food Measurement and Characterization*, *13*(3), 2406–2416. <https://doi.org/10.1007/s11694-019-00161-0>
- Yue, X., Wei, S., Zhang, P., Zhou, Z., Tao, T. H., & Qin, N. (2023). Electronic-Nose: An Array of 16 MOS-Gas Sensors Integrated With Temperature and Moisture Sensing Capabilities. *2023 IEEE 36th International Conference on Micro Electro Mechanical Systems (MEMS)*, 807–810. <https://doi.org/10.1109/MEMS49605.2023.10052638>
- Zhang, J., Van Mullem, J., Dias, D. R., & Schwan, R. F. (2021). The chemistry and sensory characteristics of new herbal tea-based kombuchas. *Journal of Food Science*, *86*(3), 740–748. <https://doi.org/10.1111/1750-3841.15613>
- Zhou, Y., Heng, Y., Zhu, J., Qian, C., Wang, T., Nguyen, D. H., & Jiao, M. (2024). Enhanced Gas Recognition of Electronic Nose Using 1-D

Convolutional Neural Network With Savitzky-Golay Filter. *IEEE Sensors Journal*, 24(7), 10769–10778. <https://doi.org/10.1109/JSEN.2024.3363698>

