

DAFTAR PUSTAKA

- Adelina, N.M., Wang, H., Zhang, L. and Zhao, Y., 2021, Comparative analysis of volatile profiles in two grafted pine nuts by headspace-SPME/GC-MS and electronic nose as responses to different roasting conditions, *Food Res. Int.*, 140, 110026.
- Agustika, D.K. and Triyana, K., 2016, Application of principal component analysis and discrete wavelet transform in electronic nose for herbal drinks classification, *AIP Conf. Proc.*, 1755, July, 1–7.
- Almaleeh, A.A., Adom, A.H. and Fathinul-Syahir, A.S., 2017, Classification of the botanical origin for Malaysian honey using UV-Vis spectroscopy, *AIP Conf. Proc.*, 1808.
- Ampuero, S., Bogdanov, S. and Bosset, J.-O., 2004, Classification of unifloral honeys with an MS-based electronic nose using different sampling modes: SHS, SPME and INDEX, *Eur. Food Res. Technol.*, 218, 2, 198–207.
- Anggriawan, R.Y., 2019, Studi Penentuan Kadar Nikotin pada Rokok Elektronik Menggunakan E-Nose dengan Kemometrik sebagai Analisisnya, Skripsi, Departemen Fisika FMIPA UGM, Yogyakarta.
- Ballabio, D., Robotti, E., Grisoni, F., Quasso, F., Bobba, M., Vercelli, S., Gosetti, F., Calabrese, G., Sangiorgi, E., Orlandi, M. and Marengo, E., 2018, Chemical profiling and multivariate data fusion methods for the identification of the botanical origin of honey, *Food Chem.*, 266, 79–89.
- Bareke, T. and Addi, A., 2019, Pollen Analysis of Honey from Borana Zone of Southern Ethiopia, *J. Apic. Sci.*, 63, 2, 233–242.
- Bhattacharyya, N. and Bandhopadhyay, R., 2010, Electronic Nose and Electronic Tongue BT - Nondestructive Evaluation of Food Quality: Theory and Practice. In S. N. Jha, ed. Springer Berlin Heidelberg, Berlin, Heidelberg, pp. 73–100.
- Bhavsar, M.H. and Ganatra, A., 2016, Radial Basis Polynomial Kernel (RBPK): A Generalized Kernel for Support Vector Machine, *Int. J. Comput. Sci. Inf. Secur.*, 14, 4 .
- BSN, 2013, Standar Nasional Indonesia SNI 3545:2013 Madu.
- BSN, 2018, Standar Nasional Indonesia SNI 8664:2018 Madu, www.bsn.go.id Jakarta.
- Cano Marchal, P., Sanmartin, C., Satorres Martínez, S., Gómez Ortega, J., Mencarelli, F. and Gámez García, J., 2021, Prediction of Fruity Aroma Intensity and Defect Presence in Virgin Olive Oil Using an Electronic Nose, *Sensors*, 21, 7 .
- Chen, H., Jin, L., Fan, C. and Wang, W., 2017, Non-targeted volatile profiles for the classification of the botanical origin of Chinese honey by solid-phase microextraction and gas chromatography–mass spectrometry combined with chemometrics, *J. Sep. Sci.*, 40, 22, 4377–4384.

- Choopun, S. and Hongsith, N., 2012, Metal-Oxide Nanowires for Gas Sensors, *Cvd*, 3–24.
- Codex Alimentarius, 2001, STANDARD FOR HONEY, 11, 1, 1–14.
- Consonni, R., Bernareggi, F. and Cagliani, L.R., 2019, NMR-based metabolomic approach to differentiate organic and conventional Italian honey, *Food Control*, 98, 133–140.
- Deng, J., Chen, W., Wang, C. and Wang, W., 2021, Prediction Model for Coal Spontaneous Combustion Based on SA-SVM, *ACS Omega*, 6, 17, 11307–11318.
- Dymerski, T., Gebicki, J., Wardencki, W. and Namieśnik, J., 2014, Application of an electronic nose instrument to fast classification of Polish honey types, *Sensors (Switzerland)*, 14, 6, 10709–10724.
- El Sohaimy, S.A., Masry, S.H.D. and Shehata, M.G., 2015, Physicochemical characteristics of honey from different origins, *Ann. Agric. Sci.*, 60, 2, 279–287.
- Elamine, Y., Inácio, P.M.C., Lyoussi, B., Anjos, O., Estevinho, L.M., da Graça Miguel, M. and Gomes, H.L., 2019, Insight into the sensing mechanism of an impedance based electronic tongue for honey botanic origin discrimination, *Sensors Actuators B Chem.*, 285, 24–33.
- Emilio, M.D.P., 2013, Data acquisition systems, *Springer*.
- Escuredo, O. and Seijo, M.C., 2019, Honey: Chemical Composition, Stability and Authenticity, *Foods*, 8, 11.
- Fedorov, F.S., Yaqin, A., Krasnikov, D. V, Kondrashov, V.A., Ovchinnikov, G., Kostyukevich, Y., Osipenko, S. and Nasibulin, A.G., 2021, Detecting cooking state of grilled chicken by electronic nose and computer vision techniques, *Food Chem.*, 345, 128747.
- Gan, Z., Yang, Y., Li, J., Wen, X., Zhu, M., Jiang, Y. and Ni, Y., 2016, Using sensor and spectral analysis to classify botanical origin and determine adulteration of raw honey, *J. Food Eng.*, 178, 151–158.
- Gancarz, M., Malaga-Toboła, U., Oniszczyk, A., Tabor, S., Oniszczyk, T., Gawrysiak-Witulska, M. and Rusinek, R., 2021, Detection and measurement of aroma compounds with the electronic nose and a novel method for MOS sensor signal analysis during the wheat bread making process, *Food Bioprod. Process.*, 127, 90–98.
- Gonzalez Viejo, C., Tongson, E. and Fuentes, S., 2021, Integrating a Low-Cost Electronic Nose and Machine Learning Modelling to Assess Coffee Aroma Profile and Intensity, *Sensors*, 21, 6 .
- Gu, S., Wang, Z., Chen, W. and Wang, J., 2021, Early identification of *Aspergillus* spp. contamination in milled rice by E-nose combined with chemometrics, *J. Sci. Food Agric* .
- Hidayat, S.N., Julian, T. and Triyana, K., 2018, Panduan penggunaan GeNose

- Hidayat, S.N., Nuringtyas, T.R. and Triyana, K., 2018, Electronic Nose Coupled with Chemometrics for Monitoring of Tempeh Fermentation Process, *Proc. - 2018 4th Int. Conf. Sci. Technol. ICST 2018*, 0–5.
- Hidayat, S.N., Rusman, A., Julian, T., Triyana, K., Veloso, A.C.A. and Peres, A.M., 2019, Electronic nose coupled with linear and nonlinear supervised learning methods for rapid discriminating quality grades of superior java cocoa beans, *Int. J. Intell. Eng. Syst.*, 12, 6, 167–176.
- Hidayat, S.N. and Triyana, K., 2016, Optimized back-propagation combined with radial basic neural network for improving performance of the electronic nose: Case study on the fermentation process of tempeh, *AIP Conf. Proc.*, 1755.
- Hidayat, S.N., Triyana, K., Fauzan, I., Julian, T., Lelono, D., Yusuf, Y., Ngadiman, N., Veloso, A.C.A. and Peres, A.M., 2019, The electronic nose coupled with chemometric tools for discriminating the quality of black tea samples in situ, *Chemosensors*, 7, 3.
- Huang, L., Liu, H., Zhang, B. and Wu, D., 2015, Application of Electronic Nose with Multivariate Analysis and Sensor Selection for Botanical Origin Identification and Quality Determination of Honey, *Food Bioprocess Technol.*, 8, 2, 359–370.
- James, G., Witten, D., Hastie, T. and Tibshirani, R., 2013, *An introduction to statistical learning*, Springer.
- Jaya, F., 2017, *Produk-produk lebah madu dan hasil olahannya*, Universitas Brawijaya Press.
- Jeong, H., Ziemkiewicz, C., Ribarsky, W. and Chang, R., 2009, Understanding Principal Component Analysis Using a Visual Analytics Tool. Charl, *Charlotte Vis. Center, UNC Charlotte*, 1–10.
- Jolliffe, I.T., 2002, Principal Component Analysis. Second Edition, *Springer Ser. Stat.*, 98, 487.
- Karabagias, I.K., Badeka, A. and Kontominas, M.G., 2020, A decisive strategy for monofloral honey authentication using analysis of volatile compounds and pattern recognition techniques, *Microchem. J.*, 152, 104263.
- Kasprzyk, I., Depciuch, J., Grabek-Lejko, D. and Parlinska-Wojtan, M., 2018, FTIR-ATR spectroscopy of pollen and honey as a tool for unifloral honey authentication. The case study of rape honey, *Food Control*, 84, 33–40.
- Kenjerić, F.Č., Mannino, S., Bennedetti, S., Primorac, L. and Kenjerić, D.Č., 2009, Honey botanical origin determination by electronic nose, *J. Apic. Res.*, 48, 2, 99–103.
- Kombo, K.O., Hidayat, S.N., Triyana, K., Julian, T. and Kusmaatmaja, A., 2019, Electronic Nose Coupled with Support Vector Machines for Rapid Discrimination of Black Tea According to the Quality Levels, *Proc. Int. Conf. Electr. Eng. Informatics*, 2019-July, 306–309.
- Kratsios, A. and Hyndman, C., 2021, NEU: A meta-algorithm for universal UAP-invariant feature representation, *J. Mach. Learn. Res.*, 22, 92, 1–51.

- Van Laarhoven, P.J.M. and Aarts, E.H.L., 1987, Simulated annealing. In *Simulated annealing: Theory and applications*. Springer, pp. 7–15.
- Lee, D., Lee, H.J., Yoon, J.W., Kim, M. and Jo, C., 2021, Effect of Different Aging Methods on the Formation of Aroma Volatiles in Beef Strip Loins, *Foods*, 10, 1.
- Morin, J.F. and Lees, M., 2018, *Food Integrity Handbook- A guide to food authenticity issues and analytical solutions*.
- Di Natale, C., Davide, F. and D'Amico, A., 1995, Pattern recognition in gas sensing: well-stated techniques and advances, *Sensors Actuators B. Chem.*
- Nomura, M., Osada, E., Tokita, T., Iwamoto, T. and Manome, Y., 2021, Measurement and differentiation of banana juice scent using an electronic nose FF-2A C. Bilbao-Sainz, ed., *PeerJ*, 9, e10638.
- Pascual-Maté, A., Osés, S.M., Fernández-Muiño, M.A. and Sancho, M.T., 2018, Methods of analysis of honey, *J. Apic. Res.*, 57, 1, 38–74.
- Patel, H.K., 2014, *The Electronic Nose : Artificial Olfaction Technology*, edisi 1, Springer India.
- Pavlova, T., Stamatovska, V., Kalevska, T., Dimov, I. and Nakov, G., 2018, Quality characteristics of honey: a review, *Proc. Univ. Ruse*, 57, 10.2, 32–37.
- Pearce, T.C., Schiffman, S.S., Nagle, H.T. and Gardner, J.W., 2003, *Handbook of Machine Olfaction: Electronic Nose Technology*, WILEY-VCH Verlag GmbH and Co. KGaA, Weinheim.
- Pedregosa, F., Grisel, O., Weiss, R., Passos, A., Brucher, M., Varoquax, G., Gramfort, A., Michel, V., Thirion, B., Grisel, O., Blondel, M., Prettenhofer, P., Weiss, R., Dubourg, V. and Brucher, M., 2011, Scikit-learn: Machine Learning in Python, *J. Mach. Learn. Res.*, 12, 2825–2830.
- Popek, S., Halagarda, M. and Kurska, K., 2017, A new model to identify botanical origin of Polish honeys based on the physicochemical parameters and chemometric analysis, *LWT*, 77, 482–487.
- Prehanto, D.R., Indriyanti, A.D., Nuryana, I.K.D. and Permadi, G.S., 2021, Classification based on K-Nearest Neighbor and Logistic Regression method of coffee using Electronic Nose, *IOP Conf. Ser. Mater. Sci. Eng.*, 1098, 3, 032080.
- Prosser, S.W.J. and Hebert, P.D.N., 2017, Rapid identification of the botanical and entomological sources of honey using DNA metabarcoding, *Food Chem.*, 214, 183–191.
- Puspita, M., 2020, *Klasifikasi Sosis Berdasarkan Asal Daging Menggunakan Hidung Elektronik yang Dikopel dengan Kemometrik*, Tesis, Departemen Fisika FMIPA UGM, Yogyakarta.
- Qiu, S., Gao, L. and Wang, J., 2014, Classification and regression of ELM, LVQ and SVM for E-nose data of strawberry juice, *J. Food Eng.*, 144, 77–85.
- Rasekh, M. and Karami, H., 2021, E-nose coupled with an artificial neural network to detection of fraud in pure and industrial fruit juices, *Int. J. Food Prop.*, 24,

1, 592–602.

- Rodopoulou, M.-A., Tananaki, C., Dimou, M., Liolios, V., Kanelis, D., Goras, G. and Thrasyvoulou, A., 2018, The determination of the botanical origin in honeys with over-represented pollen: combination of melissopalynological, sensory and physicochemical analysis, *J. Sci. Food Agric.*, 98, 7, 2705–2712.
- Saravanan, M., Mohanapriya, G., Laha, R., Sathishkumar, R. and Boatwright, J., 2019, DNA barcoding detects floral origin of Indian honey samples, *Genome*, 62, 5, 341–348.
- Sartakhti, J.S., Zangoeei, M.H. and Mozafari, K., 2012, Hepatitis disease diagnosis using a novel hybrid method based on support vector machine and simulated annealing (SVM-SA), *Comput. Methods Programs Biomed.*, 108, 2, 570–579.
- Schuhfried, E., del Pulgar, J.S., Bobba, M., Piro, R., Cappellin, L., Märk, T.D. and Biasoli, F., 2016, Classification of 7 monofloral honey varieties by PTR-ToF-MS direct headspace analysis and chemometrics, *Talanta*, 147, 213–219.
- Scikit-learn, 2020, RBF SVM parameters, https://scikit-learn.org/stable/auto_examples/svm/plot_rbf_parameters.html#sphx-glr-auto-examples-svm-plot-rbf-parameters-py, diakses 13 Juli 2021.
- Soares, S., Grazina, L., Costa, J., Amaral, J.S., Oliveira, M.B.P.P. and Mafra, I., 2018, Botanical authentication of lavender (*Lavandula* spp.) honey by a novel DNA-barcoding approach coupled to high resolution melting analysis, *Food Control*, 86, 367–373.
- Sousa, M.E.B.C., Dias, L.G., Veloso, A.C.A., Estevinho, L., Peres, A.M. and Machado, A.A.S.C., 2014, Practical procedure for discriminating monofloral honey with a broad pollen profile variability using an electronic tongue, *Talanta*, 128, 284–292.
- Spiteri, M., Rogers, K.M., Jamin, E., Thomas, F., Guyader, S., Lees, M. and Rutledge, D.N., 2017, Combination of ¹H NMR and chemometrics to discriminate manuka honey from other floral honey types from Oceania, *Food Chem.*, 217, 766–772.
- Subari, N., Saleh, J.M., Shakaff, A.Y.M. and Zakaria, A., 2012, A hybrid sensing approach for pure and adulterated honey classification, *Sensors (Switzerland)*, 12, 10, 14022–14040.
- Suhandy, D. and Yulia, M., 2021, The Use of UV Spectroscopy and SIMCA for the Authentication of Indonesian Honeys According to Botanical, Entomological and Geographical Origins, *Molecules*, 26, 4.
- Sulistya, E., 2020, Penggunaan Arduino dan Sistem Akuisisi Data Excel Pada Praktikum Kesetaraan Kalor Listrik, *J. Fis. Indones.*, 22, 2, 12.
- Teixeira, G.G., Dias, L.G., Rodrigues, N., Marx, Í.M.G., Veloso, A.C.A., Pereira, J.A. and Peres, A.M., 2021, Application of a lab-made electronic nose for extra virgin olive oils commercial classification according to the perceived fruitiness intensity, *Talanta*, 226, December 2020.
- Tharwat, A., 2020, Classification assessment methods, *Appl. Comput. Informatics*,

17, 1, 168–192.

- Tian, H., Shen, Y., Yu, H. and Chen, C., 2018, Aroma features of honey measured by sensory evaluation, gas chromatography-mass spectrometry, and electronic nose, *Int. J. Food Prop.*, 21, 1, 1755–1768.
- Triyana, K., Tauhid Subekti, M., Aji, P., Nur Hidayat, S. and Rohman, A., 2015, Development of Electronic Nose with Low-Cost Dynamic Headspace for Classifying Vegetable Oils and Animal Fats, *Appl. Mech. Mater.*, 771, 50–54.
- Tsankova, D. and Lekova, S., 2019, UV- Vis Spectroscopy and Chemometrics Analysis in Distinguishing Different Types of Bulgarian Honey. In *2019 Big Data, Knowledge and Control Systems Engineering (BdKCSE)*. pp. 1–4.
- Ulloa, P.A., Guerra, R., Cavaco, A.M., Rosa da Costa, A.M., Figueira, A.C. and Brigas, A.F., 2013, Determination of the botanical origin of honey by sensor fusion of impedance e-tongue and optical spectroscopy, *Comput. Electron. Agric.*, 94, 1–11.
- Utzeri, V.J., Ribani, A., Schiavo, G., Bertolini, F., Bovo, S. and Fontanesi, L., 2018, Application of next generation semiconductor based sequencing to detect the botanical composition of monofloral, polyfloral and honeydew honey, *Food Control*, 86, 342–349.
- VanderPlas, J., 2016, *Python data science handbook: Essential tools for working with data*, “O’Reilly Media, Inc.”
- Varma, V., 2018, Simulated Annealing For Clustering Problems.
- Wang, X., Gu, Y. and Liu, H., 2021, A Transfer Learning Method for the Protection of Geographical Indication in China Using an Electronic Nose for the Identification of Xihu Longjing Tea, *IEEE Sens. J.*, 21, 6, 8065–8077.
- Wijaya, D.R., Sarno, R. and Zulaika, E., 2021, DWTLSTM for electronic nose signal processing in beef quality monitoring, *Sensors Actuators B Chem.*, 326, 128931.
- Wirta, H., Abrego, N., Miller, K., Roslin, T. and Vesterinen, E., 2021, DNA traces the origin of honey by identifying plants, bacteria and fungi, *Sci. Rep.*, 11, 1, 4798.
- Xagoraris, M., Revelou, P.-K., Dedegkika, S., Kanakis, C.D., Papadopoulos, G.K., Pappas, C.S. and Tarantilis, P.A., 2021, SPME-GC-MS and FTIR-ATR Spectroscopic Study as a Tool for Unifloral Common Greek Honey’s Botanical Origin Identification, *Appl. Sci.*, 11, 7 .
- Xu, J., Liu, K. and Zhang, C., 2021, Electronic nose for volatile organic compounds analysis in rice aging, *Trends Food Sci. Technol.*, 109, 83–93.
- Yan, J., Guo, X., Duan, S., Jia, P., Wang, L., Peng, C. and Zhang, S., 2015, Electronic nose feature extraction methods: A review, *Sensors (Switzerland)*, 15, 11, 27804–27831.
- Yin, T., Yang, Z., Miao, N., Zhang, X., Li, Q., Wang, Z., Li, C., Sun, X. and Lan, Y., 2021, Development of a remote electronic tongue system combined with the VMD-HT feature extraction method for honey botanical origin

authentication, *Measurement*, 171, 108555.

Yu, D. and Gu, Y., 2021, A Machine Learning Method for the Fine-Grained Classification of Green Tea with Geographical Indication Using a MOS-Based Electronic Nose, *Foods*, 10, 4.

Zhang, J., Zhang, Y., Zou, Y. and Zhang, W., 2021, Effects of ultrasound-assisted cooking on quality characteristics of spiced beef during cold storage, *LWT*, 136, 110359.