

REFERENCES

- [1] S. Nurmawati *et al.*, “Clinical characteristics of enteric fever and performance of TUBEX TF IgM test in Indonesian hospitals,” *PLoS Negl. Trop. Dis.*, vol. 18, no. 7, Jul. 2024, doi: 10.1371/journal.pntd.0011848.
- [2] K. Wangdi, K. Kasturiaratchi, S. V. Nery, C. L. Lau, D. J. Gray, and A. C. A. Clements, “Diversity of infectious aetiologies of acute undifferentiated febrile illnesses in south and Southeast Asia: a systematic review,” *BMC Infect. Dis.*, vol. 19, no. 1, p. 577, Dec. 2019, doi: 10.1186/s12879-019-4185-y.
- [3] F. S. M. Silalahi, “Update Kasus Dengue di Indonesia hingga Minggu ke-41 Tahun 2024,” BBLabkesling Kemenkes RI. Accessed: Apr. 03, 2026. [Online]. Available: <https://bblabkesling.go.id/r-komunikasi-kesehatan-salah-satu-kunci-cegah-dan-kendalikan-penyakit-dbd-di-indonesia>
- [4] G. Liu, X. Zhang, Q. Cao, T. Chen, B. Hu, and H. Shi, “The global burden of typhoid and paratyphoid fever from 1990 to 2021 and the impact on prevention and control,” *BMC Infect. Dis.*, vol. 25, no. 1, p. 919, Jul. 2025, doi: 10.1186/s12879-025-11223-8.
- [5] K. Saraswati *et al.*, “Geographical distribution of scrub typhus and risk of *Orientia tsutsugamushi* infection in Indonesia: Evidence mapping,” *PLoS Negl. Trop. Dis.*, vol. 17, no. 9, p. e0011412, Sep. 2023, doi: 10.1371/journal.pntd.0011412.
- [6] A. T. Aman *et al.*, “Etiologies of severe acute respiratory infection (SARI) and misdiagnosis of influenza in Indonesia, 2013-2016,” *Influenza Other Respir. Viruses*, vol. 15, no. 1, pp. 34–44, Jan. 2021, doi: 10.1111/irv.12781.
- [7] A. Hauner *et al.*, “Assessing the diagnostic performance of clinical, serological and molecular approaches to improve dengue case detection in the Peruvian Amazon,” *PLoS Negl. Trop. Dis.*, vol. 20, no. 2, p. e0013984, Feb. 2026, doi: 10.1371/journal.pntd.0013984.
- [8] M. H. Gasem *et al.*, “An observational prospective cohort study of the epidemiology of hospitalized patients with acute febrile illness in Indonesia,”

- PLoS Negl. Trop. Dis.*, vol. 14, no. 1, p. e0007927, Jan. 2020, doi: 10.1371/journal.pntd.0007927.
- [9] S. Chitrapady *et al.*, “Machine-learning-based artificial intelligence tools for the diagnosis of tropical fevers: a systematic review and meta-analysis protocol of diagnostic test accuracy,” *BMJ Open*, vol. 15, no. 8, p. e102158, Aug. 2025, doi: 10.1136/bmjopen-2025-102158.
 - [10] I. Dagal, A. Harrison, A. W. Ibrahim, and W. F. Mbasso, “Comprehensive evaluation of data preprocessing and visualization techniques for enhanced classification and sampling,” *Cluster Comput.*, vol. 28, no. 7, Sep. 2025, doi: 10.1007/s10586-025-05512-9.
 - [11] C. Kaope and Y. Pristyanto, “The Effect of Class Imbalance Handling on Datasets Toward Classification Algorithm Performance,” *MATRIK : Jurnal Manajemen, Teknik Informatika dan Rekayasa Komputer*, vol. 22, no. 2, pp. 227–238, Mar. 2023, doi: 10.30812/matrik.v22i2.2515.
 - [12] W. Arrubla-Hoyos, J. G. Gómez, and E. De-La-Hoz-Franco, “Differential Classification of Dengue, Zika, and Chikungunya Using Machine Learning—Random Forest and Decision Tree Techniques,” *Informatics*, vol. 11, no. 3, p. 69, Sep. 2024, doi: 10.3390/informatics11030069.
 - [13] S. Shenoy *et al.*, “Artificial intelligence in differentiating tropical infections: A step ahead,” *PLoS Negl. Trop. Dis.*, vol. 16, no. 6, p. e0010455, Jun. 2022, doi: 10.1371/journal.pntd.0010455.
 - [14] S. Sriyanto, R. A. Aziz, D. A. Rahayu, Z. Zuriati, M. F. Abdollah, and I. Irianto, “Comparative Analysis Of Machine Learning Algorithms For Dengue Fever Prediction Based On Clinical And Laboratory Features,” *Jurnal Teknik Informatika (Jutif)*, vol. 6, no. 6, pp. 5944–5955, Jan. 2026, doi: 10.52436/1.jutif.2025.6.6.5309.
 - [15] E. C. Gök and M. O. Olgun, “SMOTE-NC and gradient boosting imputation based random forest classifier for predicting severity level of covid-19 patients with blood samples,” *Neural Comput. Appl.*, vol. 33, no. 22, pp. 15693–15707, Nov. 2021, doi: 10.1007/s00521-021-06189-y.
 - [16] Y. F. Zamzam, T. H. Saragih, R. Herteno, Muliadi, D. T. Nugrahadi, and P. H. Huynh, “Comparison of CatBoost and Random Forest Methods for Lung

- Cancer Classification using Hyperparameter Tuning Bayesian Optimization-based,” *Journal of Electronics, Electromedical Engineering, and Medical Informatics*, vol. 6, no. 2, pp. 125–136, Apr. 2024, doi: 10.35882/jeeemi.v6i2.382.
- [17] M. Hamid, F. Hajjej, A. S. Alluhaidan, and N. W. bin Mannie, “Fine tuned CatBoost machine learning approach for early detection of cardiovascular disease through predictive modeling,” *Sci. Rep.*, vol. 15, no. 1, Dec. 2025, doi: 10.1038/s41598-025-13790-x.
- [18] J. A. Balch *et al.*, “Machine Learning–Enabled Clinical Information Systems Using Fast Healthcare Interoperability Resources Data Standards: Scoping Review,” *JMIR Med. Inform.*, vol. 11, pp. e48297–e48297, Aug. 2023, doi: 10.2196/48297.
- [19] D. Kreuzberger, N. Köhl, and S. Hirschl, “Machine Learning Operations (MLOps): Overview, Definition, and Architecture,” *IEEE Access*, vol. 11, pp. 31866–31879, 2023, doi: 10.1109/ACCESS.2023.3262138.
- [20] S. A. N., G. Kalnoor, P. R. Bhat, P. Anantha Rao, P. Prajwal, and P. T. Pradeep, “Alleviate: An AI-Powered Mobile Application for Personalized Healthcare Management and Doctor Recommendation,” *IEEE Access*, vol. 13, pp. 215822–215832, 2025, doi: 10.1109/ACCESS.2025.3647089.
- [21] S. Akbulut, F. H. Yagin, I. B. Cicek, C. Koc, C. Colak, and S. Yilmaz, “Prediction of Perforated and Nonperforated Acute Appendicitis Using Machine Learning-Based Explainable Artificial Intelligence,” *Diagnostics*, vol. 13, no. 6, Mar. 2023, doi: 10.3390/diagnostics13061173.
- [22] Z. J. Madewell *et al.*, “Machine learning for predicting severe dengue in Puerto Rico,” *Infect. Dis. Poverty*, vol. 14, no. 1, Dec. 2025, doi: 10.1186/s40249-025-01273-0.
- [23] T. N. Susilawati and W. J. H. McBride, “Acute undifferentiated fever in Asia: a review of the literature.,” *Southeast Asian J. Trop. Med. Public Health*, vol. 45, no. 3, pp. 719–26, May 2014.
- [24] R. K. Dey *et al.*, “Clinical features and outcomes of dengue and scrub typhus in hospitalized adults in the Maldives,” *Travel Med. Infect. Dis.*, vol. 68, Nov. 2025, doi: 10.1016/j.tmaid.2025.102914.

- [25] Q. An, S. Rahman, J. Zhou, and J. J. Kang, “A Comprehensive Review on Machine Learning in Healthcare Industry: Classification, Restrictions, Opportunities and Challenges,” May 01, 2023, *MDPI*. doi: 10.3390/s23094178.
- [26] M. I. Jordan and T. M. Mitchell, “Machine learning: Trends, perspectives, and prospects,” *Science (1979)*., vol. 349, no. 6245, pp. 255–260, Jul. 2015, doi: 10.1126/science.aaa8415.
- [27] L. Prokhorenkova, G. Gusev, A. Vorobev, A. V. Dorogush, and A. Gulin, “CatBoost: unbiased boosting with categorical features,” Jan. 2019, [Online]. Available: <http://arxiv.org/abs/1706.09516>
- [28] T. Akiba, S. Sano, T. Yanase, T. Ohta, and M. Koyama, “Optuna,” in *Proceedings of the 25th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining*, New York, NY, USA: ACM, Jul. 2019, pp. 2623–2631. doi: 10.1145/3292500.3330701.
- [29] F. A. Bohani, A. Suliman, M. Saripuddin, S. S. Sameon, N. S. Md Salleh, and S. Nazeri, “A Comprehensive Analysis of Supervised Learning Techniques for Electricity Theft Detection,” *Journal of Electrical and Computer Engineering*, vol. 2021, 2021, doi: 10.1155/2021/9136206.
- [30] I. H. Sarker, “Machine Learning: Algorithms, Real-World Applications and Research Directions,” *SN Comput. Sci.*, vol. 2, no. 3, p. 160, May 2021, doi: 10.1007/s42979-021-00592-x.
- [31] ScienceDirect, “Data Preprocessing,” Elsevier.
- [32] I. Guyon and A. M. De, “An Introduction to Variable and Feature Selection André Elisseeff,” 2003.
- [33] J. Starcke, J. Spadafora, J. Spadafora, P. Spadafora, and M. Toma, “The Effect of Data Leakage and Feature Selection on Machine Learning Performance for Early Parkinson’s Disease Detection,” *Bioengineering*, vol. 12, no. 8, p. 845, Aug. 2025, doi: 10.3390/bioengineering12080845.
- [34] Z. Zhang, “Missing data imputation: Focusing on single imputation,” *Ann. Transl. Med.*, vol. 4, no. 1, Jan. 2016, doi: 10.3978/j.issn.2305-5839.2015.12.38.

- [35] F. Pedregosa FABIANPEDREGOSA *et al.*, “Scikit-learn: Machine Learning in Python Gaël Varoquaux Bertrand Thirion Vincent Dubourg Alexandre Passos PEDREGOSA, VAROQUAUX, GRAMFORT ET AL. Matthieu Perrot,” 2011. [Online]. Available: <http://scikit-learn.sourceforge.net>.
- [36] N. V Chawla, K. W. Bowyer, L. O. Hall, and W. P. Kegelmeyer, “SMOTE: Synthetic Minority Over-sampling Technique,” 2002.
- [37] W. McKinney, “Data Structures for Statistical Computing in Python,” 2010, pp. 56–61. doi: 10.25080/Majora-92bf1922-00a.
- [38] C. R. Harris *et al.*, “Array programming with NumPy,” *Nature*, vol. 585, no. 7825, pp. 357–362, Sep. 2020, doi: 10.1038/s41586-020-2649-2.
- [39] D. Elreedy and A. F. Atiya, “A Comprehensive Analysis of Synthetic Minority Oversampling Technique (SMOTE) for handling class imbalance,” *Inf. Sci. (N. Y.)*, vol. 505, pp. 32–64, Dec. 2019, doi: 10.1016/j.ins.2019.07.070.
- [40] K. G. M. Moons *et al.*, “PROBAST: A Tool to Assess Risk of Bias and Applicability of Prediction Model Studies: Explanation and Elaboration,” *Ann. Intern. Med.*, vol. 170, no. 1, pp. W1–W33, Jan. 2019, doi: 10.7326/M18-1377.
- [41] P. Peduzzi, J. Concato, E. Kemper, T. R. Holford, and A. R. Feinstein, “A simulation study of the number of events per variable in logistic regression analysis,” *J. Clin. Epidemiol.*, vol. 49, no. 12, pp. 1373–1379, Dec. 1996, doi: 10.1016/S0895-4356(96)00236-3.
- [42] G. Lemaître, F. Nogueira, and C. K. Aridas, “Imbalanced-learn: A Python Toolbox to Tackle the Curse of Imbalanced Datasets in Machine Learning,” 2017. [Online]. Available: <http://jmlr.org/papers/v18/16-365.html>.
- [43] M. Sengupta *et al.*, “Predicting Leptospirosis Using Baseline Laboratory Tests and Geospatial Mapping of Acute Febrile Illness Cases Through Machine Learning-Based Algorithm,” *Cureus*, Nov. 2024, doi: 10.7759/cureus.73779.
- [44] D. Boldini, F. Grisoni, D. Kuhn, L. Friedrich, and S. A. Sieber, “Practical guidelines for the use of gradient boosting for molecular property

- prediction,” *J. Cheminform.*, vol. 15, no. 1, Dec. 2023, doi: 10.1186/s13321-023-00743-7.
- [45] A. V. Dorogush, V. Ershov, and A. Gulin, “CatBoost: gradient boosting with categorical features support,” Oct. 2018, [Online]. Available: <http://arxiv.org/abs/1810.11363>
 - [46] V. Shatravin, D. Shashev, and S. Shidlovskiy, “Implementation of the SoftMax Activation for Reconfigurable Neural Network Hardware Accelerators,” *Applied Sciences*, vol. 13, no. 23, p. 12784, Nov. 2023, doi: 10.3390/app132312784.
 - [47] M. Sokolova and G. Lapalme, “A systematic analysis of performance measures for classification tasks,” *Inf. Process. Manag.*, vol. 45, no. 4, pp. 427–437, Jul. 2009, doi: 10.1016/j.ipm.2009.03.002.
 - [48] L. Yang and A. Shami, “On hyperparameter optimization of machine learning algorithms: Theory and practice,” *Neurocomputing*, vol. 415, pp. 295–316, Nov. 2020, doi: 10.1016/j.neucom.2020.07.061.
 - [49] A. Barredo Arrieta *et al.*, “Explainable Artificial Intelligence (XAI): Concepts, taxonomies, opportunities and challenges toward responsible AI,” *Information Fusion*, vol. 58, pp. 82–115, Jun. 2020, doi: 10.1016/j.inffus.2019.12.012.
 - [50] T. G. Dietterich, “Approximate Statistical Tests for Comparing Supervised Classification Learning Algorithms,” *Neural Comput.*, vol. 10, no. 7, pp. 1895–1923, Oct. 1998, doi: 10.1162/089976698300017197.
 - [51] C. Guo, G. Pleiss, Y. Sun, and K. Q. Weinberger, “On Calibration of Modern Neural Networks,” 2017.
 - [52] G. W. BRIER, “VERIFICATION OF FORECASTS EXPRESSED IN TERMS OF PROBABILITY,” *Mon. Weather Rev.*, vol. 78, no. 1, pp. 1–3, Jan. 1950, doi: 10.1175/1520-0493(1950)078<0001:VOFEIT>2.0.CO;2.
 - [53] A. Ehsan, M. A. M. E. Abuhaliqa, C. Catal, and D. Mishra, “RESTful API Testing Methodologies: Rationale, Challenges, and Solution Directions,” *Applied Sciences*, vol. 12, no. 9, p. 4369, Apr. 2022, doi: 10.3390/app12094369.

- [54] S. Mitropoulos, C. Mitsis, P. Valacheas, and C. Douligieris, “An online emergency medical management information system using mobile computing,” *Applied Computing and Informatics*, vol. 21, no. 1/2, pp. 65–77, Jan. 2025, doi: 10.1108/ACI-03-2021-0069.
- [55] S. A. Kinari, N. Funabiki, S. T. Aung, K. H. Wai, M. Mentari, and P. Puspitaningayu, “An Independent Learning System for Flutter Cross-Platform Mobile Programming with Code Modification Problems,” *Information*, vol. 15, no. 10, p. 614, Oct. 2024, doi: 10.3390/info15100614.
- [56] G. Jošt and V. Taneski, “State-of-the-Art Cross-Platform Mobile Application Development Frameworks: A Comparative Study of Market and Developer Trends,” *Informatics*, vol. 12, no. 2, p. 45, Apr. 2025, doi: 10.3390/informatics12020045.
- [57] Google, “Flutter architectural overview.” Accessed: Mar. 29, 2026. [Online]. Available: <https://docs.flutter.dev/resources/architectural-overview>
- [58] François. Voron, *Building Data Science Applications with FastAPI: Develop, manage, and deploy efficient machine learning applications with Python*. Packt Publishing Limited, 2024.
- [59] S. T. Pulla, H. Yasarer, and L. D. Yarbrough, “Transforming Hydrology Python Packages into Web Application Programming Interfaces: A Comprehensive Workflow Using Modern Web Technologies,” *Water (Basel)*, vol. 16, no. 18, p. 2609, Sep. 2024, doi: 10.3390/w16182609.
- [60] S. R. Stoyanov, L. Hides, D. J. Kavanagh, O. Zelenko, D. Tjondronegoro, and M. Mani, “Mobile App Rating Scale: A New Tool for Assessing the Quality of Health Mobile Apps,” *JMIR Mhealth Uhealth*, vol. 3, no. 1, p. e27, Mar. 2015, doi: 10.2196/mhealth.3422.
- [61] S. Chitrapady *et al.*, “A qualitative study to inform the design and implementation of AI-driven diagnosis: Challenges, barriers, and clinical insights of physicians,” *PLoS One*, vol. 21, no. 5, p. e0348519, May 2026, doi: 10.1371/journal.pone.0348519.
- [62] D. Schütze *et al.*, “Requirements analysis for an AI-based clinical decision support system for general practitioners: a user-centered design process,”

BMC Med. Inform. Decis. Mak., vol. 23, no. 1, p. 144, Jul. 2023, doi: 10.1186/s12911-023-02245-w.

- [63] A. Uihlein *et al.*, “Expectations and Requirements of Surgical Staff for an AI-Supported Clinical Decision Support System for Older Patients: Qualitative Study,” *JMIR Aging*, vol. 7, pp. e57899–e57899, Dec. 2024, doi: 10.2196/57899.