

## DAFTAR PUSTAKA

- Aggarwal, C.C., 2017. *Outlier Analysis*. Springer International Publishing, Cham.  
<https://doi.org/10.1007/978-3-319-47578-3>
- Alba, D., 1976. Determination of soil liquefaction characteristics by large-scale laboratory tests. (No Title).
- Anderson, D.J., Franke, K.W., Kayen, R.E., Dashti, S., Badanagki, M., 2023. The Over-Prediction of Seismically Induced Soil Liquefaction during the 2016 Kumamoto, Japan Earthquake Sequence. *Geosciences* 13, 7.  
<https://doi.org/10.3390/geosciences13010007>
- Andiny, A.N., Faris, F., Adi, A.D., 2021. Re-liquefaction hazard evaluation in flow-slide affected area of Jono Oge, Central Sulawesi, Indonesia. *IOP Conf. Ser.: Earth Environ. Sci.* 861, 052030. <https://doi.org/10.1088/1755-1315/861/5/052030>
- Andrus, R.D., Stokoe II, K.H., 2000. Liquefaction Resistance of Soils from Shear-Wave Velocity. *J. Geotech. Geoenviron. Eng.* 126, 1015–1025.  
[https://doi.org/10.1061/\(ASCE\)1090-0241\(2000\)126:11\(1015\)](https://doi.org/10.1061/(ASCE)1090-0241(2000)126:11(1015))
- Boulanger, R., Idriss, I., 2014. CPT and SPT based liquefaction triggering procedures. Report No. UCD/CGM-14/01, Center for Geotechnical Modeling, University of California, Davis.
- Breiman, L., 2001. Random Forest. *Mach. Learn.* 45, 5–32.
- Brereton, P., Kitchenham, B.A., Budgen, D., Turner, M., Khalil, M., 2007. Lessons from applying the systematic literature review process within the software engineering domain. *Journal of Systems and Software* 80, 571–583.  
<https://doi.org/10.1016/j.jss.2006.07.009>
- Can, R., Kocaman, S., Gokceoglu, C., 2021. A Comprehensive Assessment of XGBoost Algorithm for Landslide Susceptibility Mapping in the Upper Basin of Ataturk Dam, Turkey. *Applied Sciences* 11, 4993. <https://doi.org/10.3390/app11114993>
- Caruana, R., Niculescu-Mizil, A., 2006. An empirical comparison of supervised learning algorithms, in: *Proceedings of the 23rd International Conference on Machine Learning, ICML '06*. Association for Computing Machinery, New York, NY, USA, pp. 161–168. <https://doi.org/10.1145/1143844.1143865>
- Cetin, K.O., Seed, R.B., Kayen, R.E., Moss, R.E.S., Bilge, H.T., Ilgac, M., Chowdhury, K., 2018. Dataset on SPT-based seismic soil liquefaction. *Data in Brief* 20, 544–548.  
<https://doi.org/10.1016/j.dib.2018.08.043>
- Chawla, N.V., Bowyer, K.W., Hall, L.O., Kegelmeyer, W.P., 2002. SMOTE: Synthetic Minority Over-sampling Technique. *Jair* 16, 321–357. <https://doi.org/10.1613/jair.953>
- Chen, T., Guestrin, C., 2016. XGBoost: A Scalable Tree Boosting System, in: *Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*. Presented at the KDD '16: The 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, ACM, San Francisco California USA, pp. 785–794. <https://doi.org/10.1145/2939672.2939785>
- Cunningham, P., Delany, S.J., 2022. k-Nearest Neighbour Classifiers - A Tutorial. *ACM Comput. Surv.* 54, 1–25. <https://doi.org/10.1145/3459665>
- Day, R.W., 2012. *Geotechnical earthquake engineering handbook: with the 2012 International building code*, Second edition. ed. McGraw-Hill, New York.
- de Magistris, F.S., 2015. *The Occurrence of Liquefaction at Low Acceleration Level*.
- Demir, S., 2023. An investigation of feature selection methods for soil liquefaction prediction based on tree-based ensemble algorithms using AdaBoost, gradient



- boosting, and XGBoost. *Neural Computing and Applications* 35, 3173–3190. <https://doi.org/10.1007/s00521-022-07856-4>
- Demir, S., 2022. Comparison of tree-based machine learning algorithms for predicting liquefaction potential using canonical correlation forest, rotation forest, and random forest based on CPT data. *Soil Dynamics and Earthquake Engineering* 154. <https://doi.org/10.1016/j.soildyn.2021.107130>
- Demir, S., Sahin, E.K., 2023. An investigation of feature selection methods for soil liquefaction prediction based on tree-based ensemble algorithms using AdaBoost, gradient boosting, and XGBoost. *Neural Comput & Applic* 35, 3173–3190. <https://doi.org/10.1007/s00521-022-07856-4>
- Demir, S., Şahin, E.K., 2022. Liquefaction prediction with robust machine learning algorithms (SVM, RF, and XGBoost) supported by genetic algorithm-based feature selection and parameter optimization from the perspective of data processing. *Environ Earth Sci* 81, 459. <https://doi.org/10.1007/s12665-022-10578-4>
- Demir, S., Sahin, E.K., 2022. Comparison of tree-based machine learning algorithms for predicting liquefaction potential using canonical correlation forest, rotation forest, and random forest based on CPT data. *Soil Dynamics and Earthquake Engineering* 154, 107130. <https://doi.org/10.1016/j.soildyn.2021.107130>
- Elwirehardja, G.N., Suparyanto, T., Pardamean, B., 2023. *Pengenalan Konsep Machine Learning Untuk Pemula*, First Edition. ed. Instiper Press, Sleman, DI Yogyakarta.
- Fadliansyah, F., Faris, F., Wilopo, W., 2024. Implementation of machine learning classification models considering the optimum data ratio in predicting soil liquefaction susceptibility. *IOP Conf. Ser.: Earth Environ. Sci.* 1416, 012012. <https://doi.org/10.1088/1755-1315/1416/1/012012>
- Fawcett, T., 2006. An introduction to ROC analysis. *Pattern Recognition Letters, ROC Analysis in Pattern Recognition* 27, 861–874. <https://doi.org/10.1016/j.patrec.2005.10.010>
- Galupino, J., Dungca, J., 2022. Machine Learning Models to Generate A Subsurface Soil Profile: A Case of Makati City, Philippines. *GEOMATE* 23. <https://doi.org/10.21660/2022.95.3029>
- Gandomi, A.H., Fridline, M.M., Roke, D.A., 2013. Decision Tree Approach for Soil Liquefaction Assessment. *The Scientific World Journal* 2013, 1–8. <https://doi.org/10.1155/2013/346285>
- Garg, A., Mago, V., 2021. Role of machine learning in medical research: A survey. *Computer Science Review* 40, 100370. <https://doi.org/10.1016/j.cosrev.2021.100370>
- Goharzay, M., Noorzad, A., Ardakani, A.M., Jalal, M., 2017. A worldwide SPT-based soil liquefaction triggering analysis utilizing gene expression programming and Bayesian probabilistic method. *Journal of Rock Mechanics and Geotechnical Engineering* 9, 683–693. <https://doi.org/10.1016/j.jrmge.2017.03.011>
- Gorunescu, F., 2011. *Data Mining, Intelligent Systems Reference Library*. Springer Berlin Heidelberg, Berlin, Heidelberg. <https://doi.org/10.1007/978-3-642-19721-5>
- Green, R.A., Bommer, J.J., 2019. What is the Smallest Earthquake Magnitude that Needs to be Considered in Assessing Liquefaction Hazard? *Earthquake Spectra* 35, 1441–1464. <https://doi.org/10.1193/032218EQS064M>
- Green, R.A., Bommer, J.J., Rodriguez-Marek, A., Maurer, B.W., Stafford, P.J., Edwards, B., Kruiver, P.P., de Lange, G., van Elk, J., 2019. Addressing limitations in existing ‘simplified’ liquefaction triggering evaluation procedures: application to induced seismicity in the Groningen gas field. *Bull Earthquake Eng* 17, 4539–4557. <https://doi.org/10.1007/s10518-018-0489-3>



- Guyon, I., Elisseeff, A., 2003. An introduction to variable and feature selection. *J. Mach. Learn. Res.* 3, 1157–1182.
- Hanna, A.M., Ural, D., Saygili, G., 2007. Neural network model for liquefaction potential in soil deposits using Turkey and Taiwan earthquake data. *Soil Dynamics and Earthquake Engineering* 27, 521–540. <https://doi.org/10.1016/j.soildyn.2006.11.001>
- Hu, J., 2021. Data cleaning and feature selection for gravelly soil liquefaction. *Soil Dynamics and Earthquake Engineering* 145. <https://doi.org/10.1016/j.soildyn.2021.106711>
- Hu, J., 2016. Assessment of seismic liquefaction potential based on Bayesian network constructed from domain knowledge and history data. *Soil Dynamics and Earthquake Engineering* 89, 49–60. <https://doi.org/10.1016/j.soildyn.2016.07.007>
- Hu, J., Wang, J., 2024. A data extension framework of seismic-induced gravelly soil liquefaction based on semi-supervised methods. *Advanced Engineering Informatics* 59, 102295. <https://doi.org/10.1016/j.aei.2023.102295>
- Hu, J.-L., Tang, X.-W., Qiu, J.-N., 2015. A Bayesian network approach for predicting seismic liquefaction based on interpretive structural modeling. *Georisk: Assessment and Management of Risk for Engineered Systems and Geohazards*.
- Hwang, J.-H., Khoshnevisan, S., Juang, C.H., Lu, C.-C., 2021. Soil liquefaction potential evaluation – An update of the HBF method focusing on research and practice in Taiwan. *Engineering Geology* 280, 105926. <https://doi.org/10.1016/j.enggeo.2020.105926>
- Hwang, J.-H., Yang, C.-W., 2001. Verification of critical cyclic strength curve by Taiwan Chi-Chi earthquake data. *Soil Dynamics and Earthquake Engineering* 21, 237–257.
- Idriss, I.M., Boulanger, R.W., 2008. *Soil Liquefaction During Earthquakes*. Earthquake Engineering Research Institute (EERI).
- Ishihara, K., 1985. Stability of Natural Deposits During Earthquakes. *Proceedings of the Eleventh International Conference on Soil Mechanics and Foundation Engineering* 1, 321–376.
- JICA. 2019a. Boring Survey for Basic Response for Central Sulawesi Earthquake (Phase 1) Under the JICA Survey for Disaster Information Collection
- JICA. 2019b. Geotechnical Investigation of Landslide Palu Area. Project for Development of Regional Disaster Risk Resilience Plan in Central Sulawesi.
- Kanno, T., Narita, A., Morikawa, N., Fujiwara, H., Fukushima, Y., 2006. A New Attenuation Relation for Strong Ground Motion in Japan Based on Recorded Data. *Bulletin of the Seismological Society of America* 96, 879–897. <https://doi.org/10.1785/0120050138>
- Kayen, R., 2013. Shear-Wave velocity-based probabilistic and deterministic assessment of seismic soil liquefaction potential. *Journal of Geotechnical and Geoenvironmental Engineering* 139, 407–419. [https://doi.org/10.1061/\(ASCE\)GT.1943-5606.0000743](https://doi.org/10.1061/(ASCE)GT.1943-5606.0000743)
- Kitchenham, B., 2004. *Procedures for Performing Systematic Reviews*.
- Kiyota, T., Furuichi, H., Hidayat, R.F., Tada, N., Nawir, H., 2020. Overview of long-distance flow-slide caused by the 2018 Sulawesi earthquake, Indonesia. *Soils and Foundations* 60, 722–735. <https://doi.org/10.1016/j.sandf.2020.03.015>
- Kotoda, K., Wakamatsu, K., Midorikawa, S., 1988. Seismic Microzoning on Soil Liquefaction Potential Based on Geomorphological Land Classification. *Soils and Foundations* 28, 127–143. [https://doi.org/10.3208/sandf1972.28.2\\_127](https://doi.org/10.3208/sandf1972.28.2_127)
- Kramer, S.L., 1996. *Geotechnical Earthquake Engineering*. Pearson Education India.
- Kumar, D.R., Samui, P., Burman, A., 2023. Determination of Best Criteria for Evaluation of Liquefaction Potential of Soil. *Transp. Infrastruct. Geotech.* 10, 1345–1364. <https://doi.org/10.1007/s40515-022-00268-w>



- Lai, H., Huang, H., Keshavjee, K., Guergachi, A., Gao, X., 2019. Predictive models for diabetes mellitus using machine learning techniques. *BMC Endocr Disord* 19, 101. <https://doi.org/10.1186/s12902-019-0436-6>
- Mandhare, H.C., Idate, S.R., 2017. A comparative study of cluster based outlier detection, distance based outlier detection and density based outlier detection techniques, in: 2017 International Conference on Intelligent Computing and Control Systems (ICICCS). Presented at the 2017 International Conference on Intelligent Computing and Control Systems (ICICCS), IEEE, Madurai, pp. 931–935. <https://doi.org/10.1109/ICCONS.2017.8250601>
- Manzanal, D., Bertelli, S., Lopez-Querol, S., Rossetto, T., Mira, P., 2021. Influence of fines content on liquefaction from a critical state framework: the Christchurch earthquake case study. *Bull Eng Geol Environ* 80, 4871–4889. <https://doi.org/10.1007/s10064-021-02217-2>
- Marto, A., Tan, C.S., Makhtar, A.M., Jusoh, S.N., 2016. Cyclic Behaviour of Johor Sand. *geomate*. <https://doi.org/10.21660/2016.21.5394>
- Mase, L.Z., Fathani, T.F., Adi, A.D., 2013. Experimetal Study of Liquefaction Potential in Opak River, Yogyakarta Special Province (in Indonesian), in: 17th Annual Scientific Meeting of Indonesian Society for Geotechnical Engineering (ISGE). Presented at the 17th Annual Scientific Meeting of Indonesian Society for Geotechnical Engineering (ISGE). <https://doi.org/10.13140/RG.2.1.2802.1284>
- Muhanifah, H., Adi, A.D., Faris, F., 2021. Liquefaction investigation of Balaroa, Central Sulawesi on liquefied and non-liquefied areas. *IOP Conf. Ser.: Earth Environ. Sci.* 861, 052039. <https://doi.org/10.1088/1755-1315/861/5/052039>
- Okamura, M., Ono, K., Arsyad, A., Minaka, U.S., Nurdin, S., 2020. Large-scale flowslide in Sibalaya caused by the 2018 Sulawesi earthquake. *Soils and Foundations* 60, 1050–1063. <https://doi.org/10.1016/j.sandf.2020.03.016>
- Oktarina, P., Fikri, F., Istiarto, 2023. Correlation of excess pore water pressure ratio on flow liquefaction phenomenon in Sibalaya – Central Sulawesi Province. *E3S Web Conf.* 429, 04013. <https://doi.org/10.1051/e3sconf/202342904013>
- Palczyk, A., Grochala, D., Rydosz, A., 2021. Artificial Breath Classification Using XGBoost Algorithm for Diabetes Detection. *Sensors* 21, 4187. <https://doi.org/10.3390/s21124187>
- Pratama, A., Fathani, T.F., Satyarno, I., 2021. Liquefaction potential analysis on Gumbasa Irrigation Area in Central Sulawesi Province after 2018 earthquake. *IOP Conf. Ser.: Earth Environ. Sci.* 930, 012093. <https://doi.org/10.1088/1755-1315/930/1/012093>
- Puri, N., Prasad, H.D., Jain, A., 2018. Prediction of Geotechnical Parameters Using Machine Learning Techniques. *Procedia Computer Science* 125, 509–517. <https://doi.org/10.1016/j.procs.2017.12.066>
- Ramakrishnan, D., Mohanty, K.K., Nayak, S.R., Chandran, R.V., 2006. Mapping the liquefaction induced soil moisture changes using remote sensing technique: an attempt to map the earthquake induced liquefaction around Bhuj, Gujarat, India. *Geotech Geol Eng* 24, 1581–1602. <https://doi.org/10.1007/s10706-005-3811-1>
- Robertson, P.K., Campanella, R.G., 1985. Liquefaction Potential of Sands Using the CPT. *J. Geotech. Engrg.* 111, 384–403. [https://doi.org/10.1061/\(ASCE\)0733-9410\(1985\)111:3\(384\)](https://doi.org/10.1061/(ASCE)0733-9410(1985)111:3(384))
- Sauri, S., Rifa'i, A., Hardiyatmo, H.C., 2021. Liquefaction Vulnerability Analysis using N-SPT Value and Grain Size Analysis on Gumbasa Irrigation Canal in the Post-Disaster Petobo Area, Sulawesi. *IOP Conf. Ser.: Earth Environ. Sci.* 930, 012081. <https://doi.org/10.1088/1755-1315/930/1/012081>





- Seed, H.B., Asce, F., Idriss, I.M., Arango, I., 1983. Evaluation of Liquefaction Potential Using Field Performance Data.
- Seed, H.B., Idriss, I.M., 1971. Simplified Procedure for Evaluating Soil Liquefaction Potential. *Journal of the Soil Mechanics and Foundations Division* 97, 1249–1273. <https://doi.org/10.1061/JSFEAQ.0001662>
- Tang, L., Na, S., 2021. Comparison of machine learning methods for ground settlement prediction with different tunneling datasets. *Journal of Rock Mechanics and Geotechnical Engineering* 13, 1274–1289. <https://doi.org/10.1016/j.jrmge.2021.08.006>
- Tanjung, M.I., Irsyam, M., Sahadewa, A., Iai, S., Tobita, T., Nawir, H., 2023. Overview of Flowslide in Petobo during liquefaction of the 2018 Palu Earthquake. *Soil Dynamics and Earthquake Engineering* 173, 108110. <https://doi.org/10.1016/j.soildyn.2023.108110>
- Taranto-Vera, G., Galindo-Villardón, P., Merchán-Sánchez-Jara, J., Salazar-Pozo, J., Moreno-Salazar, A., Salazar-Villalva, V., 2021. Algorithms and software for data mining and machine learning: a critical comparative view from a systematic review of the literature. *J Supercomput* 77, 11481–11513. <https://doi.org/10.1007/s11227-021-03708-5>
- Tokimatsu, K., Yoshimi, Y., 1983. Empirical Correlation of Soil Liquefaction Based on SPT N-Value and Fines Content. *Soil and Foundations* 23, 56–74. [https://doi.org/10.3208/sandf1972.23.4\\_56](https://doi.org/10.3208/sandf1972.23.4_56)
- Towhata, I., 2008. Mitigation of Liquefaction-Induced Damage, in: Towhata, I. (Ed.), *Geotechnical Earthquake Engineering*, Springer Series in Geomechanics and Geoengineering. Springer, Berlin, Heidelberg, pp. 588–642. [https://doi.org/10.1007/978-3-540-35783-4\\_26](https://doi.org/10.1007/978-3-540-35783-4_26)
- Uddin, S., Khan, A., Hossain, M.E., Moni, M.A., 2019. Comparing different supervised machine learning algorithms for disease prediction. *BMC Med Inform Decis Mak* 19, 281. <https://doi.org/10.1186/s12911-019-1004-8>
- V. Ramalingam, V., Dandapath, A., Karthik Raja, M., 2018. Heart disease prediction using machine learning techniques : a survey. *IJET* 7, 684. <https://doi.org/10.14419/ijet.v7i2.8.10557>
- Wakamatsu, K., Yamamoto, A., Tanaka, I., 2001. Geomorphological Criteria for Evaluating Liquefaction Potential Considering the Level-2 Ground Motion in Japan, in: *International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics*. Presented at the International Conferences on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics.
- Wang, Y., Sherry Ni, X., 2019. A XGBoost risk model via feature selection and Bayesian hyper-parameter optimization. *IJDMS* 11, 01–17. <https://doi.org/10.5121/ijdms.2019.11101>
- Xue, X., Yang, X., 2014. Seismic liquefaction potential assessed by fuzzy comprehensive evaluation method. *Nat Hazards* 71, 2101–2112. <https://doi.org/10.1007/s11069-013-0997-z>
- Xue, X., Yang, X., Li, P., 2017. Application of a probabilistic neural network for liquefaction assessment. *NNW* 27, 557–567. <https://doi.org/10.14311/NNW.2017.27.030>
- Youd, T.L., 1998. Screening Guide for Rapid Assessment of Liquefaction Hazard at Highway Bridge Sites. Technical Report MCEER-98-0005.
- Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, W.D.L., Jr, L.F.H., Hynes, M.E., Ishihara, K., Koester, J.P., Liao, S.S.C., Iii, W.F.M., Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Robertson, P.K., Seed, R.B., Ii, K.H.S., 2001. Liquefaction Resistance of Soils: Summary Report from



- the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils. *Journal of Geotechnical and Geoenvironmental Engineering* Div 127, 297–313.
- Zantvoort, K., Nacke, B., Görlich, D., Hornstein, S., Jacobi, C., Funk, B., 2024. Estimation of minimal data sets sizes for machine learning predictions in digital mental health interventions. *npj Digit. Med.* 7, 361. <https://doi.org/10.1038/s41746-024-01360-w>
- Zhang, J., Wang, Y., 2021. An ensemble method to improve prediction of earthquake-induced soil liquefaction: a multi-dataset study. *Neural Comput & Applic* 33, 1533–1546. <https://doi.org/10.1007/s00521-020-05084-2>
- Zhang, P., Jia, Y., Shang, Y., 2022. Research and application of XGBoost in imbalanced data. *International Journal of Distributed Sensor Networks* 18, 155013292211069. <https://doi.org/10.1177/15501329221106935>
- Zhang, W., Wu, C., Zhong, H., Li, Y., Wang, L., 2021. Prediction of undrained shear strength using extreme gradient boosting and random forest based on Bayesian optimization. *Geoscience Frontiers* 12, 469–477. <https://doi.org/10.1016/j.gsf.2020.03.007>
- Zhang, W., Zhang, R., Wu, C., Goh, A.T.C., Wang, L., 2022. Assessment of basal heave stability for braced excavations in anisotropic clay using extreme gradient boosting and random forest regression. *Underground Space* 7, 233–241. <https://doi.org/10.1016/j.undsp.2020.03.001>