References

[1] G. Grimmett, *Percolation*, second edition ed. New York: Springer-Verlag, 1999.

[2] J. Li and M. Östling, "Precise percolation thresholds of two-dimensional random systems comprising overlapping ellipses," *Physica A: Statistical Mechanics and its Applications*, vol. 462, pp. 940–950, 2016. doi: https://doi.org/10.1016/j.physa.2016.06.020. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0378437116302886

[3] B. Sedgewick and K. Wayne, *COS 226 Programming Assignment, Percolation*, Princeton, 2008. [Online]. Available: https://www.cs.princeton.edu/courses/archive/spring11/cos226/assignments/percolation.html

[4] [Online]. Available: https://upload.wikimedia.org/wikipedia/commons/thumb/e/e6/Gamma_distribution_pdf.svg/800px-Gamma_distribution_pdf.svg.png

[5] J. E. Steif, *A mini course on percolation theory*. Chalmersplatsen, Göteborg: Chalmers University, Aug 2009.

[6] P. J. Flory, "Molecular size distribution in three dimensional polymers. i. gelation1," *Journal of the American Chemical Society*, vol. 63, no. 11, pp. 3083–3090, Nov 1941. doi: 10.1021/ja01856a061. [Online]. Available: https://doi.org/10.1021/ja01856a061

[7] A. Herega, "Some applications of the percolation theory: Brief review of the century beginning," *Journal of Materials Science and Engineering A*, vol. 5, pp. 11–12, 02 2016. doi: 10.17265/2161-6213/2015.11-12.004

[8] A. V. Eletskii, A. A. Knizhnik, B. V. Potapkin, and J. M. Kenny, "Electrical characteristics of carbon nanotube-doped composites,"

Physics-Uspekhi, vol. 58, no. 3, pp. 209–251, mar 2015. doi: 10.3367/ufne.0185.201503a.0225. [Online]. Available: https://doi.org/10.3367/ufne.0185.201503a.0225

[9] S. R. Broadbent and J. M. Hammersley, "Percolation processes: I. crystals and mazes," *Mathematical proceedings of the Cambridge Philosophical Society*, vol. 53, no. 3, pp. 629–641, 1957.

[10] S. De and J. N. Coleman, "The effects of percolation in nanostructured transparent conductors," *MRS bulletin*, vol. 36, no. 10, pp. 774–781, 2011.

[11] S. De, P. J. King, P. E. Lyons, U. Khan, and J. N. Coleman, "Size effects and the problem with percolation in nanostructured transparent conductors," *ACS nano*, vol. 4, no. 12, pp. 7064–7072, 2010.

[12] C. Hu, *Modern semiconductor devices for integrated circuits*. Upper Saddle River, N.J. ; London: Pearson Education, 2010. ISBN 0-13-700668-3

[13] S. W. King, J. Bielefeld, G. Xu, W. A. Lanford, Y. Matsuda, R. H. Dauskardt, N. Kim, D. Hondongwa, L. Olasov, B. Daly, G. Stan, M. Liu, D. Dutta, and D. Gidley, "Influence of network bond percolation on the thermal, mechanical, electrical and optical properties of high and low-k a-sic:h thin films," *Journal of non-crystalline solids*, vol. 379, pp. 67–79, 2013.

[14] S. Novak, R. Hrach, M. Svec, and V. Hrachova, "Electrical properties of nanocomposites near percolation threshold – dynamics," *Thin solid films*, vol. 518, no. 16, pp. 4537–4541, 2010.

[15] A. Zhang, J. Luan, Y. Zheng, L. Sun, and M. Tang, "Effect of percolation on the electrical conductivity of amino molecules non-covalently coated multi-walled carbon nanotubes/epoxy composites," *Applied surface science*, vol. 258, no. 22, pp. 8492–8497, 2012.

[16] V. Nicolosi, M. Chhowalla, M. G. Kanatzidis, M. S. Strano, and J. N. Coleman, "Liquid exfoliation of layered materials," *Science (American Association for the Advancement of Science)*, vol. 340, no. 6139, pp. 1420–1420, 2013.

[17] J. N. Coleman, M. Lotya, A. O'Neill, S. D. Bergin, P. J. King, U. Khan, K. Young, A. Gaucher, S. De, R. J. Smith, I. V. Shvets, S. K. Arora, G. Stanton, H.-Y. Kim, K. Lee, G. T. Kim, G. S. Duesberg,

T. Hallam, J. J. Boland, J. J. Wang, J. F. Donegan, J. C. Grunlan, G. Moriarty, A. Shmeliov, R. J. Nicholls, J. M. Perkins, E. M. Grieveson, K. Theuwissen, D. W. McComb, P. D. Nellist, and V. Nicolosi, "Two-dimensional nanosheets produced by liquid exfoliation of layered materials," *Science (American Association for the Advancement of Science)*, vol. 331, no. 6017, pp. 568–571, 2011.

[18] M. Hempel, D. Nezich, J. Kong, and M. Hofmann, "A novel class of strain gauges based on layered percolative films of 2d materials," *Nano letters*, vol. 12, no. 11, pp. 5714–5718, 2012.

[19] J. Li, M. C. Lemme, and M. Östling, "Inkjet printing of 2d layered materials," *Chemphyschem*, vol. 15, no. 16, pp. 3427–3434, 2014.

[20] J. Li, F. Ye, S. Vaziri, M. Muhammed, M. C. Lemme, and M. Östling, "Efficient inkjet printing of graphene," *Advanced materials (Weinheim)*, vol. 25, no. 29, pp. 3985–3992, 2013.

[21] J. Li and M. Östling, "Percolation thresholds of two-dimensional continuum systems of rectangles," *Physical review. E, Statistical, nonlinear, and soft matter physics*, vol. 88, no. 1, pp. 012 101–012 101, 2013.

[22] S. Marsland, *Machine Learning: An Algorithmic Perspective, Second Edition*, 2nd ed. Chapman & Hall/CRC, 2014. ISBN 1466583282

[23] R. Rojas, *Neural Networks - A Systematic Introduction*. Berlin: Springer-Verlag, 1996. [Online]. Available: http://www.inf.fu-berlin.de/inst/ag-ki/rojas_home/pmwiki/pmwiki.php?n=Books.NeuralNetworksBook

[24] S. Chandramouli, S. Dutt, A. Das, and a. O. M. C. Safari, *Machine Learning*. Pearson Education India, 2018. [Online]. Available: https://books.google.se/books?id=R6ZJzQEACAAJ

[25] E. W. Steyerberg, T. van der Ploeg, and B. Van Calster, "Risk prediction with machine learning and regression methods," *Biometrical journal*, vol. 56, no. 4, pp. 601–606, 2014.

[26] Doreswamy, H. K S, Y. KM, and I. Gad, "Forecasting air pollution particulate matter (pm2.5) using machine learning regression models," *Procedia computer science*, vol. 171, pp. 2057–2066, 2020.

[27] N. A. Povak, P. F. Hessburg, T. C. McDonnell, K. M. Reynolds, T. J. Sullivan, R. B. Salter, and B. J. Cosby, “Machine learning and linear regression models to predict catchment-level base cation weathering rates across the southern appalachian mountain region, usa,” *Water resources research*, vol. 50, no. 4, pp. 2798–2814, 2014.

[28] C. Sutton, L. M. Ghiringhelli, T. Yamamoto, Y. Lysogorskiy, L. Blumenthal, T. Hammerschmidt, J. R. Golebiowski, X. Liu, A. Ziletti, and M. Scheffler, “Crowd-sourcing materials-science challenges with the nomad 2018 kaggle competition,” *npj computational materials*, vol. 5, no. 1, pp. 1–11, 2019.

[29] X. Han, X. Wang, and K. Zhou, “Develop machine learning-based regression predictive models for engineering protein solubility,” *Bioinformatics*, vol. 35, no. 22, pp. 4640–4646, 2019.

[30] L. Breiman, “Random forests,” *Machine Learning*, vol. 45, no. 1, pp. 5–32, Oct 2001. doi: 10.1023/A:1010933404324. [Online]. Available: https://doi.org/10.1023/A:1010933404324

[31] S. Brandt, “Linear and polynomial regression,” in *Data Analysis*. Cham: Springer International Publishing, 2014, pp. 257–267. ISBN 3319037617

[32] F. Rosenblatt, “The perceptron: A probabilistic model for information storage and organization in the brain,” *Psychological review*, vol. 65, no. 6, pp. 386–408, 1958.

[33] T. Chen and C. Guestrin, “Xgboost: A scalable tree boosting system,” *CoRR*, vol. abs/1603.02754, 2016. [Online]. Available: http://arxiv.org/abs/1603.02754

[34] S. Yan, L. Wu, J. Fan, F. Zhang, Y. Zou, and Y. Wu, “A novel hybrid woa-xgb model for estimating daily reference evapotranspiration using local and external meteorological data: Applications in arid and humid regions of china,” *Agricultural water management*, vol. 244, 2021.

[35] A. Pathy, S. Meher, and B. P, “Predicting algal biochar yield using extreme gradient boosting (xgb) algorithm of machine learning methods,” *Algal research (Amsterdam)*, vol. 50, p. 102006, 2020.

[36] J. Zhou, Y. Qiu, D. J. Armaghani, W. Zhang, C. Li, S. Zhu, and R. Tarinejad, “Predicting tbm penetration rate in hard rock condition: A

comparative study among six xgb-based metaheuristic techniques," *Di xue qian yuan.*, vol. 12, no. 3, p. 101091, 2021.

[37] P. García Nieto, E. García-Gonzalo, F. Sánchez Lasheras, and F. de Cos Juez, "Hybrid pso–svm-based method for forecasting of the remaining useful life for aircraft engines and evaluation of its reliability," *Reliability engineering & system safety*, vol. 138, pp. 219–231, 2015.

[38] A. Suarez Sanchez, P. J. Garcia Nieto, P. Riesgo Fernandez, J. J. del Coz Diaz, and F. J. Iglesias-Rodriguez, "Application of an svm-based regression model to the air quality study at local scale in the avilés urban area (spain)," *Mathematical and computer modelling*, vol. 54, no. 5, pp. 1453–1466, 2011.

[39] C. CORTES and VAPNIK, "Support-vector networks," *Machine learning*, vol. 20, no. 3, pp. 273–297, 1995.

[40] W. Liu, P. Wang, Y. Meng, C. Zhao, and Z. Zhang, "Cloud spot instance price prediction using knn regression," *Human-centric computing and information sciences*, vol. 10, no. 1, pp. 1–14, 2020.

[41] Murni, R. Kosasih, A. Fahrurozi, T. Handhika, I. Sari, and D. P. Lestari, "Travel time estimation for destination in bali using knn-regression method with tensorflow," *IOP conference series. Materials Science and Engineering*, vol. 854, no. 1, p. 12061, 2020.

[42] Y. Gou, J. Liu, and T. Zhang, "Knn regression model-based refinement of thermohaline data," in *Proceedings of the Thirteenth ACM International Conference on underwater networks & systems*, ser. WUWNet '18. ACM, 2018. ISBN 1450361935 pp. 1–8.

[43] [Online]. Available: https://github.com/dmlc/xgboost/blob/master/doc/parameter.rst

Appendix A

Data Representation

A.1 Training Data Representation

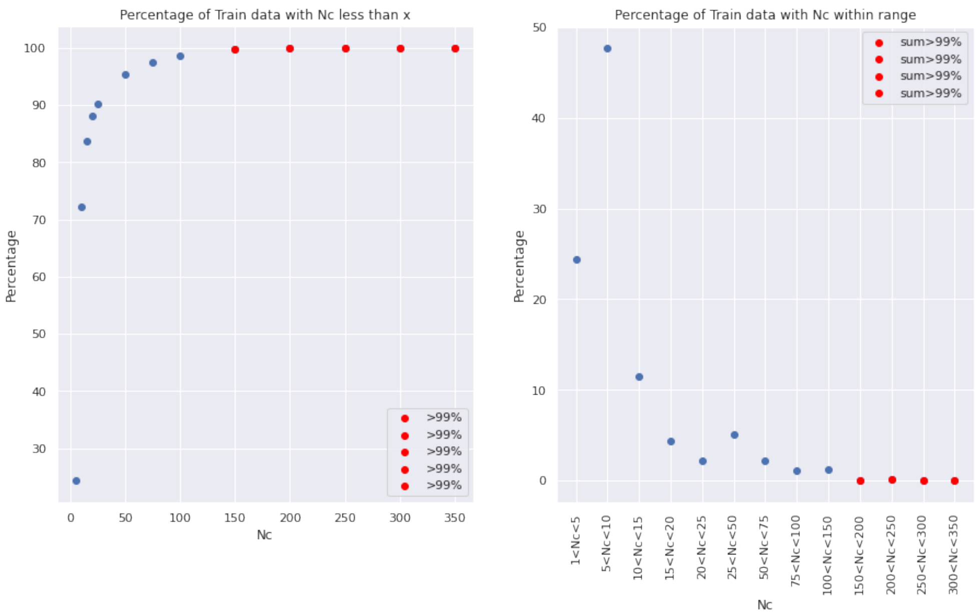

Figure A.1 – Visualisation of the Training Data Representation