REFERENCES

[1] P. Jayachandran, ‘Design of Tall Buildings: Preliminary Design and Optimization’, *National Workshop on High-rise and Tall Buildings, University of Hyderabad, Hyderabad, India, May 2009, Keynote Lecture.*, no. May, pp. 1–20, 2009.

[2] A. M. Rajbhandari, N. Anwar, and F. Najam, ‘The use of Artificial Neural Networks (ANN) for preliminary design of high-rise buildings’, in *6th ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering*, Greece, 2017, pp. 3949–3962. doi: 10.7712/120117.

[3] J. Norman *et al.*, *Conceptual design of buildings*, Version 1.1. London: Institution of Structural Engineers, 2020.

[4] T. Ikumi, E. Galeote, P. Pujadas, A. de la Fuente, and R. D. López-Carreño, ‘Neural network-aided prediction of post-cracking tensile strength of fibre-reinforced concrete’, *Comput Struct*, vol. 256, p. 106640, 2021, doi: 10.1016/j.compstruc.2021.106640.

[5] G. M. Kotsovou, A. Ahmad, D. M. Cotsovos, and N. D. Lagaros, ‘Reappraisal of methods for calculating flexural capacity of reinforced concrete members’, in *Proceedings of the Institution of Civil Engineers: Structures and Buildings*, ICE Publishing, Apr. 2020, pp. 279–290. doi: 10.1680/jstbu.18.00110.

[6] A. Ahmad, N. D. Lagaros, and D. M. Cotsovos, ‘Neural network-based prediction: The case of reinforced concrete members under simple and complex loading’, *Applied Sciences*, vol. 11, no. 11, Jun. 2021, doi: 10.3390/app11114975.

[7] S. Hore *et al.*, ‘Neural-based prediction of structural failure of multistoried RC buildings’, *Structural Engineering and Mechanics*, vol. 58, no. 3, pp. 459–473, 2016, doi: 10.12989/sem.2016.58.3.459.

[8] S. Kravanja, T. Žula, and U. Klanšek, ‘Multi-parametric MINLP optimization study of a composite I beam floor system’, *Eng Struct*, vol. 130, pp. 316–335, 2017, doi: 10.1016/j.engstruct.2016.09.012.

[9] J. Fernandez-Ceniceros, R. Fernandez-Martinez, E. Fraile-Garcia, and F. J. Martinez-De-Pison, ‘Decision support model for one-way floor slab design: A sustainable approach’, *Autom Constr*, vol. 35, pp. 460–470, 2013, doi: 10.1016/j.autcon.2013.06.002.

[10] G. Sancheti, H. Patil, S. Sharma, and S. Goswami, ‘Analysis of Design for One-Way Reinforced Concrete Slabs using Machine Learning Models’, *IOP Conf Ser Mater Sci Eng*, vol. 1099, no. 1, p. 012052, 2021, doi: 10.1088/1757-899x/1099/1/012052.

[11] G. S. Deshmukh and S. D. Halbandge, ‘Study of flat slab by ANN for preliminary design’, *International Journal of Engineering Research & Technology (IJERT)*, no. 5, May 2013, [Online]. Available: www.ijert.org

[12] H. Elhegazy *et al.*, ‘Artificial Intelligence for Developing Accurate Preliminary Cost Estimates for Composite Flooring Systems of Multi-Storey Buildings’, *Journal of Asian Architecture and Building Engineering*, vol. 21, no. 1, pp. 120–132, 2022, doi: 10.1080/13467581.2020.1838288.

[13] A. Olhoff *et al.*, ‘Emissions Gap Report 2024: No more hot air … please! With a massive gap between rhetoric and reality, countries draft new climate commitments’, United Nations Environment Programme, Oct. 2024. doi: 10.59117/20.500.11822/46404.

[14] R. Zizzo, J. Kyriazis, and H. Goodland, ‘Embodied carbon of buildings and infrastructure-International policy review’, Sep. 2017.

[15] N. N. Myint and M. Shafique, ‘Embodied carbon emissions of buildings: Taking a step towards net zero buildings’, *Case Studies in Construction Materials*, vol. 20, Jul. 2024, doi: 10.1016/j.cscm.2024.e03024.

[16] M. A. Ismail and C. T. Mueller, ‘Minimizing embodied energy of reinforced concrete floor systems in developing countries through shape optimization’, *Eng Struct*, vol. 246, no. August, p. 112955, 2021, doi: 10.1016/j.engstruct.2021.112955.

[17] C. Jones, ‘ICE (Inventory of Carbon & Energy) Database v4.0’, https://circularecology.com/embodied-carbon-footprint-database.html.

[18] *ICE Manual of Structural Design: Buildings*. 2012. doi: 10.1680/mosd.41448.

[19] Y. Bhede, S. Bire, H. Girhepuje, P. Girhepuje, and A. Murmade, ‘Green Concrete - Study of a Sustainable Construction Material’, *Int J Res Appl Sci Eng Technol*, vol. 12, no. 4, pp. 3554–3557, Apr. 2024, doi: 10.22214/ijraset.2024.60700.

[20] A. Al-Hamrani, M. Kucukvar, W. Alnahhal, E. Mahdi, and N. C. Onat, ‘Green concrete for a circular economy: A review on sustainability, durability, and structural properties’, *Materials*, vol. 14, no. 351, pp. 1–33, 2021, doi: 10.3390/ma14020351.

[21] M. Herrmann and W. Sobek, ‘Functionally graded concrete: Numerical design methods and experimental tests of mass-optimized structural components’, *Structural Concrete*, vol. 18, no. 1, pp. 54–66, Feb. 2017, doi: 10.1002/suco.201600011.

[22] A. Jayasinghe, J. Orr, W. Hawkins, T. Ibell, and W. P. Boshoff, ‘Comparing different strategies of minimising embodied carbon in concrete floors’, *J Clean Prod*, vol. 345, no. February, p. 131177, 2022, doi: 10.1016/j.jclepro.2022.131177.

[23] W. J. Hawkins, ‘Thin-shell concrete floors for sustainable buildings’, PhD Thesis, University of Cambridge, 2019.

[24] H. Movaffaghi and I. Yitmen, ‘Multi-criteria decision analysis of timber – concrete composite floor systems in multi-storey wooden buildings’, *Civil Engineering and Environmental Systems*, vol. 38, no. 3, pp. 161–175, 2021, doi: 10.1080/10286608.2021.1934826.

[25] J. Ferreiro-Cabello, E. Fraile-Garcia, E. Martinez de Pison Ascacibar, and F. J. Martinez de Pison Ascacibar, ‘Metamodel-based design optimization of structural one-way slabs based on deep learning neural networks to reduce environmental impact’, *Eng Struct*, vol. 155, no. October 2017, pp. 91–101, 2018, doi: 10.1016/j.engstruct.2017.11.005.

[26] A. Kaveh and A. Shakouri Mahmud Abadi, ‘Cost optimization of a composite floor system using an improved harmony search algorithm’, *J Constr Steel Res*, vol. 66, no. 5, pp. 664–669, 2010, doi: 10.1016/j.jcsr.2010.01.009.

[27] A. Kaveh and A. F. Behnam, ‘Cost optimization of a composite floor system, one-way waffle slab, and concrete slab formwork using a charged system search algorithm’, *Scientia Iranica*, vol. 19, no. 3, pp. 410–416, 2012, doi: 10.1016/j.scient.2012.04.001.

[28] U. Klanšek and S. Kravanja, ‘Cost estimation, optimization and competitiveness of different composite floor systems-Part 1: Self-manufacturing cost estimation of composite and steel structures’, *J Constr Steel Res*, vol. 62, no. 5, pp. 434–448, 2006, doi: 10.1016/j.jcsr.2005.08.005.

[29] U. Klanšek and S. Kravanja, ‘Cost estimation, optimization and competitiveness of different composite floor systems-Part 2: Optimization based competitiveness between the composite i beams, channel-section and hollow-section trusses’, *J Constr Steel Res*, vol. 62, no. 5, pp. 449–462, 2006, doi: 10.1016/j.jcsr.2005.08.006.

[30] A. Gulli and S. Pal, *Deep Learning with Keras : Implement neural networks with Keras on Theano and TensorFlow*. Packt Publishing, 2017.

[31] D. Koblah *et al.*, ‘A Survey and Perspective on Artificial Intelligence for Security-Aware Electronic Design Automation’, *ACM Transact Des Autom Electron Syst*, vol. 28, no. 2, Mar. 2023, doi: 10.1145/3563391.

[32] B. Krose and P. Smagt, *An introduction to neural networks*, 8th ed. The University of Amsterdam, 1996.

[33] K. Mehrotra, C. K. Mohan, and S. Ranka, *Elements of Artificial Neural Networks*. The MIT Press, 1996. doi: 10.7551/mitpress/2687.001.0001.

[34] B. Pandit, ‘Review of Artificial Intelligence (AI) work as a human brain’, *International Journal of Novel Research and Development*, vol. 7, no. 12, pp. 2456–4184, 2022, [Online]. Available: www.ijnrd.org

[35] L. Tarassenko, *Guide to Neural Computing Applications*, First edition. Oxford: Butterworth-Heinemann Ltd, 1998.

[36] X. Yang *et al.*, 'Research and applications of artificial neural network in pavement engineering: A state-of-the-art review', *Journal of Traffic and Transportation Engineering (English Edition)*, vol. 8, no. 6, pp. 1000–1021, Dec. 2021, doi: 10.1016/j.jtte.2021.03.005.

[37] I. A. Basheer and M. Hajmeer, 'Artificial neural networks: fundamentals, computing, design, and application', *J Microbiol Methods*, vol. 43, no. 1, pp. 3–31, Dec. 2000, doi: 10.1016/S0167-7012(00)00201-3.

[38] F. Chollet, *Deep learning with Python*, Second edition. Manning Publications Co, 2021.

[39] K. I. Funahashi, 'On the approximate realization of continuous mappings by neural networks', *Neural Networks*, vol. 2, no. 3, pp. 183–192, 1989, doi: 10.1016/0893-6080(89)90003-8.

[40] M. A. N. Dewapriya, R. K. N. D. Rajapakse, and W. P. S. Dias, 'Characterizing fracture stress of defective graphene samples using shallow and deep artificial neural networks', *Carbon N Y*, vol. 163, pp. 425–440, 2020, doi: 10.1016/j.carbon.2020.03.038.

[41] S. Walczak and N. Cerpa, 'Artificial Neural Networks', *Encyclopedia of Physical Science and Technology*. pp. 631–645, 2003. [Online]. Available: http://www.emsl.pnl.gov:2080/proj/neuron/neural/sys-

[42] K. I. Funahashi, 'On the approximate realization of continuous mappings by neural networks', *Neural Networks*, vol. 2, no. 3, pp. 183–192, 1989, doi: 10.1016/0893-6080(89)90003-8.

[43] J. Schmidhuber, 'Deep Learning in neural networks: An overview', *Neural Networks*, vol. 61, no. 2015, pp. 85–117, 2015, doi: 10.1016/j.neunet.2014.09.003.

[44] C. M. Bishop, *Pattern Recognition and Machine Learning*. Springer, 2006.

[45] J. Moody and N. Yarvin, 'Networks with learned unit response functions', *Adv Neural Inf Process Syst*, vol. 4, pp. 1048–1055, 1992.

[46] J. Han, C. Moraga, and S. Sinne, 'Optimization of Feedforward Neural Networks', 1996.

[47] S. Jayashree, B. Jansi, and V. Sumalatha, 'Exploring Activation Functions: A Comprehensive Study on Enhancing Conventional Neural Network Learning', in *Futuristic Trends in Information Technology Volume 3 Book 3*, vol. 3, IIP Series, 2024, pp. 17–26. doi: https://www.doi.org/10.58532/V3BKIT3P1CH2.

[48] O. A. Montesinos-López, A. Montesinos, and J. Crossa, 'Chapter 10: Fundamentals of Artificial Neural Networks and Deep Learning', in *Multivariate Statistical Machine Learning Methods for Genomic Prediction*,

Springer International Publishing, 2022, pp. 379–425. doi: 10.1007/978-3-030-89010-0_10.

[49] O. Sharma, ‘A Novel Activation Function in Convolutional Neural Network for Image Classification in Deep Learning’, in *Data Science and Analytics: 5th International Conference on Recent Developments in Science, Engineering and Technology, REDSET 2019*, vol. 1229 CCIS, Springer, 2020, pp. 120–130. doi: 10.1007/978-981-15-5827-6_10.

[50] F. Chollet, ‘Keras’. Accessed: Feb. 17, 2025. [Online]. Available: https://keras.io

[51] M. Shariati *et al.*, ‘A novel approach to predict shear strength of tilted angle connectors using artificial intelligence techniques’, *Eng Comput*, vol. 37, no. 3, pp. 2089–2109, 2021, doi: 10.1007/s00366-019-00930-x.

[52] A. Jain, K. Nandakumar, and A. Ross, ‘Score normalization in multimodal biometric systems’, *Pattern Recognit*, vol. 38, no. 12, pp. 2270–2285, Dec. 2005, doi: 10.1016/j.patcog.2005.01.012.

[53] G. Castellano and A. M. Fanelli, ‘Variable selection using neural-network models’, *Neurocomputing*, vol. 31, pp. 1–13, 2000.

[54] A. Krogh and J. Vedelsby, ‘Neural Network Ensembles, Cross Validation, and Active Learning’, in *Neural Information Processing Systems*, 1994. [Online]. Available: https://api.semanticscholar.org/CorpusID:5846986

[55] F. Pedregosa *et al.*, ‘Scikit-learn: Machine Learning in Python’, 2011. [Online]. Available: http://scikit-learn.sourceforge.net.

[56] Google, ‘Google Colaboratory’, https://colab.research.google.com/.

[57] European Committee for Standardization, ‘EN 1992-1-1: Eurocode 2: Design of concrete structures-Part 1-1 : General rules and rules for buildings’, Brussels, 2004.

[58] Building and Construction Authority, *Sustainable Construction : A Guide on Concrete Usage Index, BCA Sustainable Construction Series - 6*. Singapore: The Centre for Sustainable Buildings and Construction, Building and Construction Authority, 2012.

[59] A. Ghasemi and S. Zahediasl, ‘Normality tests for statistical analysis: A guide for non-statisticians’, *Int J Endocrinol Metab*, vol. 10, no. 2, pp. 486–489, 2012, doi: 10.5812/ijem.3505.

[60] M. Bowles, *Machine Learning in Python®: Essential techniques for predictive analysis*. Indiana: John Wiley & Sons, Inc, 2015.

[61] V. Vipulananthan, U. Weerasinghe, N. Ariyasinghe, C. Mallikarachchi, and S. Herath, ‘Homogenized material property prediction of carbon fiber composites using data-driven methods’, *Journal of Sustainable Civil and Environmental Engineering Practices*, vol. 1, no. 1, 2023.

[62] F. Maleki, N. Muthukrishnan, K. Ovens, C. Reinhold, and R. Forghani, 'Machine Learning Algorithm Validation: From Essentials to Advanced Applications and Implications for Regulatory Certification and Deployment', Nov. 01, 2020, *W.B. Saunders*. doi: 10.1016/j.nic.2020.08.004.

[63] P. Meddage, I. Ekanayake, U. S. Perera, H. M. Azamathulla, M. A. M. Said, and U. Rathnayake, 'Interpretation of Machine-Learning-Based (Black-box) Wind Pressure Predictions for Low-Rise Gable-Roofed Buildings Using Shapley Additive Explanations (SHAP)', *Buildings*, vol. 12, no. 6, Jun. 2022, doi: 10.3390/buildings12060734.

[64] L. Breiman, J. H. Friedman, R. A. Olshen, and C. J. Stone, *Classification And Regression Trees*. Florida: Chapman & Hall / CRC Press, 1984.

[65] R. S. S. Ranasinghe *et al.*, 'Eco-friendly mix design of slag-ash-based geopolymer concrete using explainable deep learning', *Results in Engineering*, vol. 23, Sep. 2024, doi: https://doi.org/10.1016/j.rineng.2024.102503.

[66] S. M. Lundberg and S.-I. Lee, 'A Unified Approach to Interpreting Model Predictions', in *Advances in Neural Information Processing Systems*, I. Guyon, U. Von Luxburg, S. Bengio, H. Wallach, R. Fergus, S. Vishwanathan, and R. Garnett, Eds., Curran Associates, Inc., 2017. [Online]. Available: https://proceedings.neurips.cc/paper_files/paper/2017/file/8a20a8621978632d76c43dfd28b67767-Paper.pdf