

DAFTAR PUSTAKA

- Acharaya, T. and Ray, A.K., 2005. Image Processing – Principles and Applications. USA: Wiley-Interscience.
- Andono, P.N., Sutoyo, T. and Muljono, P., 2017. Pengolahan Citra Digital. A. Pramesta, ed. Yogyakarta: ANDI Yogyakarta.
- Anton, H. and Rorres, C., 1995. Aljabar Linear Elementer. Jakarta: Erlangga.
- Basuki, A., 2005. Pengolahan Citra Digital Menggunakan Visual Basic. Yogyakarta: Graha Ilmu.
- Breuel, T.M., Ul-Hasan, A., Al-Azawi, M.A. and Shafait, F., 2013. High-performance OCR for printed English and Fraktur using LSTM networks. In: Proceedings of the 12th International Conference on Document Analysis and Recognition (ICDAR), Washington, DC, USA, 25–28 August 2013, pp.683–687.
- Chollet, F., 2018. Deep Learning with Python. Shelter Island, New York: Manning Publications Co.
- Davidson, H.A., 2012. A Short History of Chess. David McKay, Dysart, UK, pp.152–153.
- Doggers, P., 2021. How Popular Is Chess? Chess.com News. Available at: <https://www.chess.com/news/view/how-popular-is-chess-8306>
- Dutta, K., Krishnan, P., Mathew, M. and Jawahar, C., 2018. Improving CNN–RNN hybrid networks for handwriting recognition. In: Proceedings of the 16th International Conference on Frontiers in Handwriting Recognition (ICFHR), Niagara Falls, NY, USA, 5–8 August 2018, pp.80–85.
- Edwards, S.J., 1994. Standard Portable Game Notation Specification and Implementation Guide. Available at: <http://www.saremba.de/chessgml/standards/pgn/pgn-complete.htm>.
- Eicher, O., Farmer, D., Li, Y. and Majid, N., 2021. Handwritten Chess Scoresheet Dataset (HCS Dataset). Available at: https://tc11.cvc.uab.es/datasets/HCS_1.
- Eicher, O., Farmer, D., Li, Y. and Majid, N., 2021. Handwritten chess scoresheet recognition using a convolutional BiLSTM network. In: Proceedings of the International Conference on Document Analysis and Recognition Workshops (ICDARW), Lausanne, Switzerland, 5–10 September 2021, pp.245–259.
- Garg, V., 2020. Handwritten text classification using deep learning. International Research Journal of Engineering and Technology (IRJET), 7(5), pp.3485–3490.

- Goodfellow, I., Bengio, Y. and Courville, A., 2016. Deep Learning. Cambridge, MA: The MIT Press.
- Graves, A., Fernández, S., Gomez, F. and Schmidhuber, J., 2006. Connectionist temporal classification: labelling unsegmented sequence data with recurrent neural networks. In: Proceedings of the 23rd International Conference on Machine Learning (ICML), Pittsburgh, Pennsylvania, USA, pp.369–376. Available at: <https://doi.org/10.1145/1143844.1143891>.
- Graves, A. and Schmidhuber, J., 2005. Framewise phoneme classification with bidirectional LSTM and other neural network architectures. Neural Networks, 18(5–6), pp.602–610.
- Hidayatullah, P., 2017. Pengolahan Citra Digital: Teori dan Aplikasi Nyata. Bandung: Informatika Bandung.
- Joseph, S. and Vakayil, J., 2022. Optimal Ratio for Data Splitting. arXiv preprint, arXiv:2202.03326. Available at: <https://arxiv.org/abs/2202.03326>.
- Kalita, D., 2022, March 11. An Overview on Long Short-Term Memory (LSTM). Analytics Vidhya. Available at: <https://www.analyticsvidhya.com/blog/2022/03/an-overview-on-long-short-term-memory-lstm/>
- Ketkar, N., 2017. Deep Learning with Python: A Hands-on Introduction. Apress.
- Kingma, D.P. and Ba, J., 2014. Adam: A Method for Stochastic Optimization. arXiv preprint, arXiv:1412.6980.
- Khuri, A.I. and Searle, S.R., 2017. Matrix Algebra Useful for Statistics. 2nd ed. Hoboken, New Jersey: Wiley.
- Koushik, J., 2016. Understanding Convolutional Neural Networks., 3, pp.1–6.
- Li, H., Wang, P. and Shen, C., 2017. Towards end-to-end text spotting with convolutional recurrent neural networks. In: Proceedings of the IEEE International Conference on Computer Vision (ICCV), Venice, Italy, 22–29 October 2017, pp.5248–5256.
- Liu, H., Jin, S. and Zhang, C., 2018. Connectionist Temporal Classification with Maximum Entropy Regularization. NeurIPS Conference Proceedings.
- Mäenpää, T. and Pietikäinen, M., 2003. Multi-Scale Binary Patterns for Texture Analysis. Lecture Notes in Computer Science, 2749, pp.885–892. Available at: https://www.researchgate.net/publication/296415852_Multi-scale_binary_patterns_for_texture_analysis.
- Majid, N. and Eicher, O., 2022. Digitization of Handwritten Chess Scoresheets with a BiLSTM Network. Journal of Imaging, 8(2), p.31. doi: <https://doi.org/10.3390/jimaging8020031>. Available at: <https://www.mdpi.com/2313-433X/8/2/31>.
- Manchala, S.Y., Kinthali, J., Kotha, K., Santosh, K.K. and Jagilinki, J., 2020. Handwritten Text Recognition using Deep Learning with TensorFlow.

International Journal of Engineering Research and Technology (IJERT),
9(5), pp.594–600.

- Pangesti, S., Zulaela, Gunardi, Abdurakhman, and Utami, H., 2004. Metode Statistika. Yogyakarta: FMIPA UGM.
- Prechelt, L., 2002. Early Stopping — But When? In: G. Montavon, G.B. Orr and K.-R. Müller, eds. Neural Networks: Tricks of the Trade. 2nd ed. Berlin and Heidelberg: Springer, pp.55–69. doi:10.1007/3-540-49430-8_3.
- Priyanto, H., 2017. Pengolahan Citra Digital: Teori dan Aplikasi Nyata. Bandung: Informatika Bandung.
- Putra, D., 2010. Pengolahan Citra Digital I. Westriningsih, ed. Yogyakarta: ANDI Yogyakarta.
- Raschka, S., 2019. Machine Learning Lecture Notes: Introduction and Overview. University of Wisconsin–Madison. Available at: https://sebastianraschka.com/pdf/lecture-notes/stat479fs19/01-ml-overview_notes.pdf.
- Ruder, S., 2016. An Overview of Gradient Descent Optimization Algorithms., pp.1–14.
- Scheidl, H., Fiel, S. and Sablatnig, R., 2018. Word beam search: a connectionist temporal classification decoding algorithm. In: Proceedings of the 16th International Conference on Frontiers in Handwriting Recognition (ICFHR), Niagara Falls, NY, USA, 5–8 August 2018, pp.253–258. Available at: <https://doi.org/10.1109/ICFHR-2018.2018.00051>.
- Schmidhuber, J., 2016. Deep Learning – A Practitioner’s Approach. M. Loukides and T. McGovern, eds. Sebastopol: O’Reilly Media, Inc.
- Sena, S., 2017, October 28. Pengenalan Deep Learning Part 1: Neural Network. Medium. Available at: <https://medium.com/@samuelsena/pengenalan-deep-learning-8fbb7d8028ac>.
- Sena, S., 2017, November 13. Pengenalan Deep Learning Part 7: Convolutional Neural Network (CNN). Medium. Available at: <https://medium.com/@samuelsena/pengenalan-deep-learning-part-7-convolutional-neural-network-cnn-b003b477dc94>.
- Shi, B., Bai, X. and Yao, C., 2016. An end-to-end trainable neural network for image-based sequence recognition and its application to scene text recognition. IEEE Transactions on Pattern Analysis and Machine Intelligence, 39(11), pp.2298–2304. Available at: <https://doi.org/10.1109/TPAMI.2016.2646371>.
- Shkarupa, Y., Mencis, R. and Sabatelli, M., 2016. Offline handwriting recognition using LSTM recurrent neural networks. In: Proceedings of the 28th Benelux Conference on Artificial Intelligence (BNAIC), Amsterdam, The Netherlands, 10–11 November 2016.
- Sutoyo, T., 2009. Teori Pengolahan Citra Digital. Yogyakarta: Andi.



UNIVERSITAS
GADJAH MADA

Lapisan Connectionist Temporal Classification (CTC) pada Arsitektur Model Convolutional Recurrent Neural Networks (CRNN) untuk Rekognisi Lembar Skor Catur Tulisan Tangan
FADIL IRSYAD MUHAMMAD, Danang Teguh Qoyyimi, S.Si., M.Sc., Ph.D.

Universitas Gadjah Mada, 2025 | Diunduh dari <http://etd.repository.ugm.ac.id/>

Vyavahare, S., Hajari, K. and Surwase, S., 2020. Handwritten cursive English text recognition using deep CNN–RNN-based CT. *International Journal of Innovative Research in Computer Science & Technology (IJIRCST)*, 13(2), pp.564–569.