

## DAFTAR PUSTAKA

- Azad, R., Asadi-Aghbolaghi, M., Fathy, M., Escalera, S., 2019. Bi-Directional ConvLSTM U-Net with Densley Connected Convolutions, in: 2019 IEEE/CVF International Conference on Computer Vision Workshop (ICCVW). Presented at the 2019 IEEE/CVF International Conference on Computer Vision Workshop (ICCVW), IEEE, Seoul, Korea (South), pp. 406–415. <https://doi.org/10.1109/ICCVW.2019.00052>
- Bai, W., Suzuki, H., Qin, C., Tarroni, G., Oktay, O., Matthews, P.M., Rueckert, D., 2018. Recurrent neural networks for aortic image sequence segmentation with sparse annotations. <https://doi.org/10.48550/arXiv.1808.00273>
- Boerckel, J.D., Mason, D.E., McDermott, A.M., Alsberg, E., 2014. Microcomputed tomography: approaches and applications in bioengineering. *Stem Cell Res. Ther.* 5, 144. <https://doi.org/10.1186/scrt534>
- Brondolo, F., Beaussant, S., 2024. DINOv2 Rocks Geological Image Analysis: Classification, Segmentation, and Interpretability. <https://doi.org/10.48550/arXiv.2407.18100>
- Chen, J., Lu, Y., Yu, Q., Luo, X., Adeli, E., Wang, Y., Lu, L., Yuille, A.L., Zhou, Y., 2021. TransUNet: Transformers Make Strong Encoders for Medical Image Segmentation. <https://doi.org/10.48550/arXiv.2102.04306>
- Chen, J., Yang, L., Zhang, Y., Alber, M., Chen, D.Z., 2016. Combining Fully Convolutional and Recurrent Neural Networks for 3D Biomedical Image Segmentation. <https://doi.org/10.48550/arXiv.1609.01006>
- Chollet, F., 2018. Deep learning with Python. Manning, Shelter Island, NY.
- Chowdhury, S.R., Mirzaei, G., 2025. Hybridization of Attention UNet with Repeated Atrous Spatial Pyramid Pooling for Improved Brain Tumour Segmentation. <https://doi.org/10.48550/arXiv.2501.13129>

- Delbem, I.D., Galéry, R., Brandão, P.R.G., Peres, A.E.C., 2015. Semi-automated iron ore characterisation based on optical microscope analysis: Quartz/resin classification. *Miner. Eng.* 82, 2–13. <https://doi.org/10.1016/j.mineng.2015.07.021>
- Goodfellow, I., Bengio, Y., Courville, A., 2016. Deep learning, Adaptive computation and machine learning. The MIT press, Cambridge, Mass.
- Gotkowski, K., Gupta, S., Godinho, J.R.A., Tochtrop, C.G.S., Maier-Hein, K.H., Isensee, F., 2024. ParticleSeg3D: A scalable out-of-the-box deep learning segmentation solution for individual particle characterization from micro CT images in mineral processing and recycling. *Powder Technol.* 434, 119286. <https://doi.org/10.1016/j.powtec.2023.119286>
- Hsieh, J., 2015. Computed Tomography, 3rd ed. ed. Society of Photo-Optical Instrumentation Engineers (SPIE), Bellingham.
- Ihsan, M., 2023, Segmentasi Lubang Jalan Menggunakan Arsitektur U-Net Dan LSTM, Tesis, Fakultas Matematika dan Ilmu Pengetahuan Alam / Program Studi Ilmu Komputer, Universitas Gadjah Mada, Yogyakarta.
- Landis, E.N., Keane, D.T., 2010. X-ray microtomography. *Mater. Charact.* 61, 1305–1316. <https://doi.org/10.1016/j.matchar.2010.09.012>
- Lee, K., Sunwoo, L., Kim, T., Lee, K.J., 2021. Spider U-Net: Incorporating Inter-Slice Connectivity Using LSTM for 3D Blood Vessel Segmentation. *Appl. Sci.* 11, 2014. <https://doi.org/10.3390/app11052014>
- Liang, J., Gurevich, B., Lebedev, M., Vialle, S., Yurikov, A., Glubokovskikh, S., 2020. Elastic Moduli of Arenites From Microtomographic Images: A Practical Digital Rock Physics Workflow. *J. Geophys. Res. Solid Earth* 125, e2020JB020422. <https://doi.org/10.1029/2020JB020422>

- Liang, J., Sun, Y., Lebedev, M., Gurevich, B., Nzikou, M., Vialle, S., Glubokovskikh, S., 2022. Multi-mineral segmentation of micro-tomographic images using a convolutional neural network. *Comput. Geosci.* 168, 105217. <https://doi.org/10.1016/j.cageo.2022.105217>
- Liu, L., Han, Q., Zhao, Yue, Zhao, Yandong, 2024. A Novel Method Combining U-Net with LSTM for Three-Dimensional Soil Pore Segmentation Based on Computed Tomography Images. *Appl. Sci.* 14, 3352. <https://doi.org/10.3390/app14083352>
- Liu, Y., Wang, X., Zhang, Z., Deng, F., 2023. Deep learning in image segmentation for mineral production: A review. *Comput. Geosci.* 180, 105455. <https://doi.org/10.1016/j.cageo.2023.105455>
- Mahmoudi, S., Asghari, O., Boisvert, J., 2025. Addressing class imbalance in micro-CT image segmentation: A modified U-Net model with pixel-level class weighting. *Comput. Geosci.* 196, 105853. <https://doi.org/10.1016/j.cageo.2025.105853>
- Mahmud, B.U., Hong, G.Y., Mamun, A.A., Ping, E.P., Wu, Q., 2023. Deep Learning-Based Segmentation of 3D Volumetric Image and Microstructural Analysis. *Sensors* 23, 2640. <https://doi.org/10.3390/s23052640>
- Ouyang, X., Matt, A., Wang, F., Gracheva, E., Migunova, E., Rajamani, S., Dubrovsky, E.B., Zhou, C., 2024. Attention LSTM U-Net model for *Drosophila melanogaster* heart tube segmentation in optical coherence microscopy images. *Biomed. Opt. Express* 15, 3639. <https://doi.org/10.1364/BOE.523364>
- Papadomanolaki, M., Verma, S., Vakalopoulou, M., Gupta, S., Karantzalos, K., 2019. Detecting Urban Changes with Recurrent Neural Networks from Multitemporal Sentinel-2 Data. <https://doi.org/10.48550/ARXIV.1910.07778>

- Patel, A.K., Chatterjee, S., Gorai, A.K., 2017. Development of machine vision-based ore classification model using support vector machine (SVM) algorithm. *Arab. J. Geosci.* 10, 107. <https://doi.org/10.1007/s12517-017-2909-0>
- Poudel, R.P.K., Lamata, P., Montana, G., 2016. Recurrent Fully Convolutional Neural Networks for Multi-slice MRI Cardiac Segmentation. <https://doi.org/10.48550/ARXIV.1608.03974>
- Purwono, P., Ma'arif, A., Rahmaniar, W., Fathurrahman, H.I.K., Frisky, A.Z.K., Haq, Q.M.U., 2023. Understanding of Convolutional Neural Network (CNN): A Review. *Int. J. Robot. Control Syst.* 2, 739–748. <https://doi.org/10.31763/ijrcs.v2i4.888>
- Rafferty, J.P. (Ed.), 2012. *Minerals*, 1. ed. ed, Geology : landforms, minerals, and rocks. Britannica Educational Pub. In association with Rosen Educational Services, New York.
- Ramsundar, B., Eastman, P., Walters, P., Pande, V., 2021. *Deep learning for the life sciences: applying deep learning to genomics, microscopy, drug discovery, and more*, First edition, revision, second release. ed. O'Reilly, Beijing Boston Farnham Sebastopol Tokyo.
- Ronneberger, O., Fischer, P., Brox, T., 2015. U-Net: Convolutional Networks for Biomedical Image Segmentation. <https://doi.org/10.48550/arXiv.1505.04597>
- Roslin, A., Marsh, M., Provencher, B., Mitchell, T.R., Onederra, I.A., Leonardi, C.R., 2023. Processing of micro-CT images of granodiorite rock samples using convolutional neural networks (CNN), Part II: Semantic segmentation using a 2.5D CNN. *Miner. Eng.* 195, 108027. <https://doi.org/10.1016/j.mineng.2023.108027>
- Salehin, I., Kang, D.-K., 2023. A Review on Dropout Regularization Approaches for Deep Neural Networks within the Scholarly Domain. *Electronics* 12, 3106. <https://doi.org/10.3390/electronics12143106>

- Shanmugamani, R., 2018. Deep learning for computer vision: expert techniques to train advanced neural networks using TensorFlow and Keras, 1st ed. ed. Packt Publishing, Place of publication not identified.
- Shi, X., Chen, Z., Wang, H., Yeung, D.-Y., Wong, W., Woo, W., 2015. Convolutional LSTM Network: A Machine Learning Approach for Precipitation Nowcasting. <https://doi.org/10.48550/arXiv.1506.04214>
- Sibeichi, R., Booij, O., Baka, N., Bloem, P., 2019. Exploiting Temporality for Semi-Supervised Video Segmentation. <https://doi.org/10.48550/ARXIV.1908.11309>
- Stollenga, M.F., Byeon, W., Liwicki, M., Schmidhuber, J., 2015. Parallel Multi-Dimensional LSTM, With Application to Fast Biomedical Volumetric Image Segmentation. <https://doi.org/10.48550/arXiv.1506.07452>
- Sun, P., Ge, L., Liu, Y., Li, B., Nie, X., 2023. Modeling of multi-mineral-component digital core based on Res-Unet. *J. Geophys. Eng.* 20, 483–493. <https://doi.org/10.1093/jge/gxad024>
- Taha, A.A., Hanbury, A., 2015. Metrics for evaluating 3D medical image segmentation: analysis, selection, and tool. *BMC Med. Imaging* 15, 29. <https://doi.org/10.1186/s12880-015-0068-x>
- Tran, D., Bourdev, L., Fergus, R., Torresani, L., Paluri, M., 2015. Learning Spatiotemporal Features with 3D Convolutional Networks. <https://doi.org/10.48550/arXiv.1412.0767>
- Wang, J., Tang, Y., Xiao, Y., Zhou, J.T., Fang, Z., Yang, F., 2024. GREnet: Gradually REcurrent Network With Curriculum Learning for 2-D Medical Image Segmentation. *IEEE Trans. Neural Netw. Learn. Syst.* 35, 10018–10032. <https://doi.org/10.1109/TNNLS.2023.3238381>

Whitten, D.G.A., Brooks, J.R.V., 1982. The Penguin dictionary of geology, Repr. ed, Penguin reference books. Penguin Books, Harmondsworth.

Xu, D., Chen, X., Xie, Y., Yang, C., Gui, W., 2015. Complex networks-based texture extraction and classification method for mineral flotation froth images. Miner. Eng. 83, 105–116. <https://doi.org/10.1016/j.mineng.2015.08.017>

Zhang, A., Lipton, Z.C., Li, M., Smola, A.J., 2023. Dive into Deep Learning. <https://doi.org/10.48550/arXiv.2106.11342>