BAB VI

KESIMPULAN DAN SARAN

6.1 Kesimpulan

Dari penelitian ini diperoleh beberapa kesimpulan yaitu :

1. Proses klasifikasi jenis biji kopi Indonesia menggunakan deep learning yang telah dilakukan menunjukkan hasil yang baik.
2. Pelatihan yang dilakukan untuk klasifikasi jenis kopi cocok menggunakan arsitektur jaringan Convolutional Neural Network (CNN).
3. Proses pelatihan yang telah dilakukan menghasilkan tingkat akurasi validation sebesar 74,26%.

6.2 Saran

Adapun saran untuk penelitian berikutnya adalah :

1. Apabila menambahkan jumlah dataset yang lebih banyak akan menghasilkan akurasi yang lebih baik dan penambahan kelas lebih banyak akan membuat penelitian lebih variatif.
2. Penelitian yang telah berhasil dilakukan dapat diimplementasikan ke aplikasi mobile sehingga dapat dimanfaatkan oleh masyarakat luas dan diterapakan secara *real time.*

3. Penelitian klasifikasi jenis kopi ini pertama kali dilakukan dan bisa dikembangkan lebih jauh lagi terkait industry kopi, contohnya membangun sistem yang dapat menentukan *grade* kualitas biji kopi.

Daftar Pustaka

Alom, Z., Sidike, P., Hasan, M., Taha, T. M., & Asari, V. K. (n.d.). Handwritten Bangla Character Recognition Using The State-of-Art Deep Convolutional Neural Networks, 1–12.

Alshehri, A. K., Ricardez-Sandoval, L. A., & Elkamel, A. (2010). Designing and Testing a Chemical Demulsifier Dosage Controller in a Crude Oil Desalting Plant: An Artificial Intelligence-Based Network Approach. *Chemical Engineering & Technology*, (6), n/a-n/a. https://doi.org/10.1002/ceat.200900615

Bargoti, S., & Underwood, J. P. (2006). Image Segmentation for Fruit Detection and Yield Estimation in Apple Orchards arXiv : 1610 . 08120v1 [cs . RO] 25 Oct 2016.

Cao, L., Zhang, X., Ren, W., & Huang, K. (2015). Author ' s Accepted Manuscript large scale crowd analysis based on convolutional neural network. *Pattern Recognition*. https://doi.org/10.1016/j.patcog.2015.04.001

Chandra, D., Ismono, R. H. dan, & Kasymir, E. (2013). Prospek Perdagangan Kopi Robusta Indonesia di Pasar Internasional. *JIIA Jurnal Ilmu Ilmu Agribisnis*, *1*(1), 10–15.

Cho, S. W., Baek, N. R., Kim, M. C., Koo, J. H., Kim, J. H., & Park, K. R. (2018). Face detection in nighttime images using visible-light camera sensors with two-step faster region-based convolutional neural network. *Sensors (Switzerland)*, *18*(9). https://doi.org/10.3390/s18092995

Choi, H. K., Willett, W., & Curhan, G. (2007). Coffee Consumption and Risk of Incident Gout in Men A Prospective Study, *56*(6), 2049–2055. https://doi.org/10.1002/art.22712

Ciocca, G., Napoletano, P., & Schettini, R. (2018). CNN-based features for retrieval and classification of food images. *Computer Vision and Image Understanding*, *176–177*(July), 70–77. https://doi.org/10.1016/j.cviu.2018.09.001

Cranfield, J., Henson, S., Northey, J., & Masakure, O. (2010). An Assessment of Consumer Preference for Fair Trade Coffee in Toronto and Vancouver. *Agribusiness*, *26*(2), 307–325. https://doi.org/10.1002/agr.20217

Erdas, O., Buyukbingol, E., & Nur, F. (2010). Modeling and predicting binding affinity of phencyclidine-like compounds using machine, (February 2009), 1–13. https://doi.org/10.1002/cem.1265

Farhadi, F., Nia, V. P., & Lodi, A. (2019). Activation Adaptation in Neural Networks. Retrieved from http://arxiv.org/abs/1901.09849

Farnham, B., Tokyo, S., Boston, B., Sebastopol, F., Beijing, T., Hope, T., … Lieder, I. (2017). *Learning TensorFlow A Guide to Building Deep Learning Systems Revision History for the First Edition: Second Release*.

Géron, A. (2017). *Hands-On Machine Learning with Scikit-Learn and TensorFlow*. *Hands-on Machine Learning with Scikit-Learn and TensorFlow*. O'Reilly Media.

https://doi.org/10.3389/fninf.2014.00014

Girshick, R., Donahue, J., Darrell, T., & Malik, J. (2014). Rich feature hierarchies for accurate object detection and semantic segmentation. *Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition*, 580–587. https://doi.org/10.1109/CVPR.2014.81

Habaragamuwa, H., Ogawa, Y., Suzuki, T., Shiigi, T., Ono, M., & Kondo, N. (2018). Detecting greenhouse strawberries (mature and immature), using deep convolutional neural network. *Engineering in Agriculture, Environment and Food*, *11*(3), 127–138. https://doi.org/10.1016/j.eaef.2018.03.001

He, S., Lau, R. W. H., Liu, W., Huang, Z., & Yang, Q. (2015). SuperCNN: A Superpixelwise Convolutional Neural Network for Salient Object Detection. *International Journal of Computer Vision*, *115*(3), 330–344. https://doi.org/10.1007/s11263-015-0822-0

Jalled, F., & Voronkov, I. (2016). Object Detection using Image Processing, 1–6. Retrieved from http://arxiv.org/abs/1611.07791

Kestur, R., Meduri, A., & Narasipura, O. (2019). MangoNet: A deep semantic segmentation architecture for a method to detect and count mangoes in an open orchard. *Engineering Applications of Artificial Intelligence*, *77*(September 2018), 59–69. https://doi.org/10.1016/j.engappai.2018.09.011

Ketkar, N. (2017). *Deep Learning with Python*. *Deep Learning with Python*. https://doi.org/10.1007/978-1-4842-2766-4

Kim, P. (2017). *MATLAB Deep Learning*. https://doi.org/10.1007/978-1-4842-2845-6

Krizhevsky, A., Sutskever, I., & Hinton, G. E. (n.d.). ImageNet Classification with Deep Convolutional Neural Networks. https://doi.org/10.1201/9781420010749

Kurniawan, W. M., & Hastuti, K. (2017). Penentuan Kualitas Biji Kopi Arabika Dengan Menggunakan Analytical Hierarchy Process (Studi Kasus Pada Perkebunan Kopi Lereng Gunung Kelir Jambu Semarang). *Simetris : Jurnal Teknik Mesin, Elektro Dan Ilmu Komputer*, *8*(2), 519. https://doi.org/10.24176/simet.v8i2.1358

Lee, Y. H. (2007). Dyeing, fastness, and deodorizing properties of cotton, silk, and wool fabrics dyed with coffee sludge (Coffea arabica L.) extract. *Journal of Applied Polymer Science*, *103*(1), 251–257. https://doi.org/10.1002/app.25221

Li, S., Liu, Z. Q., & Chan, A. B. (2015). Heterogeneous Multi-task Learning for Human Pose Estimation with Deep Convolutional Neural Network. *International Journal of Computer Vision*, *113*(1), 19–36. https://doi.org/10.1007/s11263-014-0767-8

Liu, T., & Stathaki, T. (2018). Faster R-CNN for Robust Pedestrian Detection Using Semantic Segmentation Network, *12*(October), 1–10. https://doi.org/10.3389/fnbot.2018.00064

Marhaenanto, B., Soedibyo, D. W., & Farid, M. (2015). Penentuan lama Sangrai Kopi Terhadap Variasi Derajat Sangrai. *Jurnal Agroteknologi*, *09*(02), 1–10.

Meiri, A., Nurmalina, R., & Rifin, A. (2013). Analisis Perdagangan Kopi Indonesia di Pasar

Internasional. *Jurnal Tanaman Industri Dan Penyegar*, *4*(1), 39–46. https://doi.org/10.21082/jtidp.v4n1.2013.p39-46

Nakazawa, T., & Kulkarni, D. V. (2018). Wafer map defect pattern classification and image retrieval using convolutional neural network. *IEEE Transactions on Semiconductor Manufacturing*, *31*(2), 309–314. https://doi.org/10.1109/TSM.2018.2795466

Pattanayak, S. (n.d.). *Pro Deep Learning with TensorFlow*.

Qayyum, A., Anwar, S. M., Awais, M., & Majid, M. (2017). Medical image retrieval using deep convolutional neural network. *Neurocomputing*, *266*, 8–20. https://doi.org/10.1016/j.neucom.2017.05.025

Rahnemoonfar, M., & Sheppard, C. (2017). Deep count: Fruit counting based on deep simulated learning. *Sensors (Switzerland)*, *17*(4), 1–12. https://doi.org/10.3390/s17040905

Riaz, U., Svanera, M., Leonardi, R., & Benini, S. (2018). Hair detection , segmentation , and hairstyle classification in the wild &. *Image and Vision Computing*, *71*, 25–37. https://doi.org/10.1016/j.imavis.2018.02.001

Rokach, L., Kalech, M., Blank, I., & Stern, R. (2011). Who Is Going to Win the Next Association for the Advancement of Artificial Intelligence Fellowship Award? Evaluating Researchers by Mining Bibliographic Data. *JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY*, *62*(12), 2456–2470. https://doi.org/10.1002/asi.21638

Rouhi, R., Jafari, M., Kasaei, S., & Keshavarzian, P. (2015). Benign and malignant breast tumors classification based on region growing and CNN segmentation. *Expert Systems with Applications*, *42*(3), 990–1002. https://doi.org/10.1016/j.eswa.2014.09.020

Science, C., & Publications, S. (2012). Segmentation of Ureteric and Bladder Calculi in Ultrasound Images Sridhar , S . Department of Information Science and Technology , Faculty of Information and Communication Engineering , *8*(5), 716–720.

SKansi, S. (2018). *Introduction to deep learning: From Logical Calculus to Artificial Intelligence*. *Chemical Engineering Progress* (Vol. 114). https://doi.org/10.1007/978-3-319-73004-2

Wahyuni, E., Karim, A., & Anhar, A. (2013). Analisis Citarasa Kopi Arabika Organik pada Beberapa Ketinggian Tempat dan Cara Pengolahannya di Datararan Tinggi Gayo. *Jurnal Manajemen Sumberdaya Lahan*, *2*(2), 261–269.

Zhang, Y., Zhao, D., Sun, J., Zou, G., & Li, W. (2016). Adaptive Convolutional Neural Network and Its Application in Face Recognition. *Neural Processing Letters*, *43*(2), 389–399. https://doi.org/10.1007/s11063-015-9420-y

Zocca, V., Spacagna, G., Slater, D., & Roelants, P. (2017). *Python Deep Learning*. *Packt Publishing Ltd.* https://doi.org/10.7210/jrsj.33.92