

BAB VI

KESIMPULAN DAN SARAN

A. Kesimpulan

Dari penelitian ini dapat diperoleh beberapa kesimpulan yaitu :

1. Pengenalan emosi wajah menggunakan autoencoder dengan convolutional neural network yang telah dibangun mendapatkan hasil yang baik.
2. Pelatihan yang dilakukan menggunakan 1500 epoch menunjukkan nilai loss dan akurasi saat pelatihan tidak mengalami perubahan yang terlalu signifikan
3. Hasil pelatihan dataset untuk pengenalan wajah menggunakan KDEF dataset menunjukkan akurasi sebesar 99,55%
4. Hasil pengujian dataset untuk pengenalan emosi wajah menggunakan KDEF dataset menunjukkan akurasi sebesar 81,77%

B. Saran

Adapun saran dari penulis untuk penelitian berikutnya adalah :

1. Penambahan dataset yang lebih banyak akan menghasilnya hasil yang lebih variatif.
2. Hasil dari penelitian pengenalan emosi wajah dapat diimplementasikan ke aplikasi mobile seperti android dan ios sehingga dapat dimanfaatkan secara real time.

3. Modifikasi pada arsitekur jaringan sehingga memungkinkan mendapatkan hasil yang lebih baik.



DAFTAR PUSTAKA

- Alom, M. Z., Sidike, P., Taha, T. M., & Asari, V. K. (2017). *Handwritten Bangla Digit Recognition Using Deep Learning*. International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 6(7), 990– 997. Retrieved from <http://arxiv.org/abs/1705.02680>
- Aurelien Geron. *Hands-On Machine Learning with Scikit-Learn and TensorFlow*. eBokk, 2017.
- Calvo, M., G., & Lundqvist, D.(2008). Facial expressions of emotion (KDEF): Identification under different display-duration conditions. doi: 10.3758/BRM.40.1.109
- Cao, X., Wang, P., Meng, C., Bai, X., Gong, G., Liu, M., & Qi, J. (2018). *Region based CNN for foreign object debris detection on airfield pavement*. Sensors (Switzerland), 18(3), 1–14. <https://doi.org/10.3390/s18030737>
- 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>
- ChristopherBishop. (2006). *PatternRecognition and Machine Learning*. Springer-Verlag New York.
- Ciocca, G., Napoletano, P., & Schettini, R. (2018). *CNN-based features for retrieval and classification of food images*. Computer Vision and Image Understanding, 176–177(February), 70–77. <https://doi.org/10.1016/j.cviu.2018.09.001>
- Convolutional Neural Network. (n.d.). Retrieved May 24, 2019, from <https://www.mathworks.com/solutions/deep-learning/convolutional-neural-network.html>
- Deng, L., & Yu, D. (2014). *Deep Learning: Methods and Applications*. now Publishers Inc. <https://doi.org/http://dx.doi.org/10.1561/2000000039>
- Ding, C., Bao, T., Karmoshi, S., & Zhu, M. (2017). *Low-Resolution Face Recognition via Convolutional Neural Network*. 2017 9th IEEE International Conference on Communication Software and Networks
- Farhadi, F., & Lodi Vahid, A. N. (2017). *Learning activation functions in deep neural networks*. Département de Mathématiques et de Génie Industriel, 151. Retrieved from <https://publications.polymtl.ca/2945/>
- Guo, S., Chen, S., & Li, Y. (2016). *Face Recognition Based on Convolutional Neural Network and Support Vector Machine*
- Hopfield, J. J. (1982). *Neural networks and physical systems with emergent collective computational abilities*. Proceedings of the National Academy of Sciences of the United States of America. <https://doi.org/https://doi.org/10.1073/pnas.79.8.2554>

- 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>
- Kim, P. (2018). *MATLAB Deep Learning With Machine Learning, Neural Networks and Artificial Intelligence*. Springer eBook.
- LeCun, Y., Kavukcuoglu, K., & Farabet, C. (2010). *Convolutional networks and applications in vision*. Proceedings of 2010 IEEE International Symposium on Circuits and Systems. <https://doi.org/10.1109/ISCAS.2010.5537907>
- Liu, T., & Stathaki, T. (2018). *Faster R-CNN for robust pedestrian detection using semantic segmentation network*. Frontiers in Neurorobotics, 12(October), 1–10. <https://doi.org/10.3389/fnbot.2018.00064>
- Lundqvist, D., Flykt, A., & Öhman, A. (1998). *The Karolinska Directed Emotional Faces - KDEF*, CD ROM from Department of Clinical Neuroscience, Psychology section, Karolinska Institutet, ISBN 91-630-7164-9.
- Mao, Q., Rao, Q., Yu, Y., & Dong, M. (2016). *Hierarchical Bayesian Theme Models for Multi-pose Facial Expression Recognition*. <http://dx.doi.org/10.1109/TMM.2016.2629282>
- 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>
- Russell, S. J., & Norvig, P. (2009). *Artificial Intelligence: A Modern Approach* (3rd Edition). Pearson.
- Shapiro, L. G., & Stockman, G. C. (2001). *Computer Vision*. Pearson.
- Wu, Z., Peng, M., & Chen, T. (2016). Thermal Face Recognition Using Convolutional Neural Network. 2016 International Conference on Optoelectronics and Image Processing.
- Zhang, L. & Tjondronegoro, T. (2011). Facial Expression Recognition Using Facial Movement Features. <http://dx.doi.org/10.1109/T-AFFC.2011.13>
- Zhang, Z., Li, J., & Zhu, R. (2015). Deep Neural Network for Face Recognition Based on Sparse Autoencoder. 2015 8th International Congress on Image and Signal Processing (CISP 2015)
- Zhao, J., Mao, X., & Zhang, J. (2018). Learning deep facial expression features from image and optical flow sequences using 3D CNN. *The Visual Computer*.