UNIVERSITAS
GADJAH MADA
**Analisis Stacking Ensemble Berbasis Multiple CNN untuk Klasifikasi Ekspresi Wajah pada Dataset Raf-DB**
Ahmad Fida' Ulhaq, Prof. Ir. Oyas Wahyunggoro, M.T., Ph.D.
**Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/**

# DAFTAR PUSTAKA

[1] L. Orynbay, G. Bekmanova, B. Yergesh, A. Omarbekova, A. Sairanbekova, and A. Sharipbay, "The role of cognitive computing in nlp," *Frontiers in Computer Science*, vol. Volume 6 - 2024, p. 1486581, 2025. [Online]. Available: https://www.frontiersin.org/journals/computer-science/articles/10.3389/fcomp.2024.1486581

[2] S. Alam and M. F. Khan, "Enhancing ai-human collaborative decision-making in industry 4.0 management practices," *IEEE Access*, vol. 12, pp. 119 433–119 444, 2024.

[3] J. Urakami and K. Seaborn, "Nonverbal cues in human–robot interaction: A communication studies perspective," vol. 12, no. 2, 2023. [Online]. Available: https://doi.org/10.1145/3570169

[4] M. C. Gursesli, S. Lombardi, M. Duradoni, L. Bocchi, A. Guazzini, and A. Lanata, "Facial emotion recognition (fer) through custom lightweight cnn model: Performance evaluation in public datasets," *IEEE Access*, vol. 12, pp. 45 543–45 559, 2024.

[5] T. Murray, N. Binetti, R. Venkataramaiyer, V. Namboodiri, D. Cosker, E. Viding, and I. Mareschal, "Expression perceptive fields explain individual differences in the recognition of facial emotions," *Communications Psychology*, vol. 2, no. 1, p. 62, 2024.

[6] M. Karnati, A. Seal, J. Jaworek-Korjakowska, and O. Krejcar, "Facial expression recognition in-the-wild using blended feature attention network," *IEEE Transactions on Instrumentation and Measurement*, vol. 72, pp. 1–16, 2023.

[7] Y. Tan, H. Xia, and S. Song, "Learning informative and discriminative semantic features for robust facial expression recognition," *Journal of Visual Communication and Image Representation*, vol. 98, p. 104062, 2024. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1047320324000178

[8] C. Dalvi, M. Rathod, S. Patil, S. Gite, and K. Kotecha, "A survey of ai-based facial emotion recognition: Features, ml dl techniques, age-wise datasets and future directions," *IEEE Access*, vol. 9, pp. 165 806–165 840, 2021.

[9] S. Li, W. Deng, and J. Du, "Reliable crowdsourcing and deep locality-preserving learning for expression recognition in the wild," in *2017 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2017, pp. 2584–2593.

[10] I. D. Mienye and Y. Sun, "A survey of ensemble learning: Concepts, algorithms, applications, and prospects," *IEEE Access*, vol. 10, pp. 99 129–99 149, 2022.

[11] N. S. Abdulsattar and M. N. Hussain, "Facial expression recognition using transfer learning and fine-tuning strategies: a comparative study," in *2022 International Conference on Computer Science and Software Engineering (CSASE)*. IEEE, 2022, pp. 101–106.

UNIVERSITAS
GADJAH MADA
**Analisis Stacking Ensemble Berbasis Multiple CNN untuk Klasifikasi Ekspresi Wajah pada Dataset Raf-DB**
Ahmad Fida' Ulhaq, Prof. Ir. Oyas Wahyunggoro, M.T., Ph.D.
**Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/**

[12] D. Chen, Y. Cao, and X. Cheng, "Research on facial expression recognition method based on improved convnext," *IET Image Processing*, vol. 19, no. 1, p. e70118, 2025.

[13] J. Fan, J. Zhou, X. Deng, H. Wang, L. Tao, and H. K. Kwan, "Combating uncertainty and class imbalance in facial expression recognition," in *TENCON 2022 - 2022 IEEE Region 10 Conference (TENCON)*, 2022, pp. 1–4.

[14] S. Kırbız, "Improving facial emotion recognition through dataset merging and balanced training strategies," *Journal of the Franklin Institute*, vol. 362, no. 7, p. 107659, 2025.

[15] E. G. Moung, C. C. Wooi, M. M. Sufian, C. K. On, and J. A. Dargham, "Ensemble-based face expression recognition approach for image sentiment analysis," *Int. J. Electr. Comput. Eng*, vol. 12, no. 3, pp. 2588–2600, 2022.

[16] R. Lawpanom, W. Songpan, and J. Kaewyotha, "Advancing facial expression recognition in online learning education using a homogeneous ensemble convolutional neural network approach," *Applied Sciences*, vol. 14, no. 3, p. 1156, 2024.

[17] G. Perveen, S. F. Ali, J. Ahmad, S. Shahab, M. Adnan, M. Anjum, and I. Khosa, "Multi-stream deep convolution neural network with ensemble learning for facial micro-expression recognition," *IEEE Access*, vol. 11, pp. 118 474–118 489, 2023.

[18] S. K. Nayar, "Introduction to computer vision," Columbia University, New York, NY, USA, Monograph FPCV-0-1, Feb. 2022.

[19] P. Ekman and W. V. Friesen, "Facial action coding system," *Environmental psychology nonverbal behavior*, 1978.

[20] B. Fasel and J. Luettin, "Automatic facial expression analysis: a survey," *Pattern recognition*, vol. 36, no. 1, pp. 259–275, 2003.

[21] M. I. Jordan and T. M. Mitchell, "Machine learning: Trends, perspectives, and prospects," *Science*, vol. 349, no. 6245, pp. 255–260, 2015.

[22] S. Shalev-Shwartz and S. Ben-David, *Understanding machine learning: From theory to algorithms*. Cambridge university press, 2014.

[23] D. R. Cox, "The regression analysis of binary sequences," *Journal of the Royal Statistical Society Series B: Statistical Methodology*, vol. 20, no. 2, pp. 215–232, 1958.

[24] C. Cortes and V. Vapnik, "Support-vector networks," *Machine learning*, vol. 20, no. 3, pp. 273–297, 1995.

[25] L. Breiman, "Random forests," *Machine learning*, vol. 45, no. 1, pp. 5–32, 2001.

[26] D. E. Rumelhart, G. E. Hinton, and R. J. Williams, "Learning representations by back-propagating errors," *nature*, vol. 323, no. 6088, pp. 533–536, 1986.

[27] T. Chen and C. Guestrin, "Xgboost: A scalable tree boosting system," in *Proceedings of the 22nd acm sigkdd international conference on knowledge discovery and data mining*, 2016, pp. 785–794.

UNIVERSITAS
GADJAH MADA
**Analisis Stacking Ensemble Berbasis Multiple CNN untuk Klasifikasi Ekspresi Wajah pada Dataset Raf-DB**
Ahmad Fida' Ulhaq, Prof. Ir. Oyas Wahyunggoro, M.T., Ph.D.
**Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/**

[28] Y. LeCun, Y. Bengio, and G. Hinton, "Deep learning," *nature*, vol. 521, no. 7553, pp. 436–444, 2015.

[29] X. Zhao, L. Wang, Y. Zhang, X. Han, M. Deveci, and M. Parmar, "A review of convolutional neural networks in computer vision: X. zhao et al." *Artificial Intelligence Review*, vol. 57, no. 4, p. 99, 2024.

[30] C. Szegedy, V. Vanhoucke, S. Ioffe, J. Shlens, and Z. Wojna, "Rethinking the inception architecture for computer vision," in *Proceedings of the IEEE conference on computer vision and pattern recognition*, 2016, pp. 2818–2826.

[31] K. He, X. Zhang, S. Ren, and J. Sun, "Deep residual learning for image recognition," in *Proceedings of the IEEE conference on computer vision and pattern recognition*, 2016, pp. 770–778.

[32] Z. Liu, H. Mao, C.-Y. Wu, C. Feichtenhofer, T. Darrell, and S. Xie, "A convnet for the 2020s," in *2022 IEEE/CVF conference on computer vision and pattern recognition (CVPR)*. IEEE, 2022, pp. 11 966–11 976.

[33] X. Ma, X. Li, A. Luo, J. Zhang, and H. Li, "Galaxy image classification using hierarchical data learning with weighted sampling and label smoothing," *Monthly Notices of the Royal Astronomical Society*, vol. 519, no. 3, pp. 4765–4779, 2023.

[34] G. Chandrababu, O. Thomas Lee, and R. K. S, "An abridged review of transfer learning technology," in *2022 Second International Conference on Next Generation Intelligent Systems (ICNGIS)*, 2022, pp. 1–7.

[35] A. Chatzimparmpas, R. M. Martins, K. Kucher, and A. Kerren, "Stackgenvis: Alignment of data, algorithms, and models for stacking ensemble learning using performance metrics," *IEEE Transactions on Visualization and Computer Graphics*, vol. 27, no. 2, pp. 1547–1557, 2021.

[36] I. Ploshchik, A. Chatzimparmpas, and A. Kerren, "Metastackvis: Visually-assisted performance evaluation of metamodels," in *2023 IEEE 16th Pacific Visualization Symposium (PacificVis)*, 2023, pp. 207–211.

[37] F. E. Arévalo-Cordovilla and M. Peña, "Evaluating ensemble models for fair and interpretable prediction in higher education using multimodal data," *Scientific Reports*, vol. 15, no. 1, p. 29420, 2025.

[38] X. Xiong, Z. Zhou, G. Nong, J. Deng, and N. Wu, "Three-class emotion classification for audiovisual scenes based on ensemble learning scheme," *arXiv preprint arXiv:2511.17926*, 2025.

[39] G. Naidu, T. Zuva, and E. M. Sibanda, "A review of evaluation metrics in machine learning algorithms," in *Computer science on-line conference*. Springer, 2023, pp. 15–25.

[40] M. Carpita and S. Golia, "Categorical classifiers in multiclass classification with imbalanced datasets," *Statistical Analysis and Data Mining: The ASA Data Science Journal*, vol. 16, no. 4, pp. 391–405, 2023.

UNIVERSITAS
GADJAH MADA
**Analisis Stacking Ensemble Berbasis Multiple CNN untuk Klasifikasi Ekspresi Wajah pada Dataset Raf-DB**
Ahmad Fida' Ulhaq, Prof. Ir. Oyas Wahyunggoro, M.T., Ph.D.
**Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/**

[41] G. V. Rossum and F. L. Drake, *Python 3 Reference Manual*. Scotts Valley, CA, USA: CreateSpace, 2009.

[42] A. Paszke, S. Gross, F. Massa, A. Lerer, J. Bradbury, G. Chanan, T. Killeen, Z. Lin, N. Gimelshein, L. Antiga *et al.*, "Pytorch: An imperative style, high-performance deep learning library," *Advances in neural information processing systems*, vol. 32, 2019.