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Performance Evaluation of Face Recognition Model in Deep Learning using Old Facial Photos: A Mathematical Modelling Using SVM Supervised Learning

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Abstract: *Deep Learning has been a remarkable state-of-the-art method in any classification challenge, particularly in face recognition applications. In this paper, Feature Extraction in face recognition using Deep CNNs handpicked pre-trained CNN architectures such as InceptionV3, MobileNetV2, ResNet50, and VGG19 were experimentally explored. Initially, these architectures extracted important features from eight (8) classes of face photos with large age differences of ten (10) years from the present age of an individual. The features were processed with the application of a Support Vector Machine (SVM) classifier to enhance its performance. The evaluation of each model was based on average scores ofaccuracy, precision, recall, and f1-score. The results concluded an accuracy of 84.60%, a weighted precision of 85%, a weighted recall of 84.60%, and a weighted f1-score of 84.60% obtained by ResNet50.Further, ResNet50 has the highest obtained 98% generated ROC-AUC score. With the results presented, ResNet50 isrecommended for application development related to face recognition with the consideration of large age gaps of 10 years.*

Keywords: Deep Learning, Face Recognition, Feature Extraction, Image Augmentation, SVM Classifier

REFERENCES

[1]. Dargan, S. & Kuman, M. (2020). A Comprehensive Survey on the Biometrics Recognition System Based on Physiological and Behavioral Modalities. Expert System with Applications. 143. https://doi.org/10.1016/j.eswa.2019.113113
[2]. Hangaragi, S., Singh, T., & Neelima, N. (2023). Face Detection and Recognition Using Face Mesh and Deep Neural Network. Procedia Computer Science, 218, 741-749 https://doi.org/10.1016/j.procs.2023.01.054
[3]. Wang, M. & Deng, W. (2021). Deep Face Recognition: A Survey. Neurocomputing, 429, 215-244. https://doi.org/10.1016/j.neucom.2020.10.081
[4]. Guo, G., & Zhang, N. (2019). A Survey on Deep Learning Based Face Recognition. Computer Vision and Image Undertanding, 189. https://doi.org/10.1016/j.cviu.2019.102805
[5]. Kumar, D., Garain, J, Kisku, D.R., Sing, J.K., & Gupta, P. (2020). Unconstrained and Constrained Face Recognition Using Dense Local Descriptor with Ensemble Framework. Neurocomputing, 408, 273-284. https://doi.org/10.1016/j.neucom.2019.10.117
[6]. Basly, H., Oarda, W., Sayadi, F.E. Ouni, B., & Alimi, A.M. (2020). CNN-SVM Learning Approach Based Human Activity Recognition. Image and Signal Processing: 9th International Conference, 271-281.
[7]. Keerthana, D. Venugopal, V., Nath, M.K., &Mishra, M. (2023).
[8]. Hybrid convolutional neural networks with SVM classifier for classification of skin cancer, Biomedical Engineering Advances, 5. https://doi.org/10.1016/j.bea.2022.100069
[9]. Tripathi, M. (2021). Analysis of Convolutional Neural Network Based Image Classification Techniques. Journal of Innovative Image Processing, 3, 100-117.

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[10]. Tao, T. & Wei, X. (2022). A Hybrid CNN-SVM Classsifier for Weed Recognition in Winter Rape Field. Plant Methods, 18, 29. https://doi.org/10.1186/s13007-022-00869-z

[11]. Xu, M., Yoon, S., Fuentes, A., &Park, D.S. (2023). A Comprehensive Survey of Image Augmentation Techniques for Deep Learning. Pattern Recognition, 137. https://doi.org/10.1016/j.patcog.2023.109347

[12]. Ammar, S., Bouwmans, T., & Neji, M. (2022) Face Identification Using Data Augmentation Based on the Combination of DCGANs and Basic Manipulations. Information, 13, 370. https://doi.org/10.3390/info13080370

[13]. Jogin, M., Mohana, M., Madhulika, M., Divya, G., Meghana, R & Apoorva, S. (2018). Feature Extraction using Convolution Neural Networks (CNN) and Deep Learning. 2319-2323. https://doi.org/10.1109/RTEICT42901.2018.9012507.

[14]. Jiang, et al. (2021). Facial Expression Recognition Based on Attention Mechanism. Scientific Programming. https://doi.org/10.1155/2021/6624251

[15]. Ahmad, I., et al (2020). Optimizing Pretrained Convolutional Neural Networks for Tomato Leaf Disease Detection https://doi.org/10.1155/2020/8812019

[16]. Coulibaly, S., Kamsu-Foguem, B., Kamissoko, D. & Traore, D. (2022). Deep Convolution Neural Network Sharing for the Multi-label Images Classification. Machine Learning with Applications, 10. https://doi.org/10.1016/j.mlwa.2022.100422