

Deep Neural Architectures for Ethnicity Classification in Face Images

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Abstract - Ethnicity is a key metric of an individual's identity, social cluster, physical behaviour and cultural association. Accurate ethnicity identification of humans is required in numerous fields like security, legislation, social analysis and psychology. Ethnicity classification using machine learning is a complex, non-trivial and multi-dimensional research problem due to the feature complexity, class imbalance and the absence of rich data sets. In this research study, we have trained and compared four state-of-the-art deep neural models and their ensemble architectures on the problem of ethnicity classification in large-scale image data. The empirical results demonstrate that these end-to-end deep learning models and their ensemble architectures perform well in learning complex ethnic features in facial images and classifying them. From the evaluated models, Ensemble Convolutional Neural network provided the highest classification performance with 78.9% accuracy. Also, we have tested six prominent pre-trained models using transfer learning for ethnicity classification while being able to achieve comparable results.

Keywords - deep learning, ethnicity classification, image processing, neural networks, transfer learning