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Super-Low Resolution Face Recognition using Integrated Efficient Sub-Pixel Convolutional Neural Network (ESPCN) and Convolutional Neural Network (CNN)

Mohammed Ahmed Talab
Department of Engineering of Computer Technology
Al-maarif University College
Ramadi, Iraq
mmss_ah@yahoo.com

Suryanti Awang
Soft Computing & Intelligence Systems (SPINT)
Faculty of Computer Systems & Software Engineering
Universiti Malaysia Pahang
Kuantan, Malaysia
suryanti@ump.edu.my

Saif Al-din M. Najim
College of Computer Science and Information Technology
University of Anbar
Ramadi, Iraq
sayf73@gmail.com

***Abstract*—Several deep image-based models which depend on deep learning have shown great success in the recorded computational and reconstruction efficiencies, especially for single high-resolution images. In the past, the use of super-resolution was commonly characterized by interference, and hence, the need for a model with higher performance. This study proposed a method for low to super-resolution face recognition, called efficient sub-pixel convolution neural network. This is a convolutional neural network which is usually employed at the time of image pre-processing to increase the chances of recognizing images with low resolution. The proposed Efficient Sub-Pixel Convolutional Neural Network is used for the conversion of low-resolution images into a high-resolution format for onward recognition. This conversion is based on the features extracted from the image. Using several evaluation tools, the proposed Efficient Sub-Pixel Convolutional Neural Network recorded a higher performance in terms of image resolution when compared to the performance of the benchmarked traditional methods. The evaluations were carried out on a Yale face database and ORL dataset faces. For Yale and ORL datasets, the obtained accuracy of the proposed method was 95.3% and 93.5%, respectively, which were higher**

attempt to invert the downsampling process. Be that as it may, the quality of an outcome is mainly affected by the accuracy of the method adopted. However, a computationally complex image registration and fusion stages are required for these methods. The single image super-resolution (SISR) methods are the suitable alternative as they can implicitly learn the inherent redundancy in most data sourced from both high and single low-resolution images. These depict the temporal correlations for videos and local spatial correlations for images. As such, there is a need for pre-information for the solution space in reconstruction. In recent times, the use of artif cial intelligence (AI) has assumed a vantage position with great technological relevance. An important aspect of this is the use of AI in biometric authentication for face recognition [7, 8].

Face recognition is important because it has several advantages compared to the other authentication or biometric methods like iris and speaker recognition [9, 10]. Studies on biometric authentication have recently focused on face recognition. Biometrics refers to the instant identification of