NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

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Towards Interpretable & Robust Occluded Face Recognition

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Motivation & Objective

With rapid technological advances, robust facial recognition systems have become necessary to strengthen security. Deep Convolutional Neural Networks are gaining popularity in enhancing such systems. However, facial recognition algorithms still face challenges when tested in real-world scenarios. The objective of this research is to improve the robustness of an existing facial recognition model ("End2End occluded Face Recognition by masking corrupted features" by H. Qiu, D. Gong, Z. Li, W. Liu, and D. Tao), which utilizes feature masks to detect synthetic occlusions, and make it handle occlusions better in an unconstrained environment.

Methodology & Experiment Results

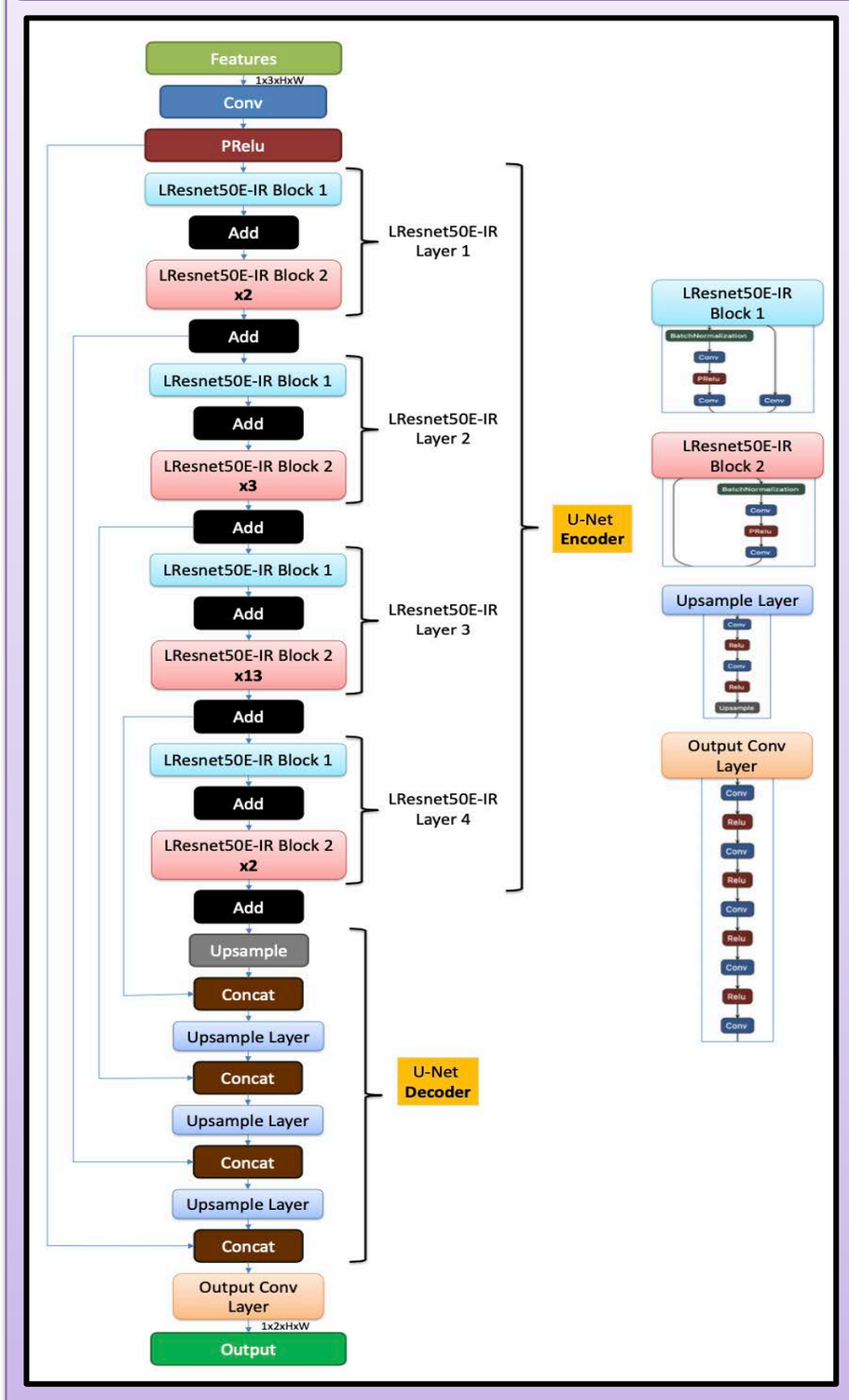

Figure 1: *U-Net model with LResnet50E-IR*

We researched three fundamental approaches: feature dictionaries, Feature Pyramid Networks (FPNs), and image segmentation. Post analysis, we found that the most effective solution was the U-Net model with LResnet50E-IR backbone (Figure 1), as it could accurately detect the boundary of the visible part of the face and outperformed on the failure case of existing methods (Figure 2), along with real-world occluded face images (Figure 3).

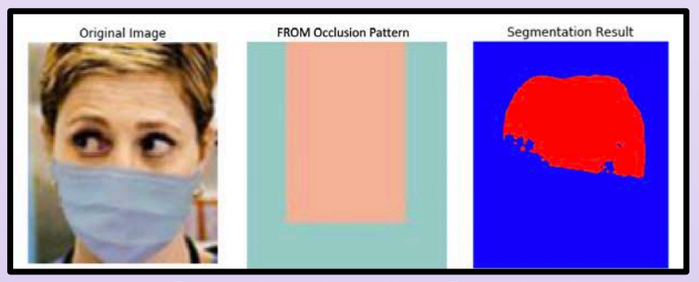

Figure 2: *Results on a Synthetically Occluded Image for which the existing method failed to localize on occlusion, but our model successfully identified the face features.*

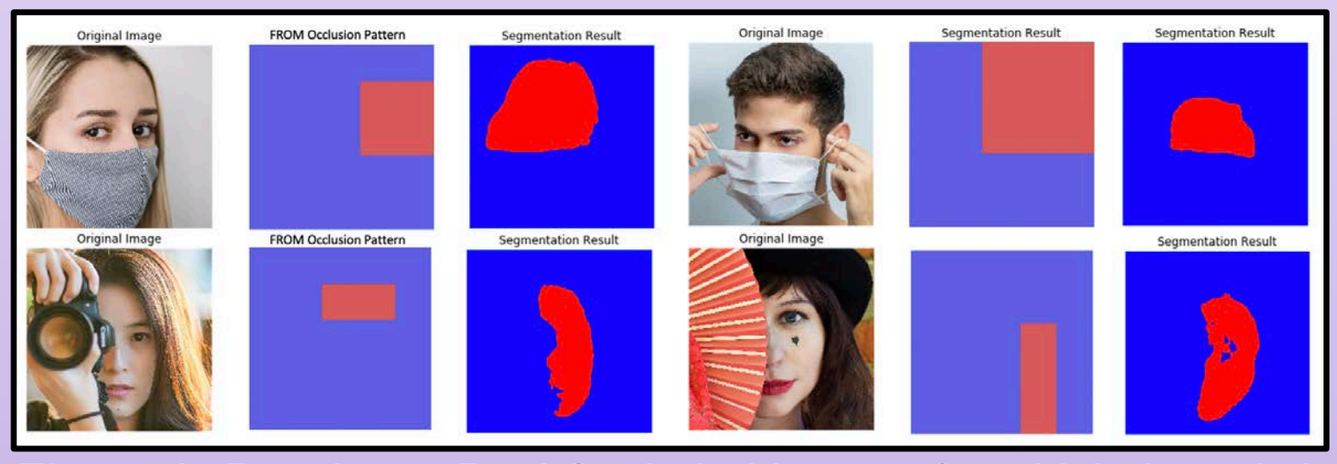

Figure 3: *Results on Real Occluded Images for which the existing method failed but our model successfully identified the face features.*

Conclusion & Future Work

Our experiments show that adopting such an approach can significantly improve the accuracy of modern facial recognition algorithms. Future work can be done to investigate deeper image segmentation models and combine them with FPNs to enhance facial recognition models.