ABSTRACT

Advances in generative technologies such as Generative Adversarial Networks (GANs) and Latent Diffusion Models enable the generation of synthetic images that are difficult to distinguish from original images, thus posing challenges in verifying the authenticity of visual content. This study develops a DenseNet-121-based image classification model with hyperparameter optimization and the integration of Squeeze-and-Excitation (SE) attention mechanisms at the Early, Mid, and Late positions. Experiments were conducted using the CIFAKE dataset with a resolution of 32×32 pixels to compare the Plain baseline model and three SE variants. Hyperparameter optimization was performed to maximize performance, while eXplainable AI interpretability using SHapley Additive exPlanations (SHAP) was used as an additional analysis to understand the contribution of features. The results show that DenseNet-121 Plain with hyperparameter optimization achieves an accuracy of 98.52%, higher than the standard configuration in previous studies. SE integration provides varying performance, with Mid SE achieving the highest accuracy of 98.56%, while Early SE (98.45%) and Late SE (98.48%) exhibit better stability with lower standard deviations. This confirms SE's role in enhancing important features while suppressing less relevant features. These findings suggest that the combination of hyperparameter optimization and proper Squeeze-and-Excitation placement contributes to improved model performance in image classification.

Keywords : AI-Generated Image, Attention, Hyperparameter, Squeeze-And-Excitation, DenseNet121, SHAP, Interpebelity