REPORT

Neural Networks And Deep Learning.

Skin Lesion Diagnosis using Ensembles, Unscaled Multi-Crop Evaluation and Loss Weighting.

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CONTENTS:

Introduction.

Convolutional neural networks (CNNs), in particular, and deep learning have emerged as the industry standard for automated diagnosis based on medical imagery. A new dataset has been released to the public for the problem of skin lesion diagnostics. The collection of data includes 10,000 thermoscopic pictures of skin lesions that have been diagnosed by histology, serial imaging, or expert consensus. The challenge "ISIC 2018: Skin Lesion Analysis Towards Melanoma Detection" has been put out using this dataset. The approach to this challenge is automated and utilizes several cutting-edge CNNs, substantial, unscaled cropping, loss weighting, massive data augmentation, and meta learning. We go into the specifics of our strategy in the sections that follow.

Summary.

The Summary states that the methods for focusing on automated skin lesion diagnosis. It employ an ensemble of convolutional neural networks (CNNs), using pretrained models like Densenet, SENet, and ResNeXt, to classify 10,000 images into seven classes. The challenge involves addressing a significant class imbalance, which the authors tackle with techniques such as loss weighting and balanced batch sampling. They also utilize unscaled multi-crop evaluation and meta-learning approaches for final predictions. Their method achieved second place in the challenge, and was the best approach using only publicly available data.

Critical Analysis.

Overall, a robust and innovative approach to automated skin lesion diagnosis. While the method shows significant promise, particularly in addressing class imbalance and leveraging advanced CNN architectures, there are areas for improvement, particularly concerning meta-learning strategies and hyperparameter optimization. Future research should focus on refining these aspects and exploring new techniques to further enhance the model's effectiveness and applicability.

Conclusion.

The approach uses a large ensemble of state-of-the-art convolutional neural networks (CNNs), focusing on both detailed and global image features through unscaled multi-crop evaluation. The study addresses class imbalance, which reflects real-world scenarios where benign lesions are more common, by implementing loss weighting strategies that adjust for class frequency.

Despite exploring additional loss weighting based on diagnosis difficulty, results varied across models, suggesting the need for improved techniques. The authors found that newer CNN architectures outperformed older ones like ResNet and VGG, indicating a shift towards more advanced models for better diagnosis. Future work could involve more extensive hyperparameter tuning and integrating local and global features into a single trainable architecture.