*Extended Abstract on*

**“AI-Driven Skin Cancer Detection for Early Intervention using Deep Learning”**

*By*

Abhishek S Waghchaure

(PRN: 1032221714)

*Under the guidance of*

Prof. Dr. Deepali Javale



School of Computer Engineering and Technology

Dr. Vishwanath Karad

MIT World Peace University, Pune.

[Academic Year 2023-24]

## **ABSTRACT**

Skin lesion segmentation is a critical component of computer-aided diagnosis and therapy planning for dermatological conditions. This study explores the application of Convolutional Neural Networks (CNNs) for accurate skin lesion segmentation, with a focus on the impact of data augmentation techniques. The PH2 dataset, containing dermoscopic images, serves as the foundation for training and evaluation. To enhance model generalization, rotation and flipping are employed as augmentation strategies to enrich the dataset.

The proposed architecture is based on SegNet, which includes encoding and decoding layers to facilitate efficient feature extraction and precise segmentation. Stochastic gradient descent (SGD) is used as the optimizer to minimize the loss function during training. The model's performance is further enhanced through the use of activation functions and batch normalization, ensuring robust training and improved accuracy.

The training process follows a standardized approach, with the specification of batch size, selection of a validation set, and determination of the number of epochs. The results demonstrate a significant improvement in segmentation accuracy due to the augmented dataset. Performance metrics such as Intersection over Union (IoU), precision, recall, and overall accuracy are employed to assess the effectiveness of the model on training, test, and validation sets. The IoU, in particular, is highlighted as a near-perfect measure due to the near-Euclidean shape of the lesions being segmented.

This research also presents an automated system for early detection of skin lesions, which is essential for timely intervention and treatment. The study introduces a heterogeneous, preprocessed dataset encompassing various skin lesion types, skin tones, and image qualities. The use of transfer learning from pre-trained models is a key aspect of this work, as it leverages feature representations learned from large datasets to improve the model's performance on the skin lesion dataset.

The system employs several deep learning algorithms, including CNN, Vgg6, Xception, and DenseNet. Fine-tuning these models on the skin lesion dataset, combined with hyperparameter tuning, optimizes their performance. To ensure the model's ability to generalize, extensive testing and validation are conducted on different datasets. Additionally, post-processing techniques and interpretability metrics are applied to enhance the reliability of the model's predictions.

The study underscores the importance of continuous collaboration between medical practitioners and engineers in the development of deep learning-based diagnostic tools in healthcare. Ethical considerations and adherence to regulatory norms are also emphasized as critical factors in the successful implementation of such technologies. The research concludes that CNN-based segmentation models, augmented with data enrichment techniques and transfer learning, hold significant promise for improving the accuracy and reliability of automated skin lesion detection systems, ultimately contributing to better clinical outcomes.