

**Project ID:** 002

**Project Title:** Skin Lesion Classification Using Deep Learning

**Area of Research:** Computer Vision (CV)

**Problem Statement:**

The project aims to develop a deep learning model for accurately classifying skin lesions into distinct categories, including melanoma, nevi, and benign lesions. Skin lesion classification is a critical task in dermatology, and automating this process using deep learning techniques can aid in early detection and improved patient outcomes. Unlike standard datasets such as MNIST or CIFAR-10, which are limited in diversity, skin lesion classification presents challenges due to the variability and complexity of skin conditions.

**Dataset:**

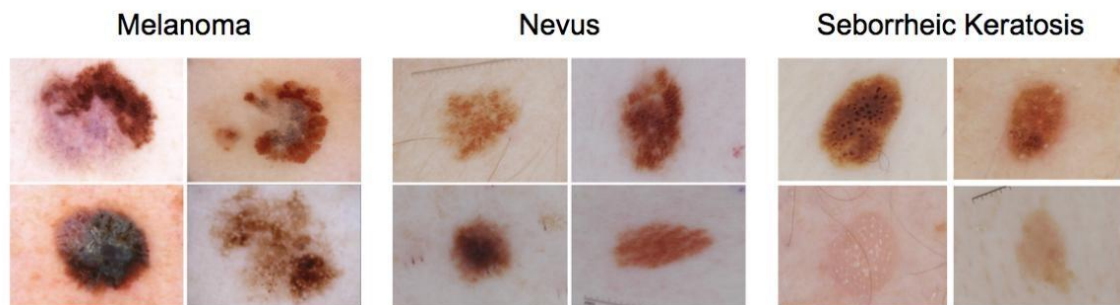


Figure 1: example images of ISIC dataset.

The project utilizes the International Skin Imaging Collaboration (ISIC) dataset, which contains a diverse collection of dermoscopic images encompassing various skin lesion types. The dataset is annotated with ground truth labels for lesion categories, providing a valuable resource for supervised learning tasks in skin lesion classification.

**Dataset URL:** <https://challenge.isic-archive.com/data/>

**Task:**

The task involves training a deep neural network to accurately classify skin lesions into predefined categories, including melanoma (malignant), nevi, and benign lesions. Students will explore architectures such as ResNet, VGG, or custom networks suitable for handling complex image features specific to dermoscopic images. Data augmentation techniques such as rotation, flipping, scaling, and color jittering will be employed to improve model generalization and robustness.

**Relevant Papers:**

1. Kassem, Mohamed A., et al. "Machine learning and deep learning methods for skin lesion classification and diagnosis: a systematic review." *Diagnostics* 11.8 (2021): 1390.
2. Lopez, Adria Romero, et al. "Skin lesion classification from dermoscopic images using deep learning techniques." 2017 13th IASTED international conference on biomedical engineering (BioMed). IEEE, 2017.
3. Benyahia, Samia, Boudjelal Meftah, and Olivier Lézoray. "Multi-features extraction based on deep learning for skin lesion classification." *Tissue and Cell* 74 (2022): 101701.