DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
NORTH SOUTH UNIVERSITY (NSU)

CSE 445: Machine Learning
Section 6

Project

Instructor: Dr. Mohammad Mahmudul Alam Semester: Fall 2025

Title:	Skin Cancer detection Model using the CNNs and transfer learning Models with PyTorch.
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Proposal

Title: Skin Cancer detection Model using the CNNs and transfer learning Models with PyTorch.

Introduction:
In this project, we are developing a deep learning-based model to detect skin cancer from dermoscopic images. Nowadays, skin cancer is a severe global issue, and early detection of skin cancer can help save many lives. However, the traditional diagnosis by a dermatologist can be time-consuming and often inaccurate. To checkmate this issue, we have planned to build an image classification model using **Convolutional Neural Networks (CNNs)** and transfer learning models such as **VGG16** and **ResNet50** with **PyTorch**. Our main motto is to assist in medical diagnosis by providing a fast and reliable classification for skin care detection.

Problem Statement:
Nowadays, skin cancer is one of the most common and deadliest forms of cancer worldwide. Traditional diagnosis based on visual inspection of skin lesions is time-consuming, subjective, and prone to error. Again, dermatologists can have various opinions depending on their experience and environmental factors. For all these reasons, there is always a growing need for an automated and reliable system that can analyze the dermoscopic images and early signs of skin cancer. Our project is trying to address this challenge by developing a **Skin Cancer detection Model** that can classify skin lesions with high accuracy using PyTorch.

Objectives:
The main objectives of our project are:

- To analyze and understand the problem of skin cancer detection using dermoscopic images.
- To preprocess and organize a labeled image dataset for training.
- To train deep learning models (CNN, VGG16, ResNet50) for binary classification.
- To compare the performance of different models and choose the best one.
- To evaluate the model using validation metrics and improve its accuracy.

Methods:
In order to accomplish this project, we shall utilize the following methodology:

- We will gather the dataset, preprocess the same by resizing images, normalizing pixel intensity values, as well as incorporating data augmentation to avoid overfitting.
- We will construct CNN-based classification models with the help of PyTorch.
- We will use transfer learning with pretrained networks like VGG16 and ResNet50 to achieve a better accuracy and save on training time.
- We will split the dataset into training, and test sets.
- We will custom train our models.
- Ultimately, we will check the models with **accuracy, loss plots, confusion matrix**, as well as **F1 Score**.

Dataset: marmal88/skin_cancer · Datasets at Hugging Face

Tools & Libraries:

- Python: Primary language for machine learning and deep learning development.
- PyTorch : Alternative deep learning framework for experimentation.
- NumPy: For data manipulation and preprocessing.
- Matplotlib: For data visualization and performance analysis.
- Scikit-learn: For calculating the evaluation matrices like accuracy, precision, recall, F1 Score, and confusion matrix.
- OpenCV: For image processing and enhancement.

Environment:
We will try to train our model locally, using Jupyter Notebook and Conda with local system GPU Support. If we fail, then we will use Google Colab with T4 GPU support.