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

CSE 445: Machine Learning
Section 6

Project Update

Instructor: Dr. Mohammad Mahmudul Alam Semester: Fall 2025

Title:	Skin Cancer detection Model using the Deep learning with transfer learning Custom CNN
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Project Update

Title: Skin Cancer detection Model using the Deep learning with transfer learning Custom CNN

Abstract:
In this project, we aim to develop a skin cancer detection model to detect skin cancer from dermoscopic images using deep learning techniques and custom CNN. We have already preprocessed and augmented our dataset and trained our VGG16, VGG19, IncetionV3, ResNet152 and EfficientNet models locally on our own machines. While the training we have got a very high training accuracy but our validation and testing accuracy remains comparatively very low which is a huge indicator that our model is overfitting. We are currently working on improving our model performance before moving on developing our custom CNN.

Methodology:
We have started our project by building our project environment setup CUDA and cuDNN Toolkit and GPUs into our training environment. Then we studied our targeted model architecture, after that we started dataset selection and after that we performed image resizing, normalization and data augmentation to improve our generalization and reduce class imbalance. After preparing the dataset, we have fine-tuned VGG16, VGG19, ResNet-152, InceptionNetV3 and EfficientNet locally, experimenting with freezing/unfreezing layers, adjusting weight decay, Dropout and learning rates and modifying the classification head.

For each of the models, we have experimented with different optimizers, dropout settings, batch normalization. As we are performing our model training locally. So, we have to optimize our batch size and image resolution to fit within in our System. These experiments helped us a lot to understand each model's behavior on our dataset and we understood that we need a stronger regularization and a better augmentation to reduce the overfitting.

Initial Results:

- VGG16, VGG19, ResNet-152, InceptionNetV3 and EfficientNet achieved a very high training accuracy, which indicated our data pipeline and augmentations steps are working properly. But our Validation and Test accuracy is competitively very low, which show our models are overfitting.
- InceptionV3 and ResNet152 delivers the most consistent result. On the other hand EfficientNet, VGG16 and VGG19 showed fluctuation in the validation performance.

Issues Faced:

- Faced a huge challenge while setting up the project, training environment and setting GPU into the environment.
- In our dataset we have faced huge class data imbalance.
- We have faced a challenge in improving generalization, stabilizing the validation loss and dealing with the remaining data imbalance despite after dataset augmentation

Next Steps:

- Improve regularization using dropout tuning. L2 regularization, and better early stopping settings.
- Increase and refine data augmentation to further prevent overfitting.
- Perform additional hyperparameter tuning.
- Begin building and training our custom CNN model from scratch using Keras.
- Perform Ensemble Learning.
- Compare the custom CNN model performance with the pretrained model performance and literature reviewed paper model's performance.to evaluate the improvements.
- Conduct final testing and evaluation before submission.