2242-DASC-5309-001 DATA SCIENCE CAPSTONE PROJECT

PROJECT PROPOSAL

BY GROUP 2

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MELANOMA DETECTION BASED ON DEEP NEURAL NETWORKS

Skin cancer, especially melanoma, is a potentially fatal condition that has to be detected early in order to be effectively treated. Deep learning models are a useful tool for automated melanoma identification since they have demonstrated good outcomes in medical image analysis. The goal of this project is to utilize the Melanoma dataset to develop a deep learning model for melanoma detection and compare its working with various pre-trained model namely VGG16, ResUNet and InceptionV3 algorithm.

1. **Building a Deep Learning Model**: Convolutional neural networks (CNNs) may be used to identify possible melanoma lesions by analysing dermatoscopic pictures.
2. **Preprocessing the Data**: To guarantee the best possible model performance, clean up and prepare the Melanoma dataset. This covers class imbalance management, data augmentation, and normalization.
3. **Training and Validation**: Use a subset of the dataset to train the model, another subset to evaluate its performance, and fine-tune the architecture to maximize accuracy.
4. **Evaluation**: To determine whether the model can be applied to fresh, untested data, test it on a separate test set. There will be a usage of metrics like F1 score, recall, accuracy, and precision.
5. **Comparison**: Follow objectives 3 and 4 iteratively to build pre-trained models and compare their metrics with the model built from scratch.

The Dataset used for this project contains around 10000 Images. The Melanoma dataset consists of high-resolution dermatoscopic images of skin lesions, labelled as benign or malignant. The dataset will be split into training, validation, and test sets to train and evaluate the deep learning model. Following is the link for dataset.

https://www.kaggle.com/datasets/hasnainjaved/melanoma-skin-cancer-dataset-of-10000-images

In order to extract hierarchical characteristics from images a CNN architecture will be utilized. For purpose of comparison, transfer learning using pre-trained models (such as VGG16, ResUNet) may be taken into consideration.