

SKIN CANCER DETECTION USING ADAM OPTIMIZER

ABSTRACT

Skin cancer is the out-of-control growth of abnormal cells in the epidermis, the outermost skin layer, caused by unrepaired DNA damage that triggers mutations. These mutations lead the skin cells to multiply rapidly and form malignant tumors. Skin cancers can look quite different from one person to another due to skin tone, size and type of skin cancer and location on the body.

The two main causes of skin cancer are the sun's harmful ultraviolet (UV) rays and using UV tanning beds. The good news is that if skin cancer is caught early, your dermatologist can treat it with little or no scarring and high odds of eliminating it entirely. Often, the doctor may even detect the growth at a precancerous stage before it has become a full-blown skin cancer or penetrated below the surface of the skin.

The main types of Skin Cancer are **Basal Cell Carcinoma, Melanoma and Squamous Cell Carcinoma**. However, this project concentrates on a few more types like **Actinic Keratosis, Dermatofibroma, Nevus, Pigmented Benign Keratosis, Seborrheic Keratosis and Vascular Lesion**. The detection system is planned to be implemented using Convolutional Neural Networks (CNN) enhanced with ADAM optimizer.

CONVOLUTIONAL NEURAL NETWORKS (CNN)

Convolutional neural networks are distinguished from other neural networks by their superior performance with image, speech, or audio signal inputs. They have three main types of layers, which are:

1. Convolutional layer
2. Pooling layer
3. Fully-connected (FC) layer

The convolutional layer is the first layer of a convolutional network. While convolutional layers can be followed by additional convolutional layers or pooling layers, the fully-connected layer is the final layer. With each layer, the CNN increases in its complexity, identifying greater portions of the image. Earlier layers focus on simple features, such as colors and edges. As the image data progresses through the layers of the CNN, it starts to recognize larger elements or shapes of the object until it finally identifies the intended object.

ADAM OPTIMIZATION

In machine learning, Adam (Adaptive Moment Estimation) stands out as a highly efficient optimization algorithm. It's designed to adjust the learning rates of each parameter. Adam tweaks the gradient descent method by considering the moving average of the first and second-

order moments of the gradient. This allows it to adapt the learning rates for each parameter intelligently.

At its core, Adam is designed to adapt to the characteristics of the data. It does this by maintaining individual learning rates for each parameter in your model. These rates are adjusted as the training progresses, based on the data it encounters.

DATASET

This project aims to pull data from various sources, the main ones being:

- apps.who.int/gho/data/node/home – Source: WHO
- datasetsearch.research.google.com – Source: GOOGLE
- kaggle.com – Source: KAGGLE
- registry.opendata.aws/ - Source: Amazon

TECHNOLOGY

This project is aimed to be implemented in Python.