

Healthcare Data Science – Using CNN Models to Predict the Cancerous State of Dermatological Lesions

Picture this scenario: a 45-year old patient enters a dermatologist's clinic, concerned about a strange-looking mole that has changed shape over the past few months. The dermatologist examines it carefully, but it is a difficult case to classify. With time of the essence, *every decision matters*.

Now, imagine if **you** could help. What if you had the power to create an AI model that could instantly analyze an image of that mole and flag whether it is benign or malignant? What if that model had the potential to save a life?

This is where healthcare data science meets real-world impact. In this case study, you will work with Convolutional Neural Networks (CNNs), one of the most powerful tools in AI, to predict the cancerous state of skin lesions from dermatological images.

Deliverable:

Your task is to build and refine a predictive CNN model capable of identifying patterns in dermatological images to classify skin lesions into one of three categories:

- Benign
- Benign* (benign but at risk of becoming malignant)
- Malignant

This task requires an initial exploratory data analysis of key features of the image data, including initial classification distribution, lesion width, height, and color(s), and image aspect ratio, brightness, and contrast. Then, you will create, train, and test a CNN model to apply feature extraction on the image data and identify significant visual patterns.

Your deliverable should include model predictions of the cancerous state of dermatological lesions, as well as the key image features that lead to these classifications. Evaluate your model's performance using confusion matrices and key model performance statistics like precision, recall, accuracy, and F1 scores.

By the end of this project, you will gain hands-on experience at the intersection of data science and medicine. Most importantly, you will see how your work using AI could be used in hospitals and clinics to make faster, more accurate diagnoses.

So, are you ready to take the first step into a field where your analysis could truly save lives?