

# Chapter 2

## Automatic Hybrid CNN–Based Skin Cancer Classification

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### ABSTRACT

*Skin cancer, particularly dermo-cancer, is a critical health concern with rising incidences worldwide. Automated classification of dermo-cancer from skin images plays a pivotal role in early diagnosis and timely intervention. In this work, hybrid architecture that integrates inception and ResNet models to enhance feature extraction and facilitate hierarchical learning for improved dermo-cancer classification is explored. The inception module contributes to capturing multi-scale features, while the ResNet module addresses the challenges of vanishing gradients and aids in building a more robust and deeper neural network. The proposed hybrid architec-*

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*ture is trained on a comprehensive dataset, and experimental results demonstrate superior performance compared to individual models, achieving enhanced accuracy, sensitivity, and specificity. The approach automated dermo-cancer classification but also holds promise for other medical image tasks, showcasing the potential of hybrid architectures in medical image analysis.*

## **INTRODUCTION**

Cancer is when cells in the body change and grow out of control. To help you understand what happens when you have cancer, let's look at how your body works normally. Your body is made up of tiny building blocks called cells. Normal cells grow when your body needs them, and die when your body does not need them any longer.

Cancer is made up of abnormal cells that grow even though your body doesn't need them. In most cancers, the abnormal cells grow to form a lump or mass called a tumor. If cancer cells are in the body long enough, they can grow into (invade) nearby areas. They can even spread to other parts of the body (metastasis).

Skin cancer is a disease that begins in the cells of the skin. The area of skin with the cancer is often called a lesion. There are several types of skin cancer (carcinoma). Melanoma is the most serious. But there are others that are known as nonmelanoma skin cancer. These include:

- Basal cell carcinoma
- Squamous cell carcinoma
- Merkel cell carcinoma
- Cutaneous T-cell lymphoma
- Kaposi sarcoma

Basal cell carcinoma and squamous cell carcinoma are by far the most common.

### **1.1. Understanding the Skin**

The skin is the largest organ of the body. Skin protects us from heat, sunlight, injury, and infection. It also stores water and fat, and makes vitamin D. The skin has 3 layers:

- The outer layer called the epidermis
- The middle layer called the dermis
- The inner layer called the subcutis (subcutaneous)

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