



# AUTOMATING SKIN CANCER DIAGNOSES WITH DEEP LEARNING ALGORITHMS

-MAYA KASBEKAR

# BACKGROUND – WHY I CHOSE THIS PROJECT

The next few years will be transformational for detection with technologies such as DNA sequencing and deep learning.

- Specifically, I chose skin cancer because over the course of the last two decades, skin cancer has become increasingly prevalent due to excessive sun exposure and environmental contaminants.
- Currently over 5 million people in the US get skin cancer and the trend is only increasing.
- The traditional method of diagnosis is through a physician's visual inspection.
- However, a physician's accuracy is limited: only 80% accuracy of detection is achieved by highly experienced physicians, and 62% accuracy by new physicians.

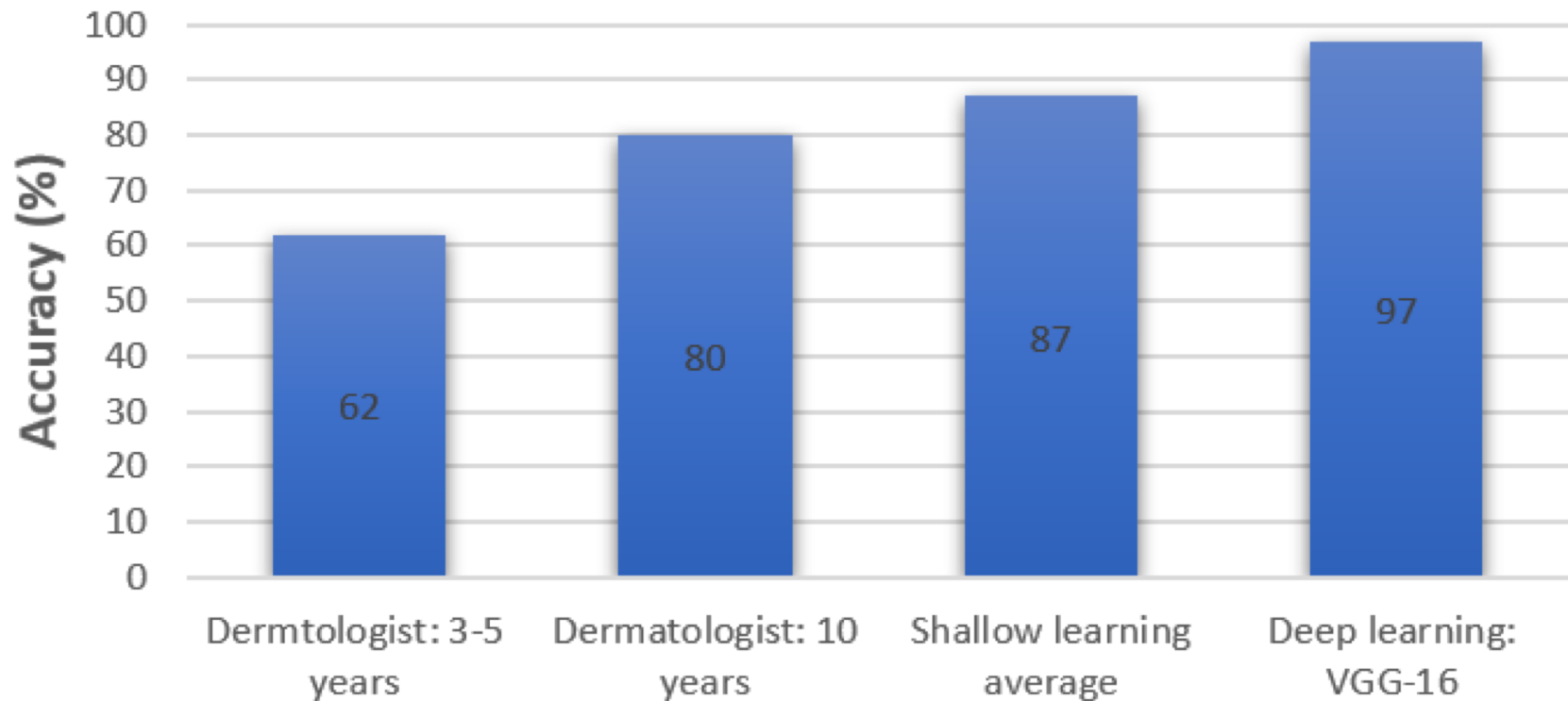
# PROJECT DETAILS

- Machine learning is a field of computer science that enables computers to learn and get better
- Machine learning can be used for classification or regression and involves two key concepts:
  1. a forward propagation using a large amount of image data
  2. a backward propagation using gradient descent learning algorithm that enables the computer to learn
- Until 2008, machine learning was not very effective at recognizing patterns due to a problem called vanishing gradient
- Once overcome, deep learning was born, and computers got better at pattern recognition than humans; powerful deep learning convolution neural networks or CNNs were born

# PROJECT DETAILS

- My project utilized 4 key classical shallow learning algorithms: support vector machines, decision trees, logistic regression, and neural networks; as well as a state-of-the-art convolution neural network: the VGG-16 convolution neural network to determine whether a skin mole was benign or malignant
- The goal was to show a comparison in accuracy between:
  1. algorithmic and human detection
  2. various shallow machine learning algorithms
  3. shallow and deep learning CNN algorithms
- THE DIFFERENCE WAS HUGE!

## Dermatologist vs. Algorithmic Accuracy



**Dermatologist VS. ML**