

Pre-Screening tool for Melanoma


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What is Melanoma?

Melanoma

Also called: malignant melanoma

ABOUT SYMPTOMS TREATMENTS



New unusual growth or a change in an existing mole

The most serious type of skin cancer.

Common
More than 200,000 US cases per year

- Treatable by a medical professional
- Requires a medical diagnosis
- Lab tests or imaging often required

If undetected:

→ Late stage Melanoma can spread to organs

→ Poor prognosis (95% → 19% survival)

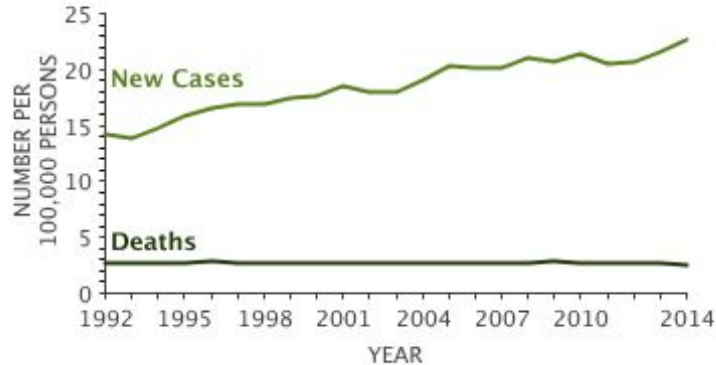
Melanoma Statistics

> At a Glance

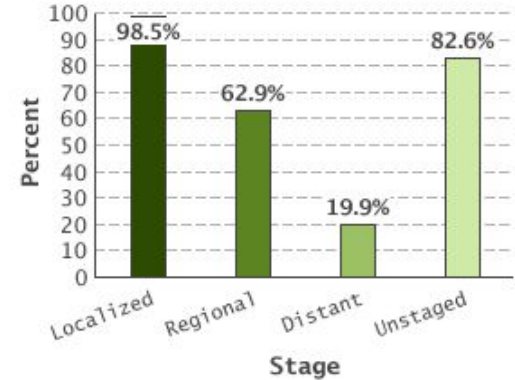
Estimated New Cases in 2017	87,110
% of All New Cancer Cases	5.2%
Estimated Deaths in 2017	9,730
% of All Cancer Deaths	1.6%



NATIONAL CANCER INSTITUTE
Surveillance, Epidemiology, and End Results Program



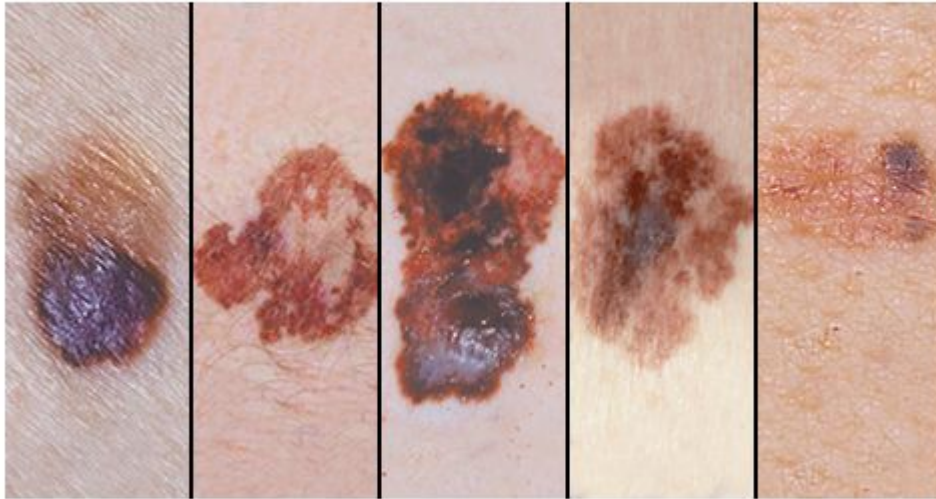
5-Year Relative Survival



Highly curable if detected early and treated properly

How to Detect Melanoma?

Slide show: Melanoma pictures to help identify skin cancer



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A: Asymmetry



B: Border irregularity



C: Color changes



D: Diameter



E: Evolving

Detection susceptible to bias, examiner experience, and frequency.

Motivation

Mole Misdiagnosis: When It's Really Stage IV Skin Cancer

Erin Youngerberg noticed a small mole, the size of a pencil eraser, on her back. She was told not to worry. But it was stage IV melanoma, an aggressive form of skin cancer. Doctors went on to find tumors all over her body. This is her story.

Misdiagnosis → 16% of malpractice insurer's claims related melanoma (1998-2001)

Resource → Third world countries lack certified dermatologist

Solution → *Web app where users upload pictures (input) of skin to obtain prediction of melanoma (output) using image processing and machine learning tools*

Data Acquisition

- Start: PH2 dermoscopic image database with 400+ images
- Enlarge:
 - Open-access repositories by clinicians
 - Web scraping (Scrapy/BeautifulSoup)

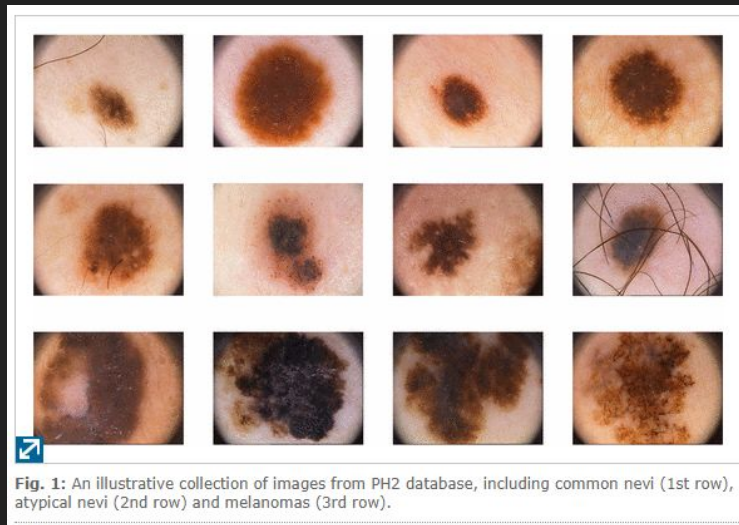
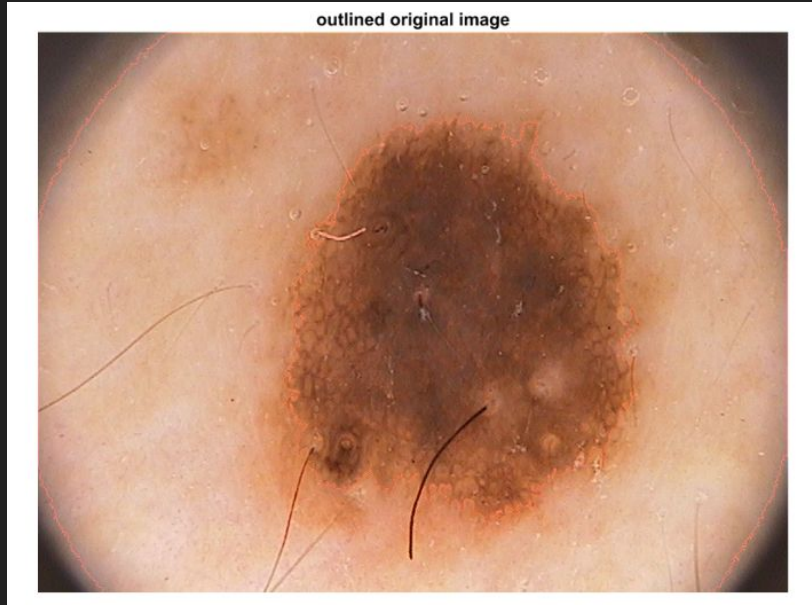


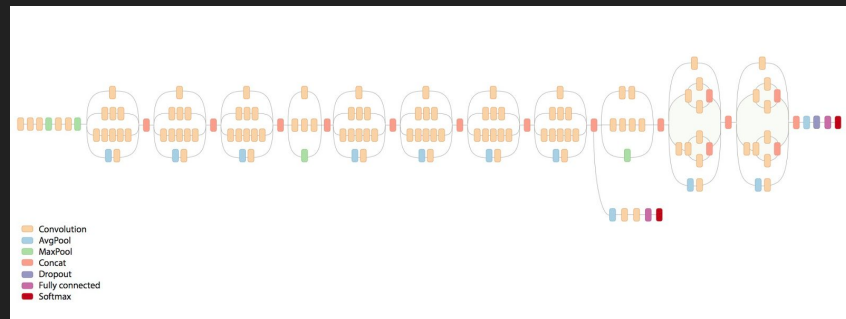
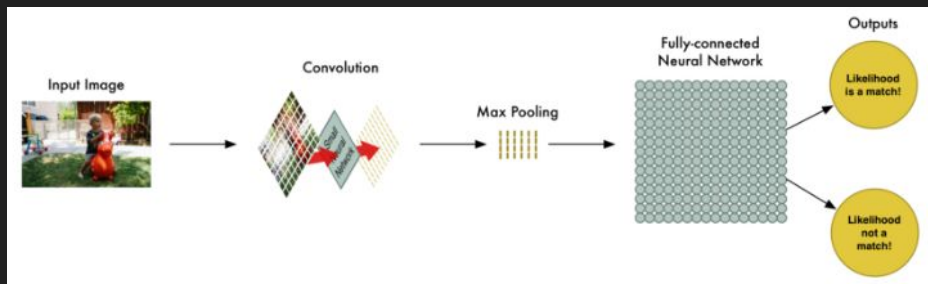
Image Segmentation/Analysis



RGB \rightarrow Grayscale \rightarrow High Frequency Emphasis Filter \rightarrow Binary Image \rightarrow Extract
Circularity, Symmetricality. etc

Deep learning

- Neural network for image classification
 - Convolution neural networks (Tensorflow-Keras)
 - Deeper model using transfer learning → Tensorflow-Inception-v3



Potential Obstacles & Summary

Imperfect Image segmentation → Alternatives: watershed segmentation method

Deep Learning → Alternative: Classification tree/Random Forest

- *Webapp as pre-screening tool for melanoma → point-of-care diagnostic mobile app*
 - *Unbiased predictions*
 - *Increased convenience*
 - *Low cost*

Thank you for listening. Any questions?

