Pre-Screening tool for Melanoma

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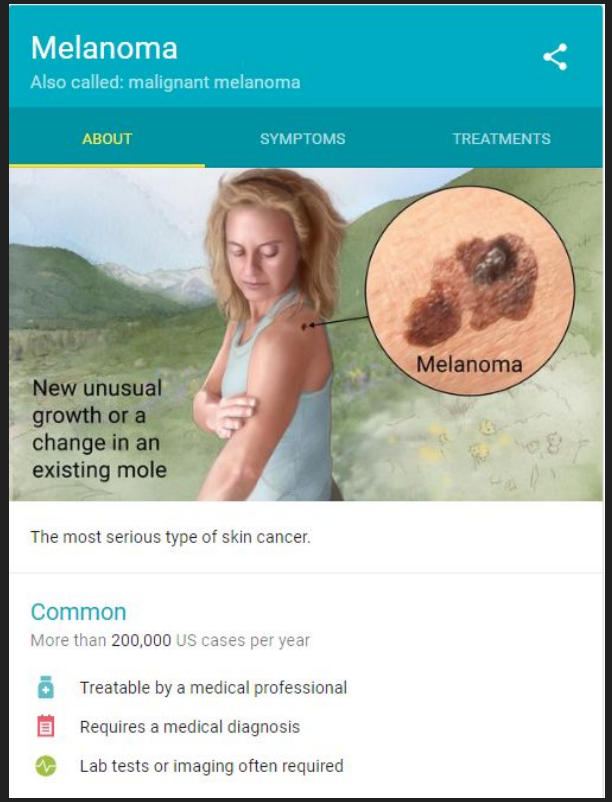
What is Melanoma?

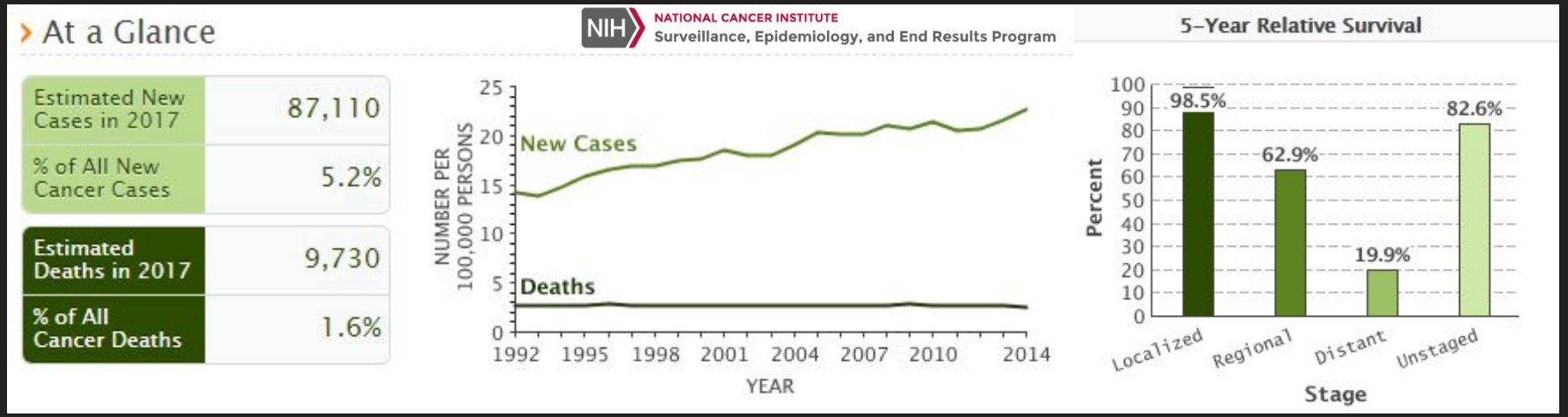


If undetected:

→ Late stage Melanoma can spread to organs

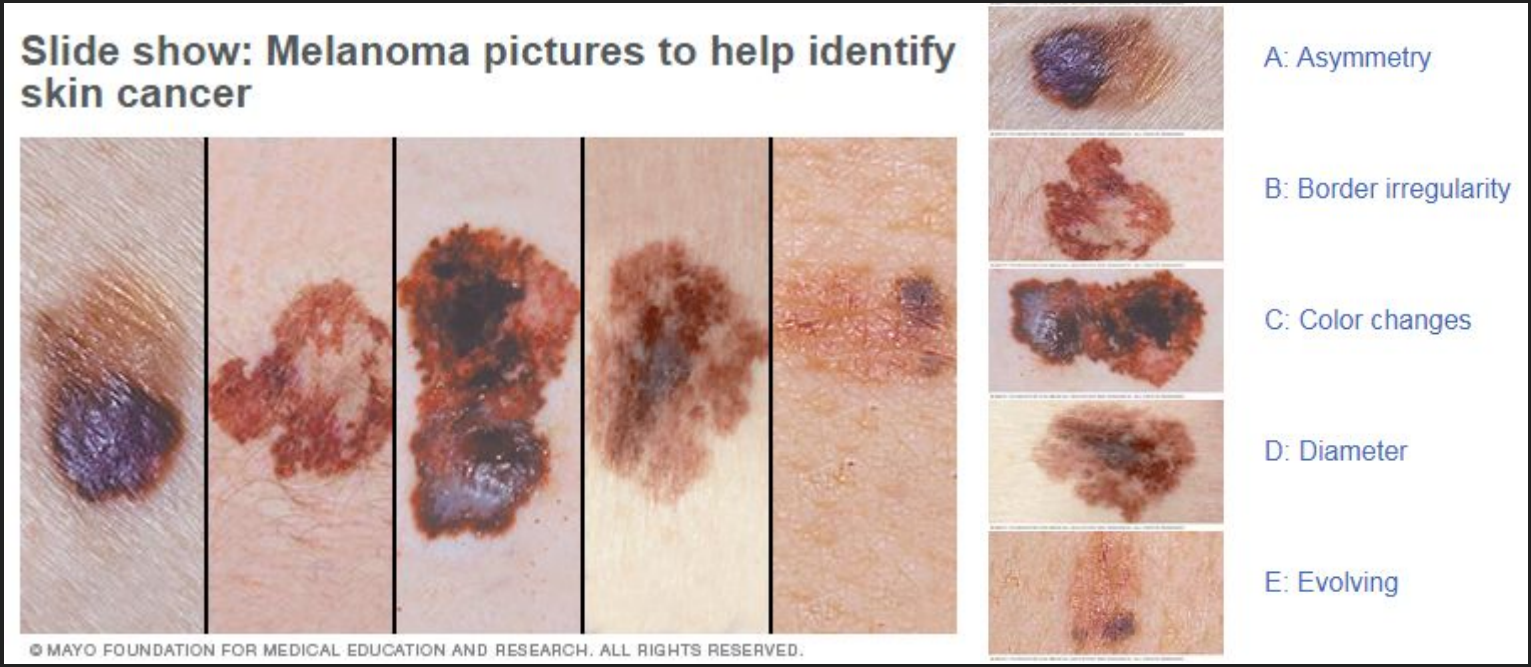
→ Poor prognosis (95% → 19% survival)

Melanoma Statistics



*Highly curable if **detected early** and **treated properly***

How to Detect Melanoma?



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)

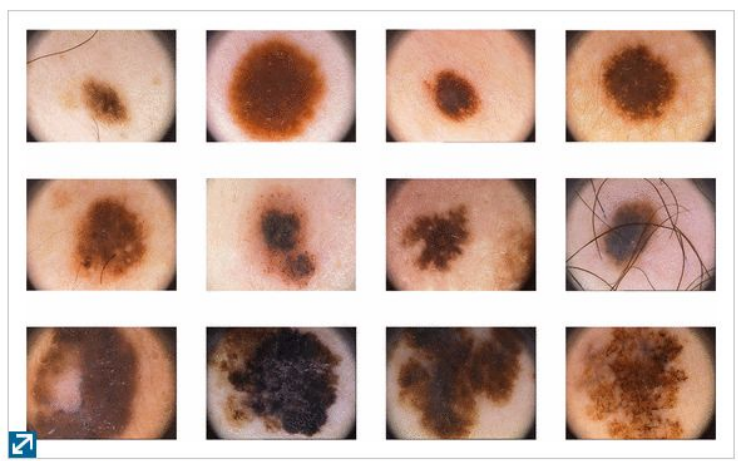
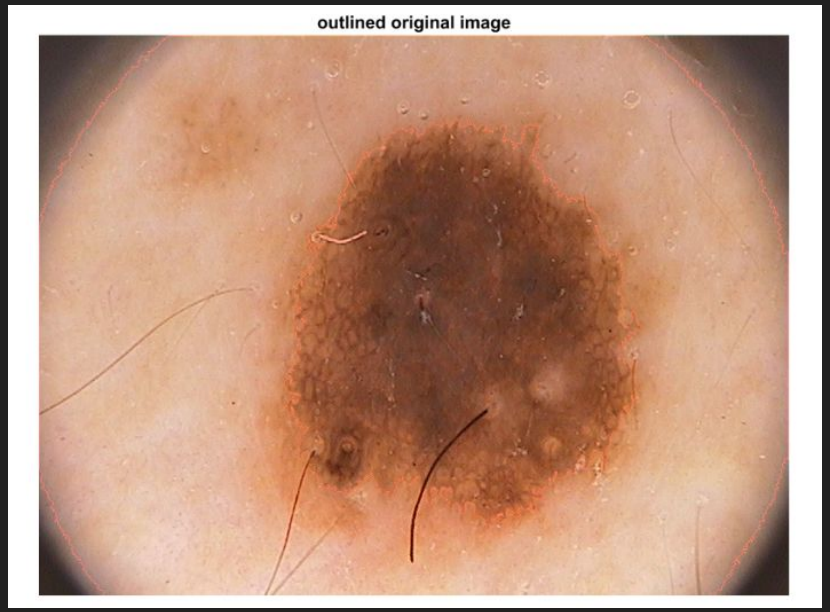
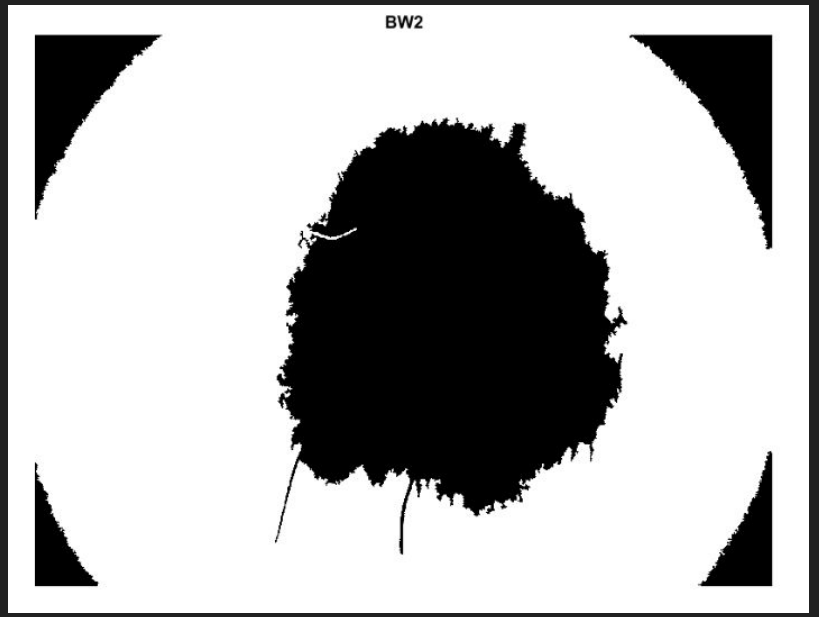


Fig. 1: An illustrative collection of images from PH2 database, including common nevi (1st row), atypical nevi (2nd row) and melanomas (3rd row).

Image Segmentation/Analysis

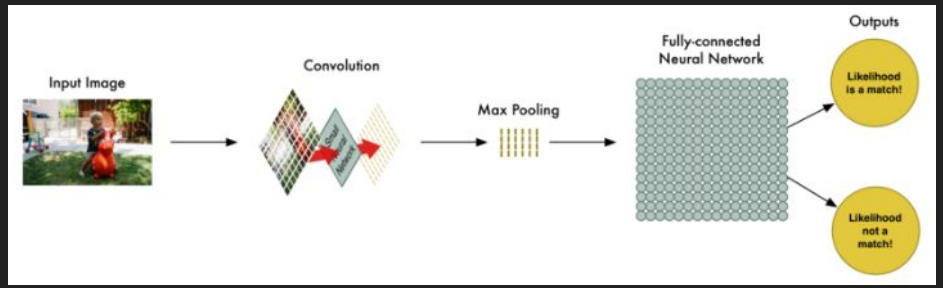


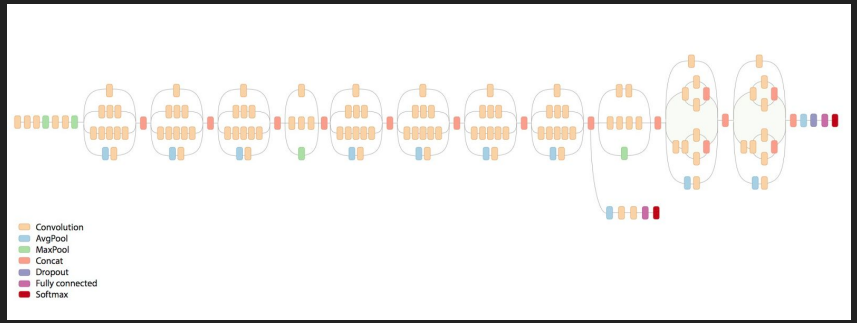


RGB → Grayscale → High Frequency Emphasis Filter → Binary Image → Extract Circularity, Symmetricality. etc

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?