AI for Healthcare Hackathon
#HealthHack

HEALTHY SKIN AI SOLUTION FOR EARLY SKIN CANCER DETECTION

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GitHub Repo: https://bit.ly/2JW9iNJ

ISIC Challenge: Skin Lesion Analysis Towards Melanoma Detection

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PREPARED FOR JUDGES

AI for Healthcare Hackathon
#HealthHack

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Judging Criteria and scoring. Final score is the total awarded in each of the categories

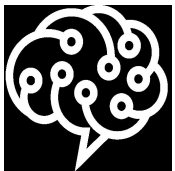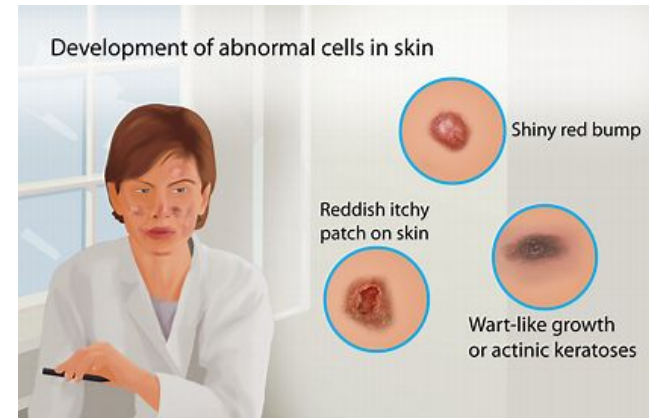| Criteria Possible	Points
Innovation	1-10
Technical Achievement	1-10
Application	1-10
Total Possible	30

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CASE

Data set: 23,000 images

Metadata:

- Unstructured

- Date of JPEG

- Localization of body part

- Lesion Diagnosis: Benign or Malignant


UN SDG #3 Health

SKIN CANCER FACTS & STATISTICS

- One in five Americans will develop skin cancer by the age of 70[1]

- Melanoma is predicted to become the second most commonly diagnosed cancer among men 85 and older by 2030

- UN WHO - Annually:

  - 2-3 million non-melanoma skin cancers

  - 132,000 melanoma skin cancers

  - 10% decrease in ozone levels: additional ~300,000 non-melanoma, ~4,500 melanoma skin cancer cases

Figure S5. Trends in Cancer Incidence Rates for Selected Sites, Ages 85+, US, 1995-2015
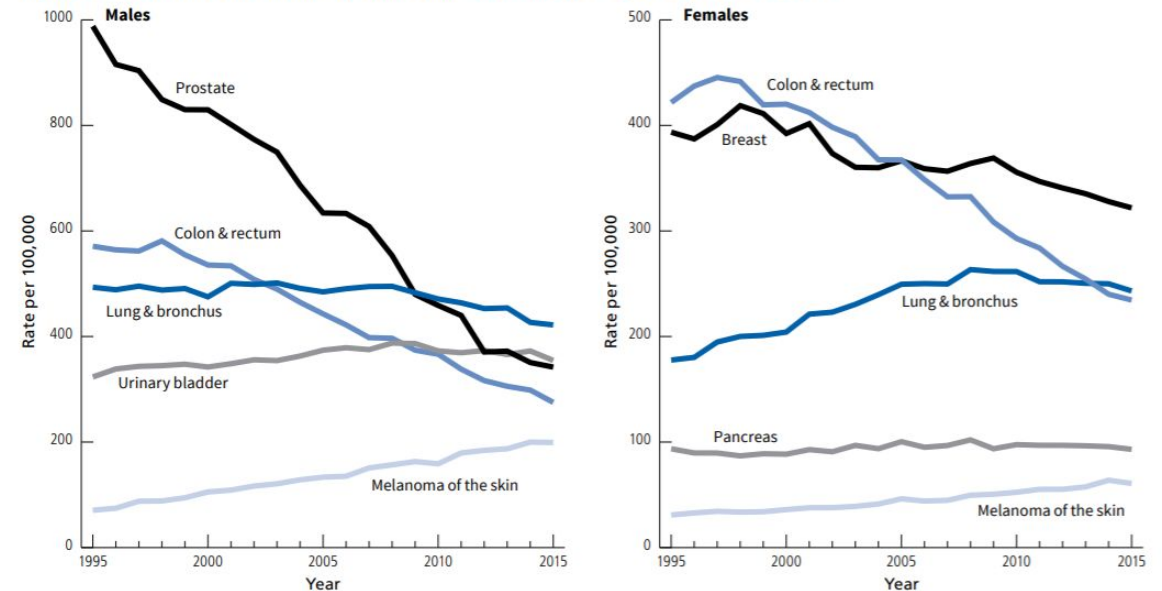
Note: Rates have been adjusted for reporting delays using delay ratios from the SEER 18 registries.
Sources: NAACCR, 2018.

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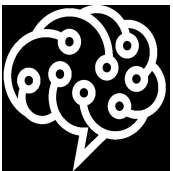
SKIN CANCER FACTS & STATISTICS CONTD..

- U.S. more skin cancer diagnoses than all other cancers combined (e.g., basel cell carcinoma (BCC), squamous cell carcinoma (SCC))

- Annual cost of treatment:

  - ~$8.1 B (~$.48 B non-melanoma, ~$3.3 B melanoma)

  - ~$343.1 M attributed to indoor tanning

- Organ transplant patients 100x more likely SCC

- Ozone level related (non-melanoma): ~90%

  - 5+ sunburns doubles melanoma risk

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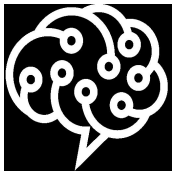
SKIN CANCER FACTS & STATISTICS CONTD..

- **Melanoma estimates for 2019**
  - ~7.7% increase in case diagnoses
  - ~22% increase in melanoma related deaths
  - ~7,230 deaths expected (4,740 men, 2,490 women)
- **Invasive melanoma case diagnoses (2008-2019)**
  - ~54% increase/annually

- **Treatment of stage I melanoma**
  - <30 days of biopsy
  - 30-59 days of biopsy: 5% higher risk of death
  - >199 days of biopsy: 41% higher risk of death
- **Survival rate**
  - 92% avg. 5-year survival rate
  - 98% avg. 5-year survival rate for early detection
  - 64% when lymph nodes are reached
  - 23% disease metastasizes to distant organs

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EXISTING ALTERNATIVES IN THE MARKET & UNMET NEEDS

Apps – e.g., VisualDX, SkinVision

- Not designed for continuous monitoring

- Some are "Awareness raising" apps

- Even where the technology is efficient, if it has not been combined with specialist input from a dermatologist, it may not pick up on all red-flag symptoms – missing the learning loop.

Doctors –

- Limited practice in treating skin cancer patients

- Human error (false +ve/-ve)

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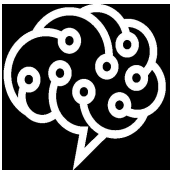
OUR SOLUTION

Tools used - Google Cloud Platform – AutoML, Vision API, Cloud Storage

Training -
- We performed preliminary Training with 200 images
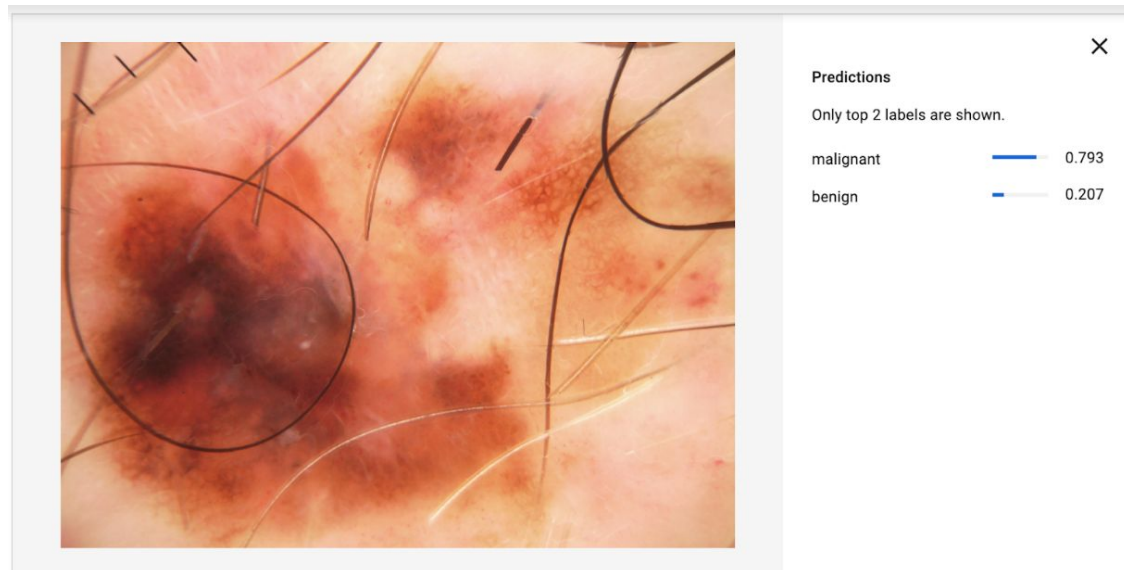- Additional training time required to train with the entire data set

Process –
We uploaded a new image not seen by AutoML during training.

Evaluation –
The image shows the probability of malignancy as seen.

Image fed to our model

Metadata of the image

Predictions

Only top 2 labels are shown.

malignant   0.793

benign   0.207

Output of our Solution

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APP – HEALTHY SKIN AI

Page 1 - UserInfo
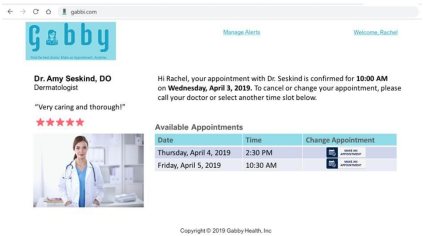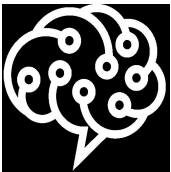
Page 2 – Medical History

Page 3 – Skin Image

Page 4 – App results

Page 5 – Provider info

UNIQUE VALUE PROPOSITION

User

- Registration with user's mobile #

- User account allows updating profile

- Allows frequent monitoring & comparison of individual moles

- Privacy (e.g, PII, GDPR)

App

- Trained with 23K images + continuous learning

- Improves intelligence due to Network effect

- Combines cutting edge Google AutoML with latest data to accurately predict skin cancer

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REFERENCES

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International Skin Imaging Collaboration

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The School of AI
https://www.theschool.ai/

Skin Cancer Foundation
https://www.skincancer.org/

UN Sustainability Developmental Goals 2030
https://www.un.org/sustainabledevelopment

https://cloud.google.com/vision/automl/docs/beginners-guide

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