

Skin Cancer Detection Using AI

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2020

About Me / Bio

- Mobile Communications Engineer by Day
- ML and Computer vision enthusiast by Night
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Agenda

Intro & Overview

Melanoma Facts, Awareness

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Define our Challenge

Business Question, Data Question

Data Process

Data ,EDA, Features, Modelling

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Recap our Challenge

Results and Review

Conclusion & Next Steps

Conclusions , Next Steps

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Questions

Melanoma Facts

- Melanoma , Cancer impacting skin pigment cells
- The third most common Cancer in Australia
- The most common Cancer affecting 15 to 39-year-olds
- According to ABS Melanomas caused 2,094 deaths in 2018
- In 2019 there were 15,229 cases of Melanoma

“In Australia, the annual estimated cost for treatment of melanomas was AU\$201 million”.

2017 Elliott TM, Whiteman DC, Olsen CM, Gordon LG. Estimated Healthcare Costs of Melanoma in Australia Over 3 Years
<https://www.melanoma.org.au/>

EARLY DETECTION MAKES A DIFFERENCE


99%

5-Year survival rate for patients whose melanoma is detected early.

The Survival rate drops to 65% if the disease reaches the lymph nodes and 25% if it spreads to distant organs.

<https://www.skincancer.org/>

Awareness Campaign



Can you spot
A rip at the beach?
A great wave?
A skin cancer?



Two in three Australians will develop skin cancer before the age of 70. The good news is that 95 per cent of skin cancers can be successfully treated if detected early.

Do you know what skin cancer looks like?
A simple check could save your life. We should all check our skin regularly. Get to know your skin and take immediate action if you notice any changes.

If you have fair skin, blue or green eyes, fair or red hair or lots of moles or freckles you are at high risk of developing skin cancer.

Cumulative UV exposure also contributes to your risk of developing skin cancer. So if you grew up in Australia, work outdoors or spend lots of time in the sun you should take care to protect and check your skin.

Use the ABCD of melanoma detection to check for the following:

	Asymmetry If the spot or lesion is divided in half, the two halves are not a mirror image.		Border A spot with a spreading or irregular edge.		Colour A spot with a number of different colours through it.		Diameter A spot that is growing and changing in diameter or size.
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AI Automation
Opportunity !?

Published online 2019 Dec 31. PMCID: PMC6936633 PMID: [31921498](#)

**An Observational Study of Diagnostic Accuracy, found
GPs Scored 79.9% & Dermatologist 87.5% on Sensitivity
Score for Visually Detecting a Melanoma.**

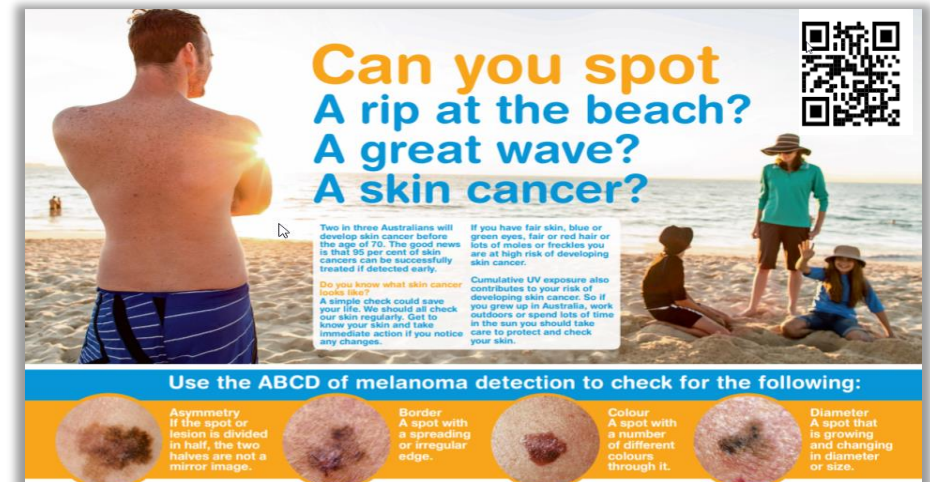
Our Challenge

Business Domain

Can we use an AI Powered APP as part of the “**Can you Spot**” Campaign?

Data Domain

“Can we use Computer vision & ML to **Detect Melanoma as well as the Human eye?**”

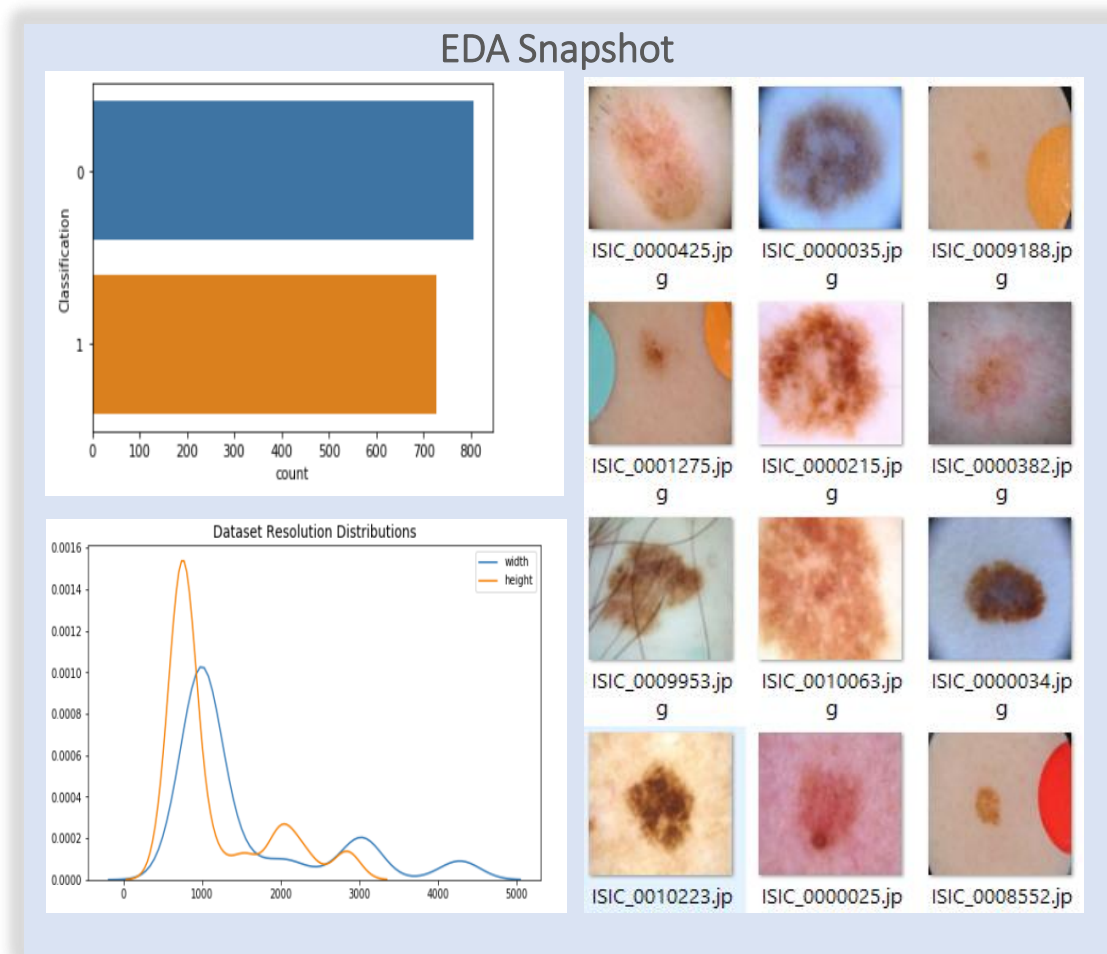
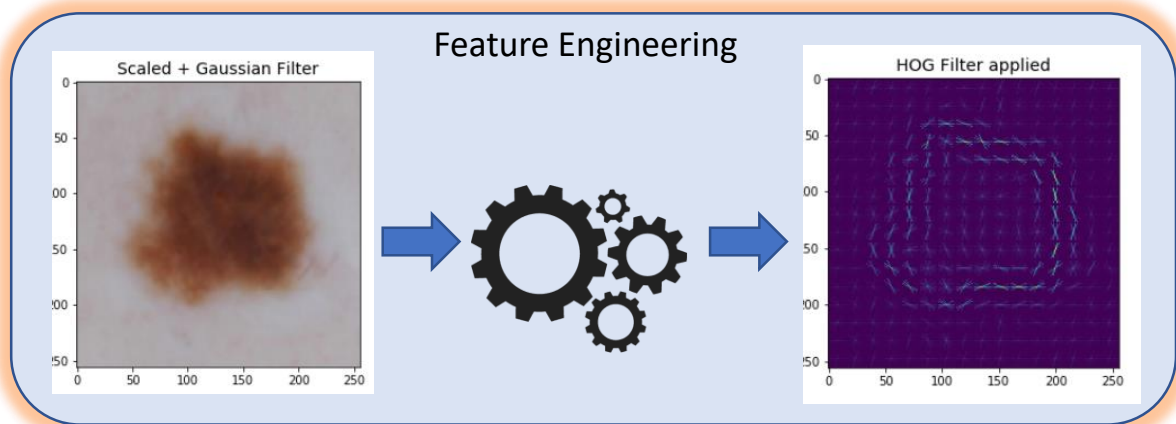


Data Process



EDA & Feature Engineering

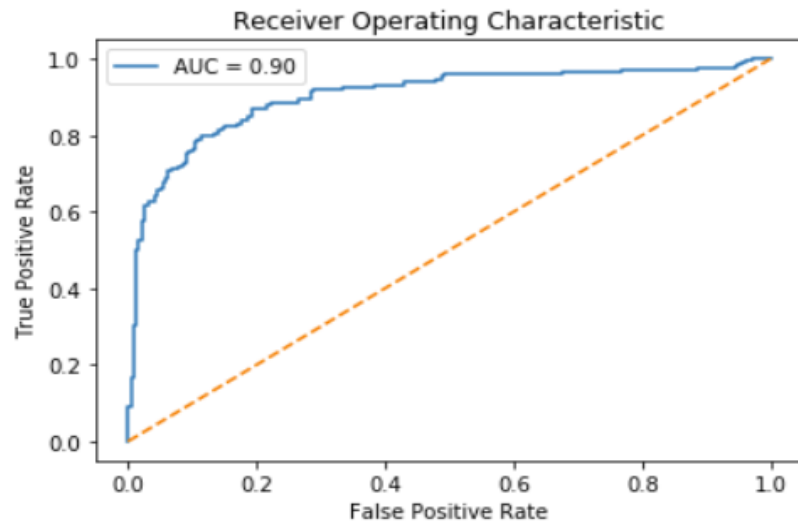
- Data Source: ISIC <https://www.isic-archive.com/>
- Total Images 1543
- Classification , Supervised Learning Models
- Scaled 256 x 256
- Filters & Cropping Applied



Modelling

Model I : SVM

- Support Vector Machines + Principal Component Analysis **PCA**
- Some Feature Engineering. Based on the “ABCD”



Model	ACC	AUC	Sensitivity	Specificity
Model I	0.84	0.90	89.1%	78.7%

Model II : CNN 12 Layers

- Convolutional Neural Network
- No feature engineering applied beyond scaling



Model	ACC	AUC	Sensitivity	Specificity
Model II	0.86	0.87	94.2%	78.4%

Summary

Challenge & EDA

- Melanoma is the third common Cancer in Australia

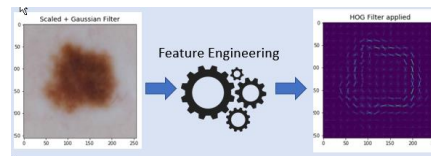
EARLY DETECTION
MAKES A DIFFERENCE
99%



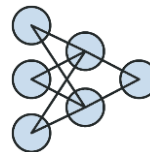
- Can we use an AI Powered APP as part of the “Can you Spot” Campaign?
- “Can we use Computer vision & ML Detect to Melanomas as well as the Human eye?”
- Data Sourced from ISIC and Resarch

Modelling

- Feature Engineering & Model Selection



- Tested 2 Models SVM & CNN



- Model II CNN had best result for our Data

Model	ACC	Sensitivity
Model II	0.86	94.2%

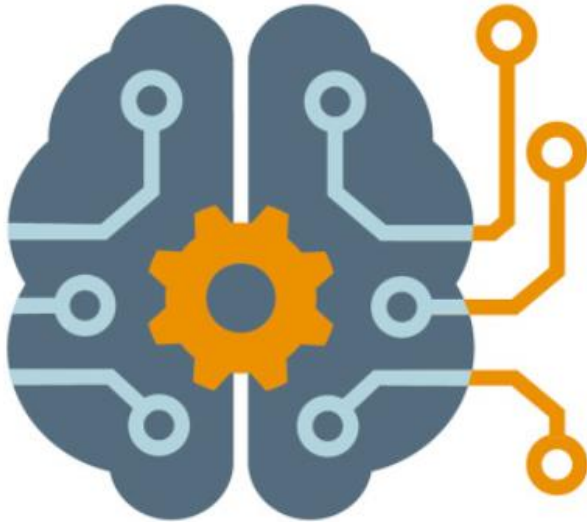
Insights

- AI can Detect Melanoma
- Automation Potential
- Model deployment
 - APP , Web
 - Imaging centres



- APP Campaign more interesting
- Raises more Awareness
- Reduce Medical Costs from advanced stages
- Ease suffering.

Next Step



- Deploy Model as POC WEB APP, using Flask + API for E2E test.
- Collect more Data Samples from Smartphones to train Model.
- Investigate smartphone Camera APIs.
- Explore CNN layer feature visualisation in search of more insights.
- Seek feedback.

Thank You

*“If I have seen further it is by standing on the shoulders of Giants.
— Isaac Newton”*

References

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