

Melanoma Classification Using Deep Learning

Identify melanoma in lesion images

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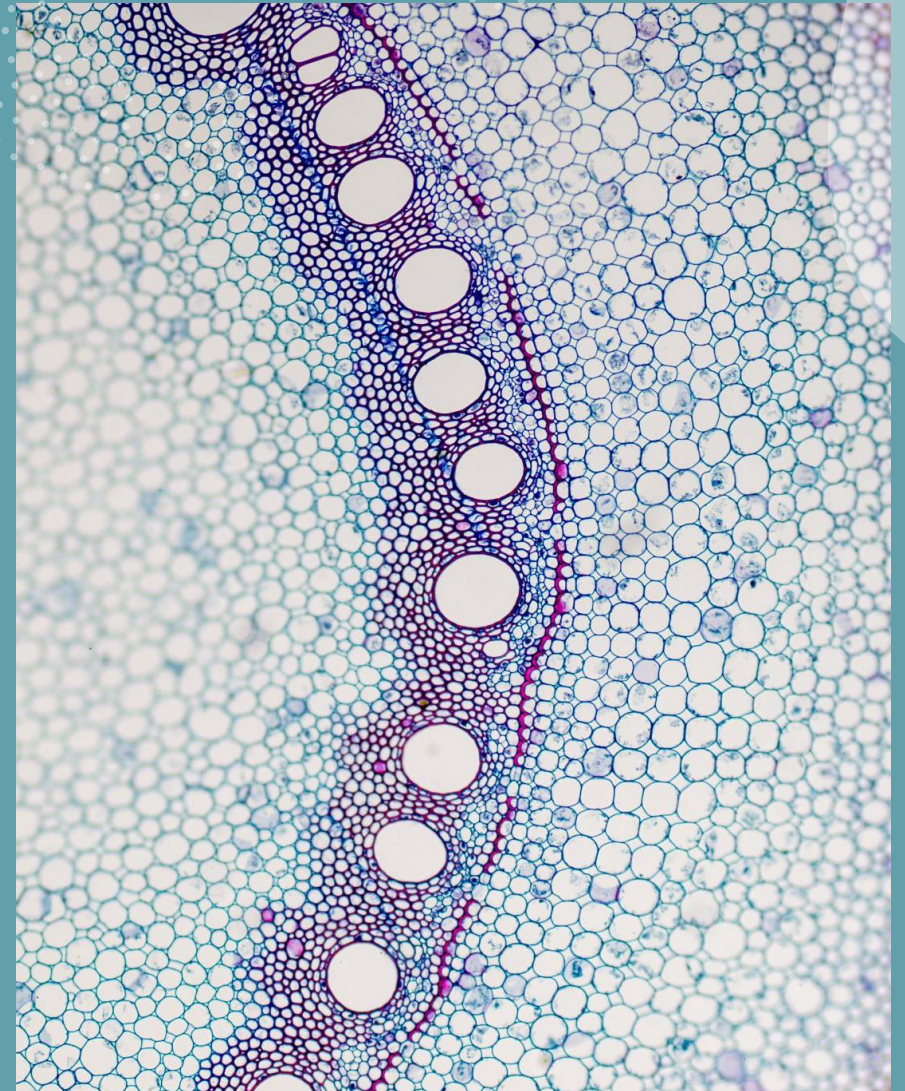


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Introduction

Melanoma is a type of skin cancer that occurs when pigment-producing cells (melanocytes) mutate and become cancerous.


Melanoma is the most serious form of skin cancer and 5th most common cancer.

The American Cancer Society estimates around 207,390 new melanoma cases will be diagnosed in 2021.

As with other cancers, early and accurate detection—potentially aided by data science—can make treatment more effective.

Current Methodology

Currently, dermatologists evaluate every one of a patient's moles to identify outlier lesions that are most likely to be melanoma.



Melanoma can develop anywhere on the skin, but it is important to be aware that it often occurs in different places in men and women:

In men, it is most likely to affect the back and the head/neck area.

In women, the legs are the most common site. Other common sites are the neck and face.

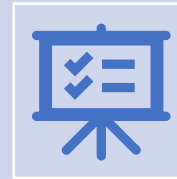
Dataset overview

Malignant: A cancerous growth that can spread very quickly and invade nearby tissues

Benign: A non-cancerous growth that usually grows very slowly and does not spread to other areas



The dataset was taken from the competition hosted by [SIIM-ISIC](#) on Kaggle.



In total, there were 33126 labeled training samples which was further split into train, test and validation datasets for model training and evaluation.



The purpose is to build a model which can classify images as Malignant(target) or Benign.

26,529
Training
Samples

3,286
Validation
Samples

3311
Test
Samples

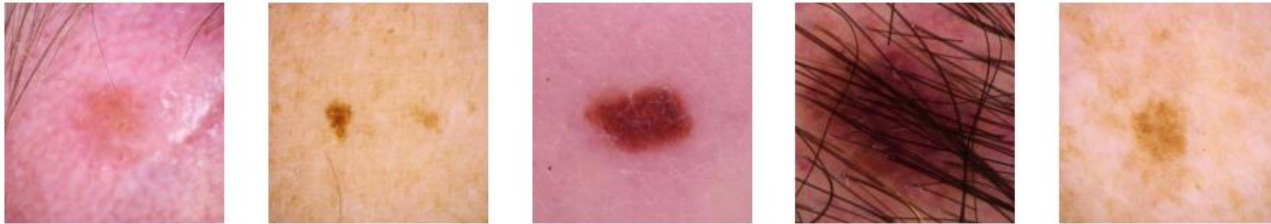
Dataset overview

- **Files**
 - *train.csv* – the training set
 - *test.csv* – the test set
 - *validation.csv* – the validation set
- **Columns**

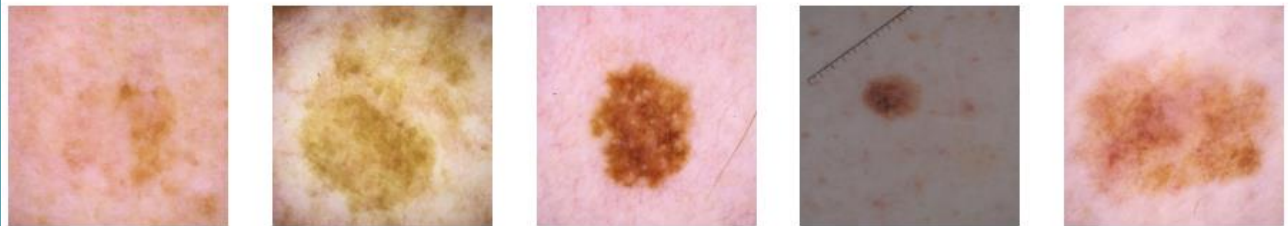
	image_name	patient_id	sex	age_approx	anatom_site_general_challenge	diagnosis	benign_malignant	target
0	ISIC_2637011	IP_7279968	male	45.0	head/neck	unknown	benign	0
1	ISIC_0015719	IP_3075186	female	45.0	upper extremity	unknown	benign	0
2	ISIC_0052212	IP_2842074	female	50.0	lower extremity	nevus	benign	0
3	ISIC_0068279	IP_6890425	female	45.0	head/neck	unknown	benign	0
4	ISIC_0074268	IP_8723313	female	55.0	upper extremity	unknown	benign	0

Dataset overview

Benign Images



Malignant Images

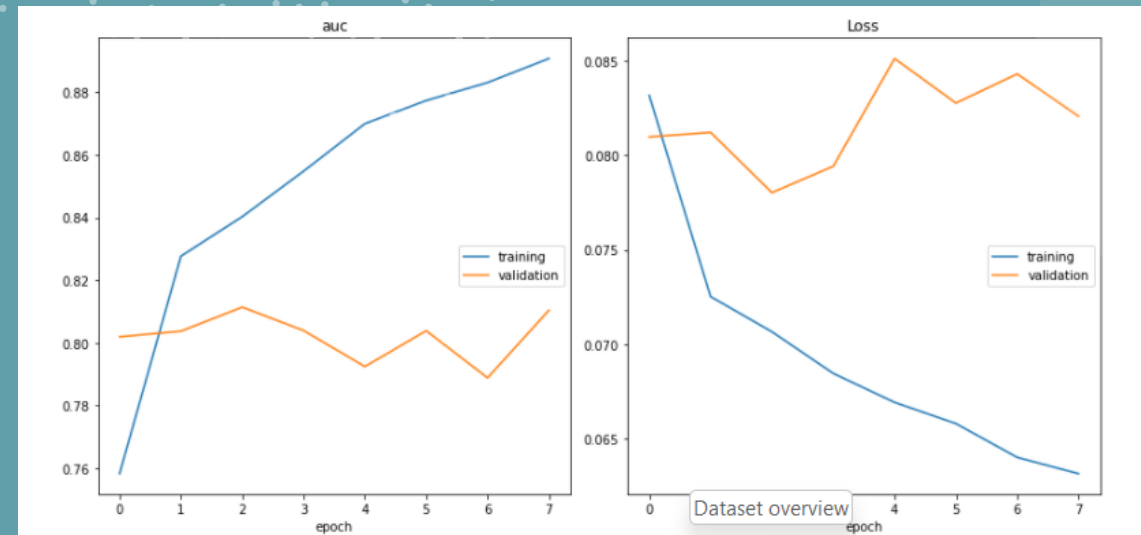


Neural Network Model

- Transfer Learning was used to create a CNN model using pretrained model Xception.
- The bottom layers of the pretrained Xception model was downloaded using Keras and the top layers were trained on the training data for a few epochs.

```
Model: "sequential"
Layer (type)                Output Shape              Param #
=====
xception (Functional)       (None, 10, 10, 2048)     20861480
global_average_pooling2d (Gl (None, 2048)              0
dense (Dense)                (None, 8)                 16392
dense_1 (Dense)              (None, 1)                 9
=====
Total params: 20,877,881
Trainable params: 16,401
Non-trainable params: 20,861,480
```

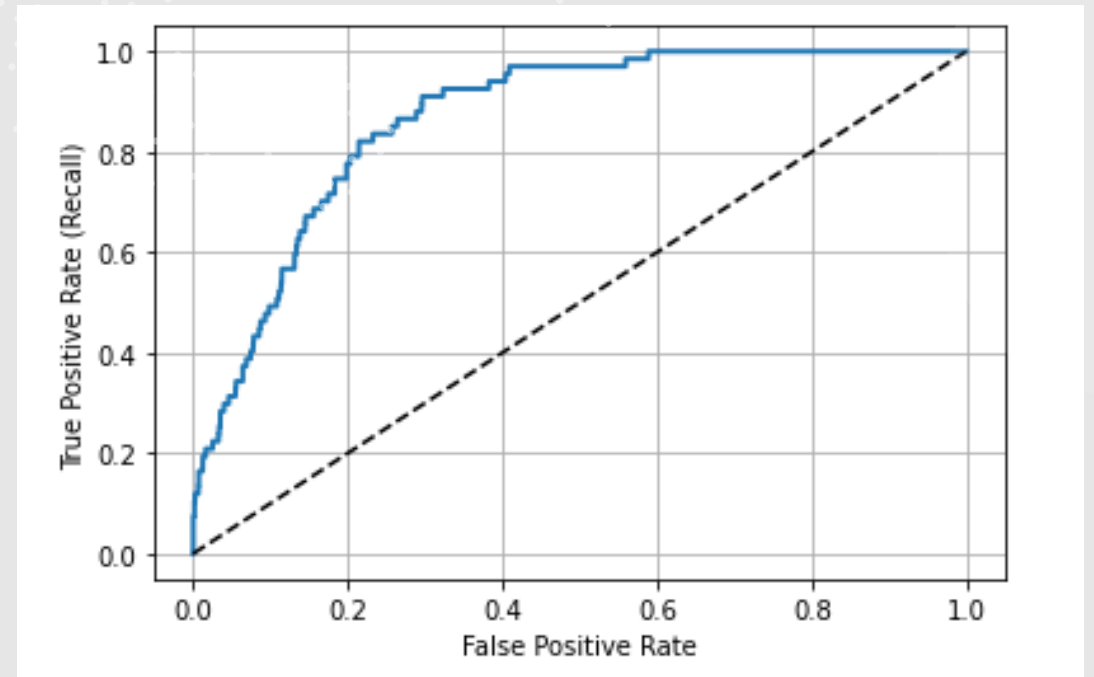

Model Performance



auc	training	(min: 0.758, max: 0.891, cur: 0.891)
	validation	(min: 0.789, max: 0.811, cur: 0.810)
Loss	training	(min: 0.063, max: 0.083, cur: 0.063)
	validation	(min: 0.078, max: 0.085, cur: 0.082)
lr	lr	(min: 0.004, max: 0.010, cur: 0.004)

Model Evaluation

- The model was lastly tested on the test data which we had split in the beginning.
- The model reached a ROC score of 0.84



```
51/51 [=====] - 19s 366ms/step - loss: 0.0603 - auc: 0.8459
```

```
[0.060340698808431625, 0.8458700180053711]
```

Conclusion

- Here, we were successfully able to build a machine learning model that can classify an input image as malignant or not.

The background is a solid teal color. It features several decorative elements: white polka dots arranged in organic, cloud-like shapes in the top-left, top-center, and bottom-left areas; and solid teal organic shapes in the top-right and bottom-left corners.

Thank you!