

Agenda Conclusion Frame the problem **Prepare Get the** the data data **Explore the** 4 **Explore** data models

Frame the problem

ABNORMAL GENE CHANGES (MUTATIONS) OFTEN PLAY A ROLE IN MELANOMA GROWTH AND DISEASE PROGRESSION



FOR PEOPLE WITH METASTATIC MELANOMA, A GENE TEST CAN DETERMINE WHETHER THEIR TUMOR HAS A BRAF MUTATION



ABOUT HALF OF MELANOMAS HAVE BRAF MUTATIONS



In metastatic melanoma, V600E and V600K together account for about 95% of all BRAF mutations



ABOUT 200,000 MELANOMA CASES ARE DIAGNOSED WORLDWIDE EACH YEAR



THE WORLD HEALTH ORGANIZATION ESTIMATES THAT 55,000 PEOPLE DIE FROM

MELANOMA ANNUALLY

In the U.S., the number of melanoma cases has more than doubled in the past 30 years



EVERY HOUR, ABOUT 6 PEOPLE DIE FROM MELANOMA WORLDWIDE.



BACK?



THE BACK IS THE MOST COMMON SITE FOR MELANOMA, THE DEADLIEST FORM OF SKIN CANCER.

PREVENTION

Adequately applying sunscreen to your own back can be a difficult task. Find a family member or friend who "has your back" when





of people rarely or never

ask someone else to apply sunscreen to their back."

. 37%

rarely or never apply sunscreen to their back.*

Apply a broad-spectrum, water-resistant, SPF 30+ sunscreen.





In addition, seek shade and wear protective clothing to protect your skin whenever possible.

DETECTION

It's been reported that about 16% of melanomaare found by spouses.





Only 36% of people examine their back for signs of skin cancer at least once a year.*

Only 35% of people ask someone else to help them examine hard-to-see areas for signs of skin cancer,*





Check your skin regularly and ask a partner to help check the hard-to-see areas.

When spotted early and treated properly, skin cancer, including melanoma, has a high cure rate.





If you notice anything changing, itching or bleeding on your skin, make an appointment to see a board-certified dermatologist.

Frame the Problem

Get the data

Explore the data

Prepare the data

Explore models



Get the data

\$30,000

Prize Money

Data Source

Kaggle Link Data set

33,126patient records
TFRecord & JPEG format

7 features in csv

benign malignant

image_name
patient_id
sex
age_approx.
anatom_site_general_challediagnosis

Target

probability that the lesion in the image is malignant.

Frame the Problem

Get the data

Explore the data

Prepare the data

Explore models

Explore the data

Train images

Examples WITH Melanoma Examples WITHOUT Melanoma

Test images



Malignant 2%



Benign 98%

- ♦ Median age is 50
- Malignant cases:62% are males

Missing Values

- Anatom. site 1.6%
- ♦ Age 0.2%
- ♦ Gender 0.2%

Frame the Problem

Get the data

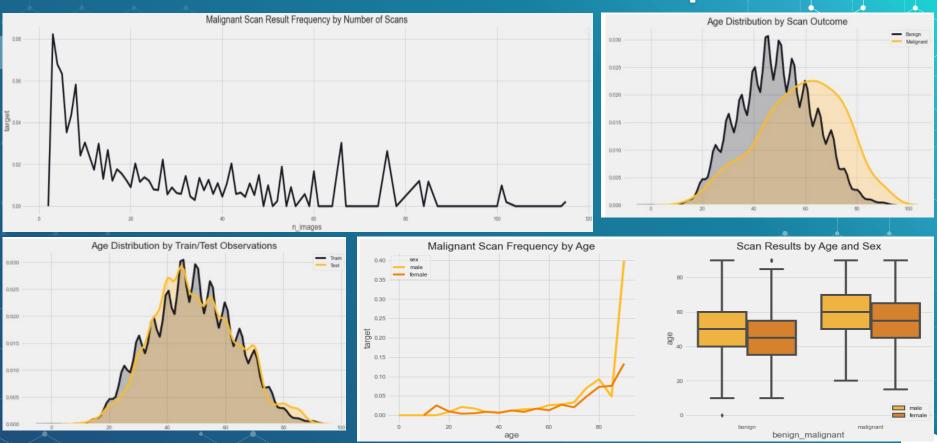
Explore the data

Prepare the data

Explore models

Explore the data

Conclusion



Prepare the data

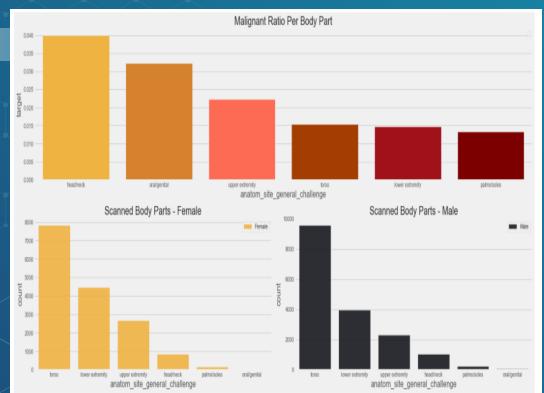
Explore models

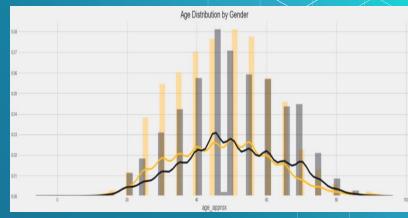
Explore the data

Get the data

Frame the Problem

Explore the data







Get the data

Explore the data

Prepare the data

Explore models



Image Augmentation

- Random rotation, Shift, Shear, Flip left/right & up/down, Translation, Zoon
- Change Hue, Saturation, Contrast, brightness & Normalize
- CutMix patches are cut and pasted among training images

Imputing Missing Metadata

- age_approx: with median value of 50
- sex: with frequent one Male
- anatom site: with frequent one Torso

Explore the models

Evaluation metric: area under the ROC curve

between the predicted and expected targets

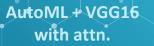






EffNet B6, B7 Ensemble







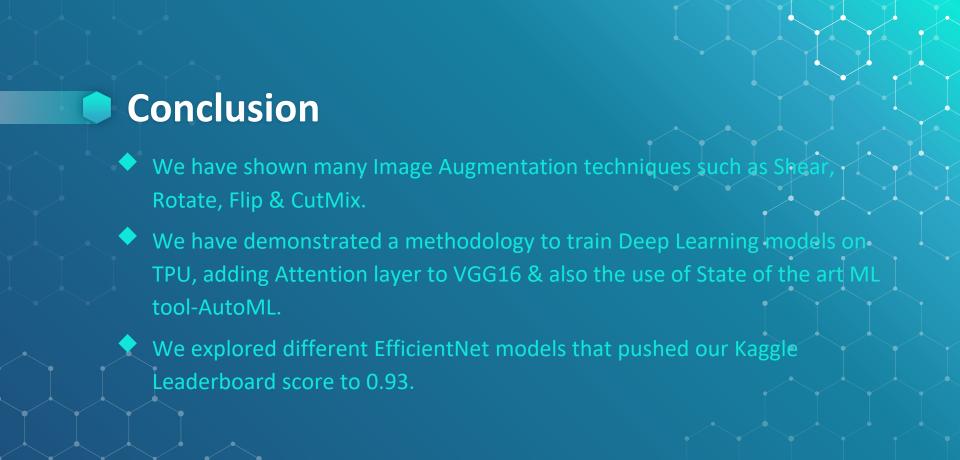
Frame the Problem

Get the data

Explore the data

Prepare the data

Explore models



Appendix

Model Inputs	Image Augme	ntation	Model Chosen	Comments	LB Score
Metadata & Images (384x384)	randomly flip image left/right & up/down randomly set hue randomly set saturation randomly set contrast randomly set brightness data CutMix Rotate images by 10 degrees reverse 50% of Train Resize Normalize CenterCrop Rotation & Horizontal Flip		EfficientNetB3	LR= 1e-3 loss=Focal Loss epochs= 15 Batch Size=16	0.8856
Metadata & Images (512x512)			XGB & vgg16 with attention	LR=1e-4 loss=Focal Loss	0.9395
Images (256x256)	Rotation Translation Shear Zoom, flip left/right	hue saturation contrast brightness	EfficientNet B6, B7	epochs=13 loss=BCE, smoothing= 0.05 Test time augmentation of 50 reps	0.9337
Images (224x224)	nages (224x224) Rotation Translation Shear Zoom		Ensemble of following models: EfficientNet B0, B1, B2, B3, B4, B5, B6, B7	epochs = 12 batch_size = 16 Loss=BCE with label smoothing = 0.05 Test Time Augmentation Custom exponential LR scheduler	0.9330

THANKS!