SIIM-ISIC Melanoma Classification

Course Name: SCS 3546 Deep Learning

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Agenda


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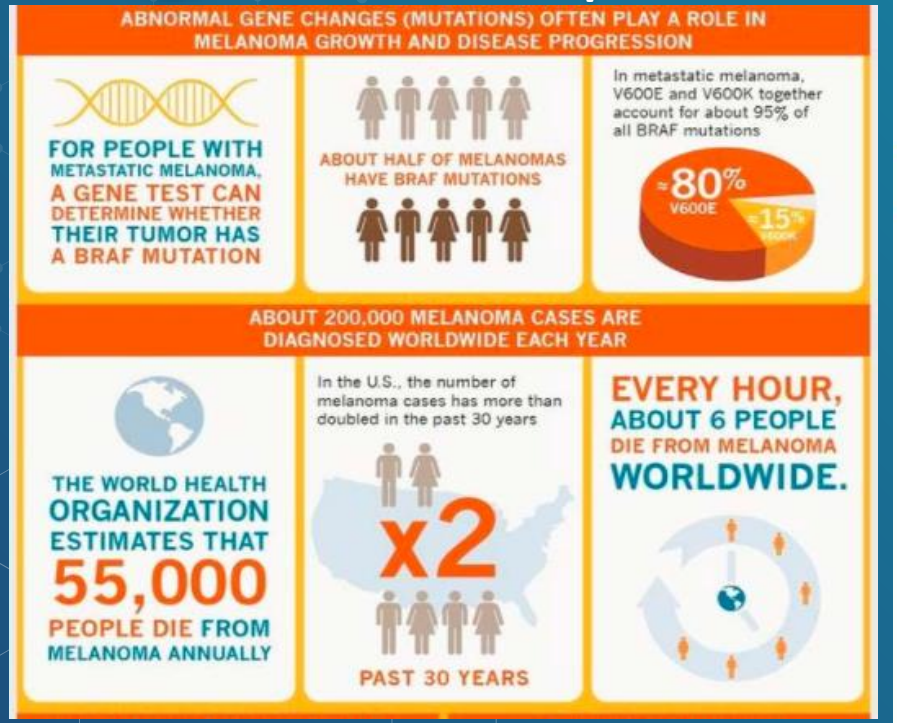
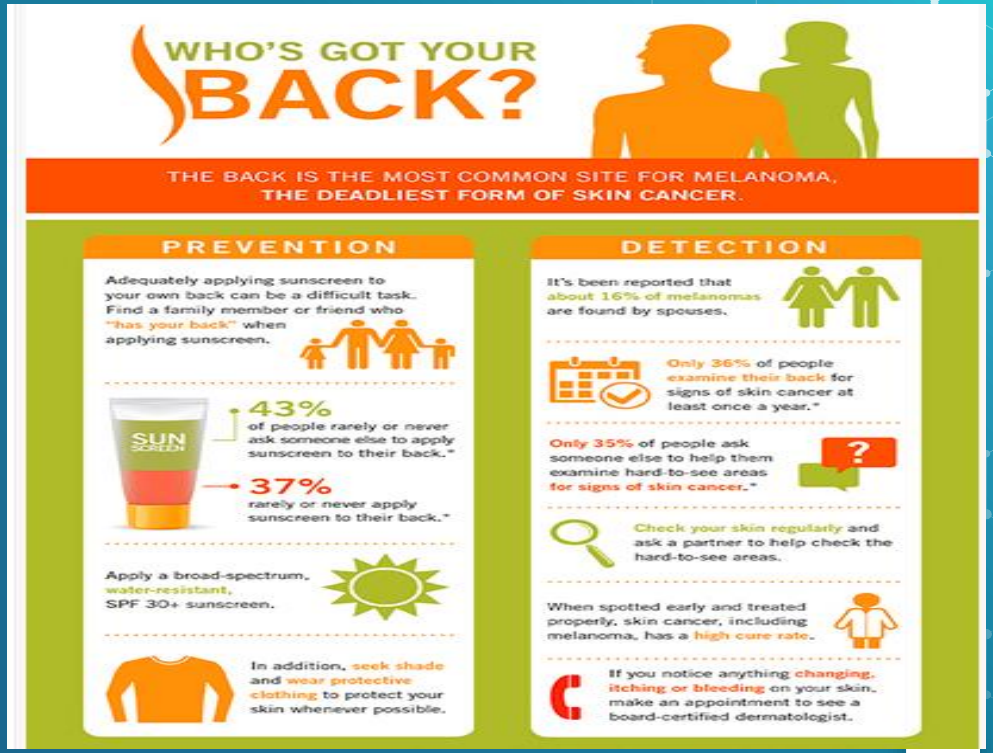
Frame the problem





Get the data

$30,000
Prize Money

Data Source

Kaggle

Link

Data set

33,126

patient records

TFRecord & JPEG format

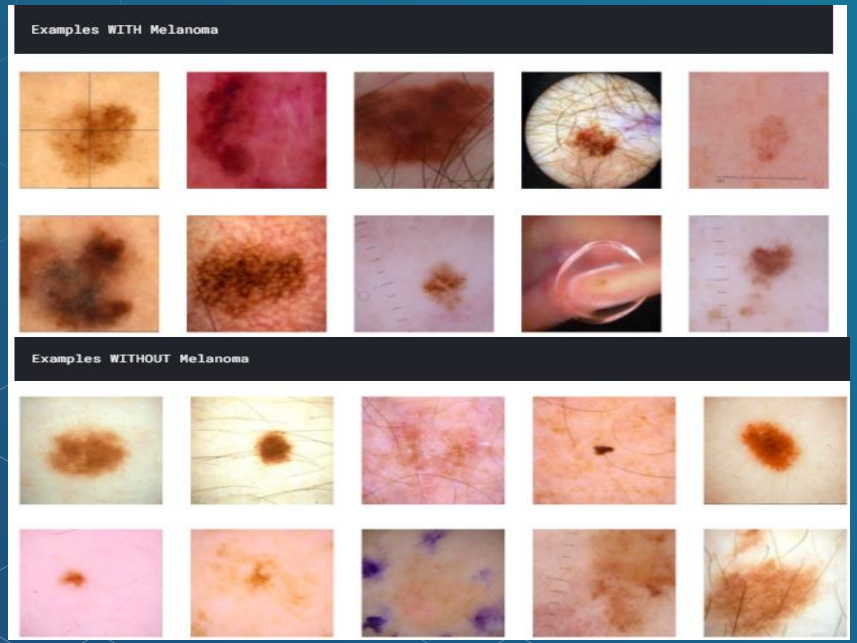
7 features in csv

image_name
patient_id
sex
age_approx.
anatom_site_general_challenge
diagnosis
benign_malignant

Target — probability that the lesion in the image is malignant.

Explore the data

Train images



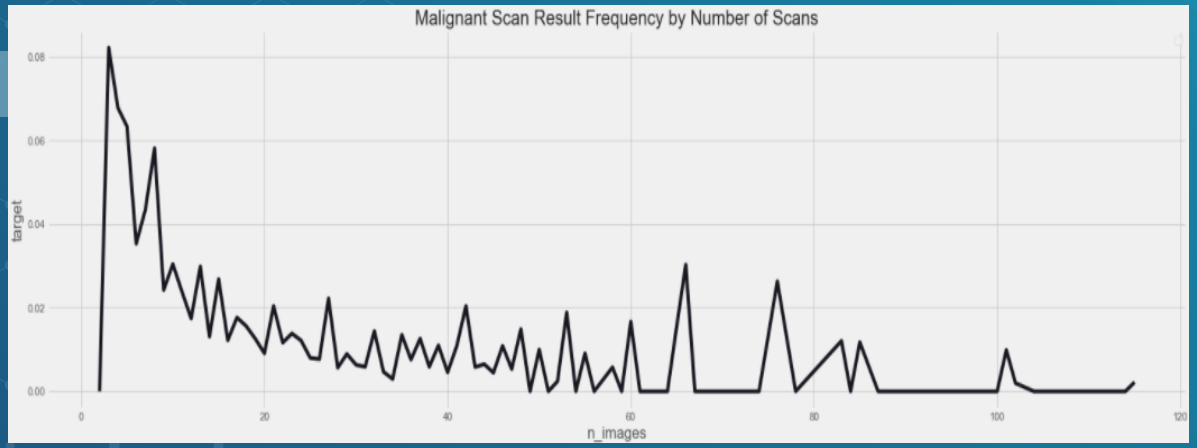
Test images

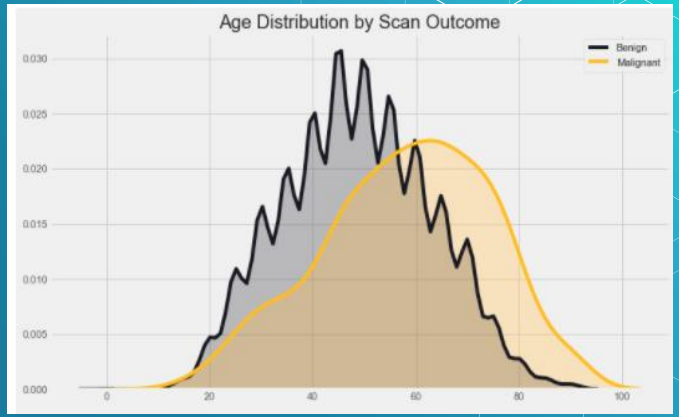
- Median age is 50
- Malignant cases: 62% are males

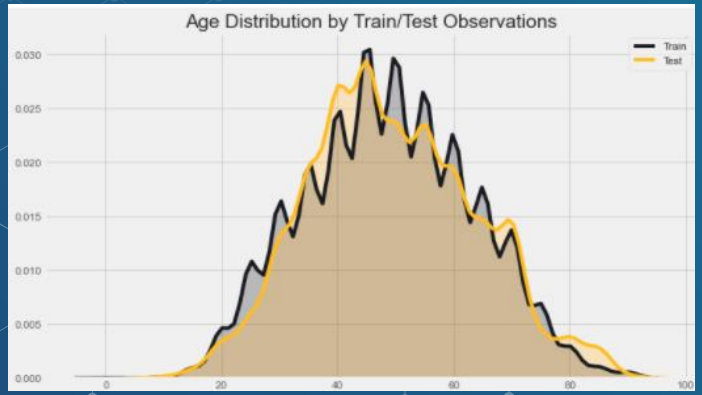
Missing Values

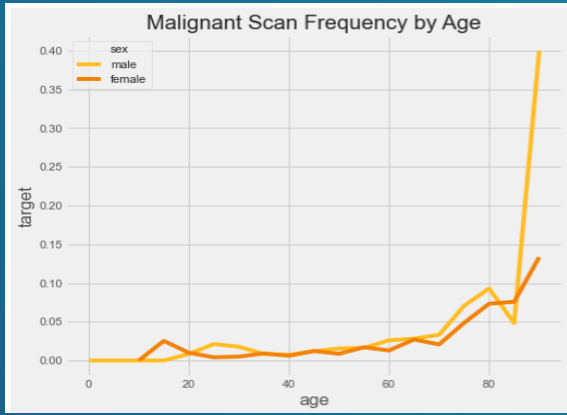
- Anatom. site - 1.6%
- Age – 0.2%
- Gender – 0.2%

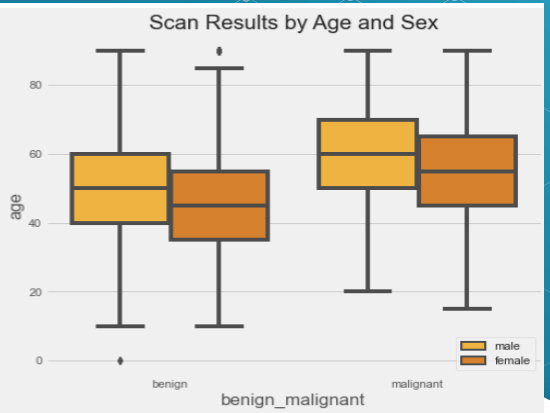
Explore the data



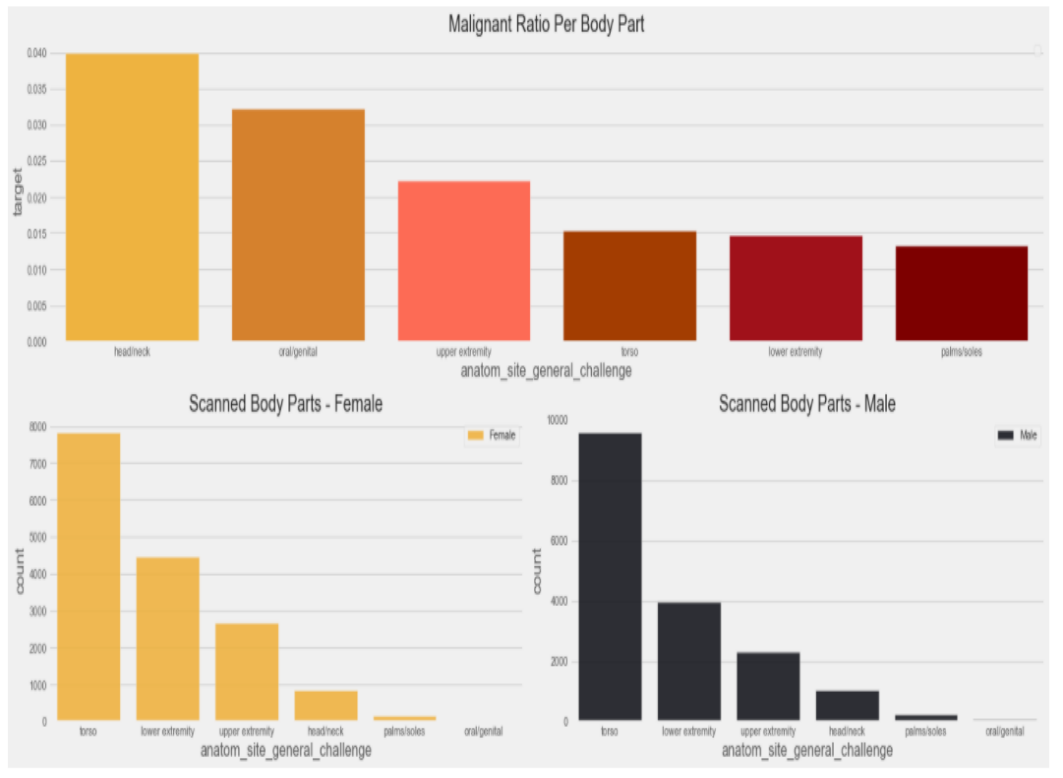


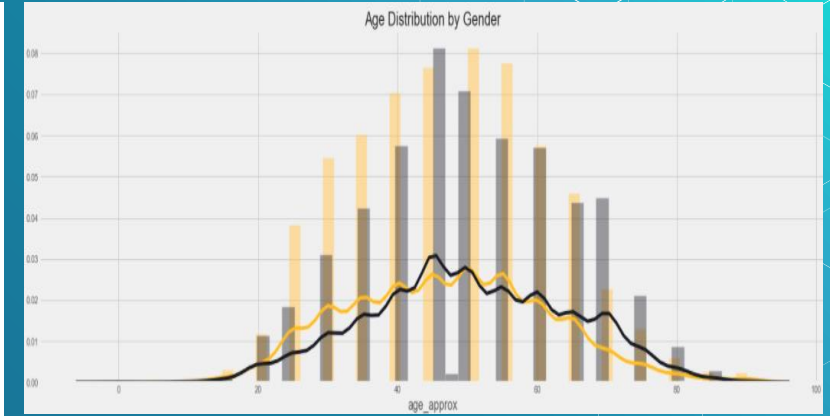






Explore the data





Prepare the data

Image Augmentation

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

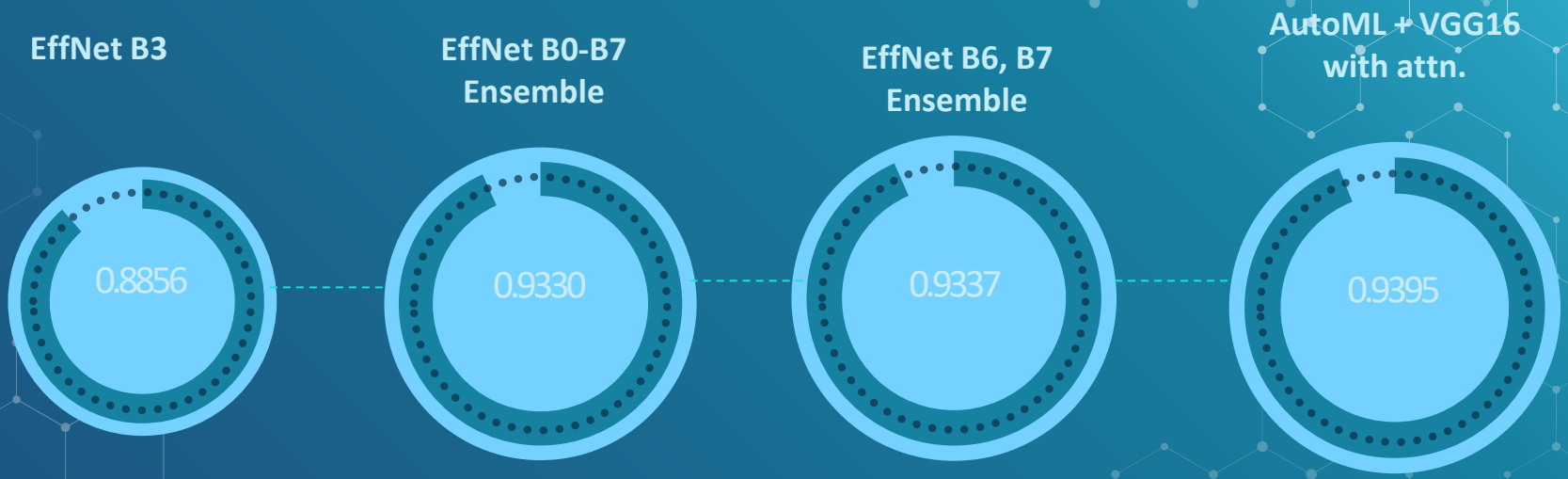
Imputing Missing Metadata

- 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



Conclusion

- We have shown many Image Augmentation techniques such as Shear, Rotate, Flip & CutMix.
- We have demonstrated a methodology to train Deep Learning models on TPU, adding Attention layer to VGG16 & also the use of State of the art ML tool-AutoML.
- We explored different EfficientNet models that pushed our Kaggle Leaderboard score to 0.93.

Appendix

Model Inputs	Image Augmentation		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		EfficientNetB3	LR= 1e-3 loss=Focal Loss epochs= 15 Batch Size=16	0.8856
Metadata & Images (512x512)	Rotate images by 10 degrees reverse 50% of Train Resize Normalize CenterCrop Rotation & Horizontal Flip		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)	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!