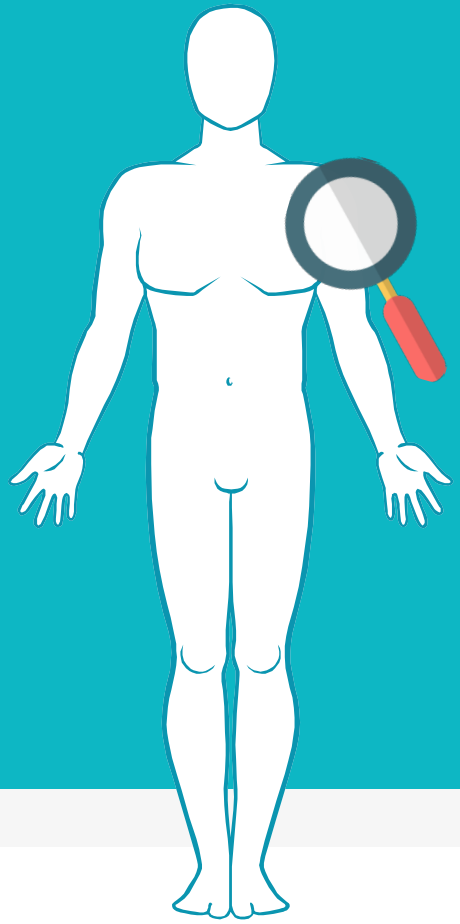
SkinCheck

Your AI-driven dermatologist.



About the Data

ISIC 2018 Challenge

Goal: Submit automated predictions of disease classification within dermatoscopic images

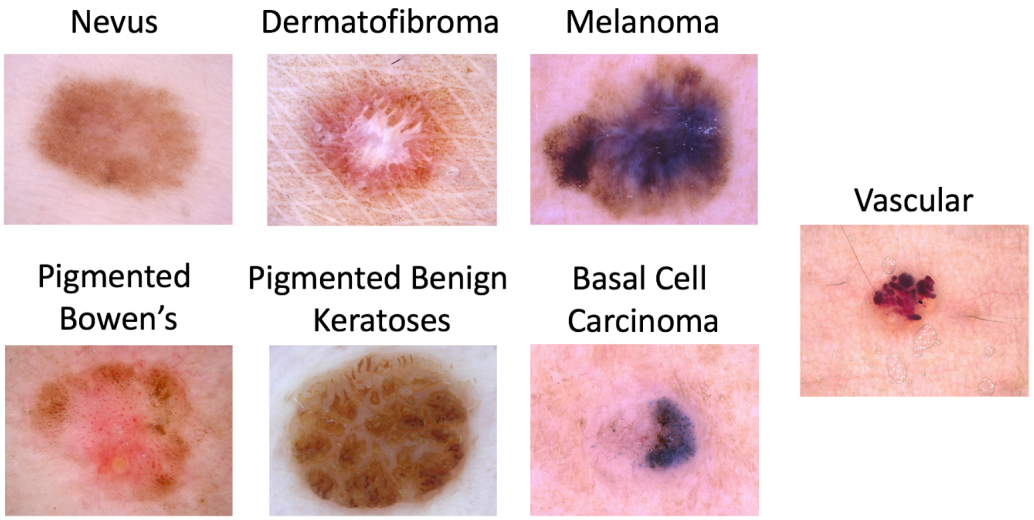
HAM10000 Dataset

~**10000** lesion-images from patients presented for skin cancer screening in Austria and Australia

ISIC 2018 Challenge

7 Possible disease categories (most common):

1. Melanocytic nevus (**nv**)
2. Melanoma (**mel**)
3. Basal Cell Carcinoma (**bcc**)
4. Actinic keratosis (**akiec**)
5. Benign keratosis (**bkl**)
6. Dermatofibroma (**df**)
7. Vascular lesions (**vasc**)



HAM10000 Dataset

- **Pro:** Images are cleaned and labeled
- **Con:** Significant Class Imbalance
- **Con**: akiec, vasc and bkl cover several (similar but still distinct) skin lesions

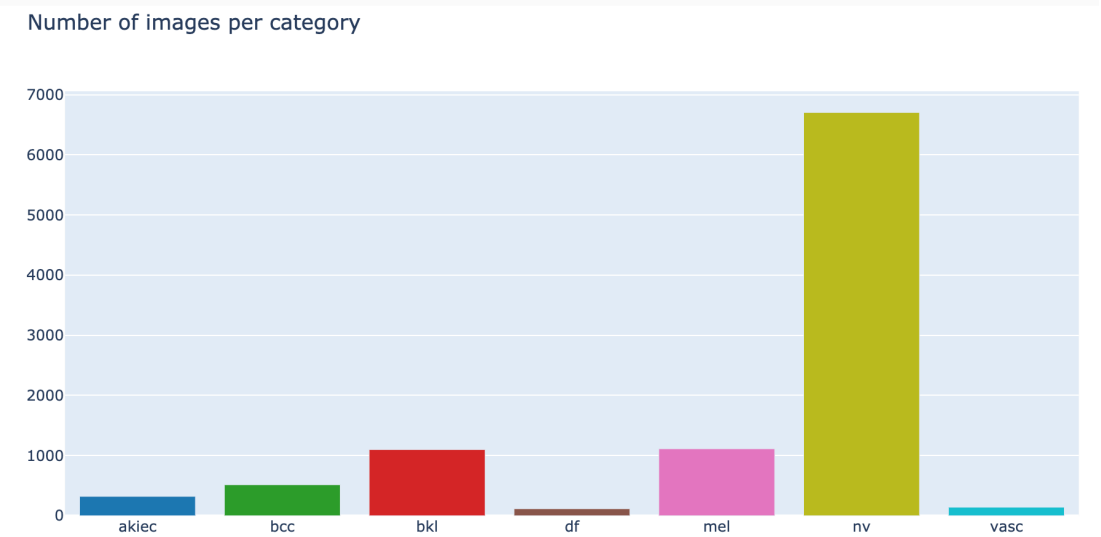
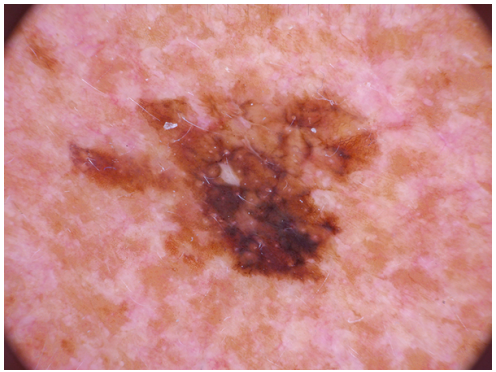
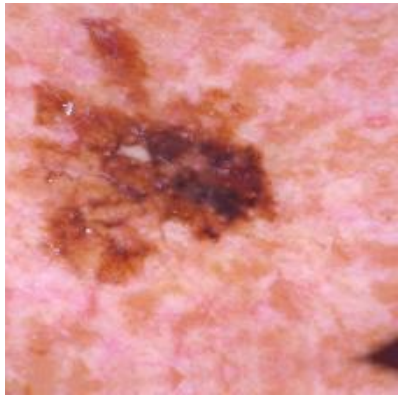
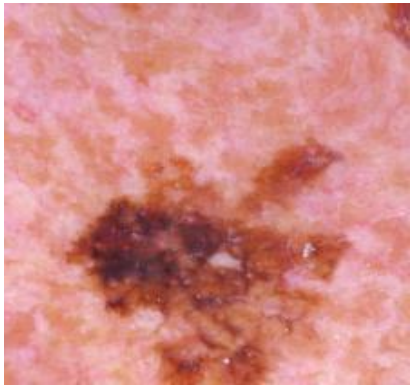


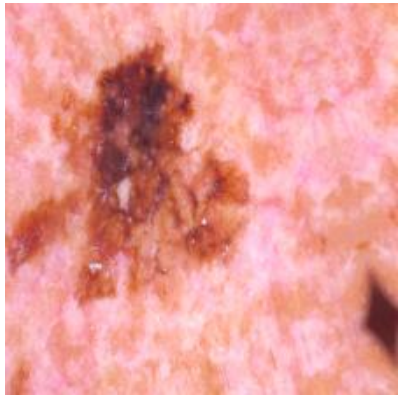
Image Augmentation:

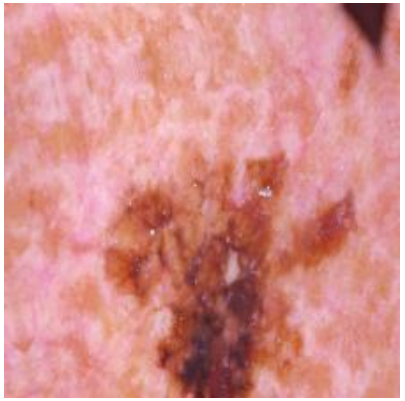


Original**:** Melanome







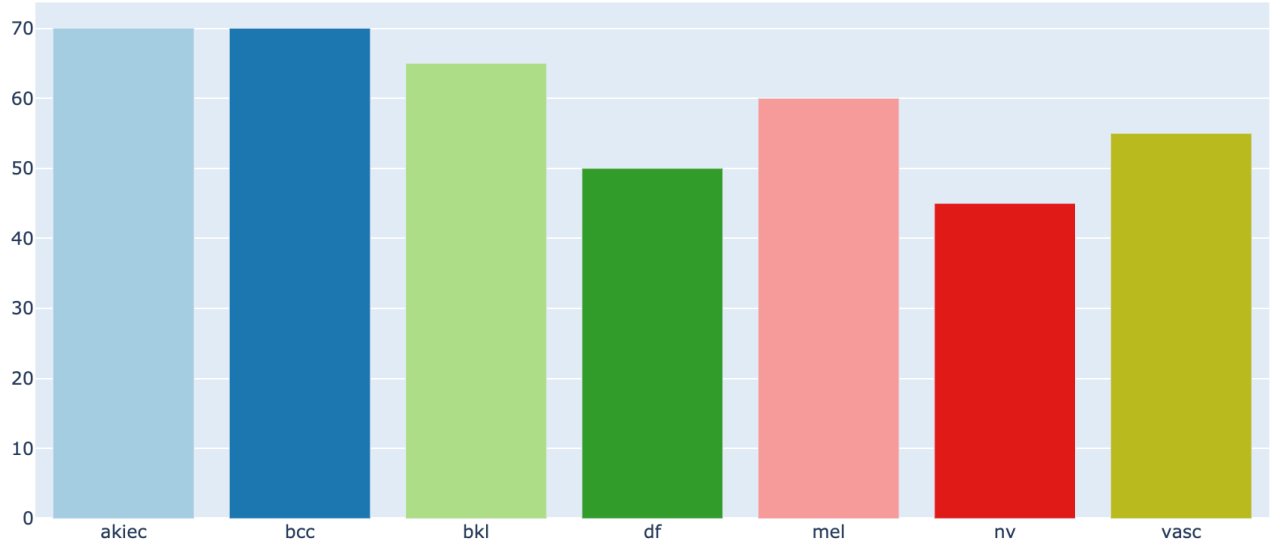


Available Metadata:

	lesion_id	image_id	dx	dx_type	age	sex	localization	duplicate	img_nr
0	HAM_0000118	ISIC_0027419	bkl	histo	80.0	male	scalp	has_duplicates	0027419
1	HAM_0000118	ISIC_0025030	bkl	histo	80.0	male	scalp	has_duplicates	0025030
2	HAM_0002730	ISIC_0026769	bkl	histo	80.0	male	scalp	has_duplicates	0026769
3	HAM_0002730	ISIC_0025661	bkl	histo	80.0	male	scalp	has_duplicates	0025661
4	HAM_0001466	ISIC_0031633	bkl	histo	75.0	male	ear	has_duplicates	0031633

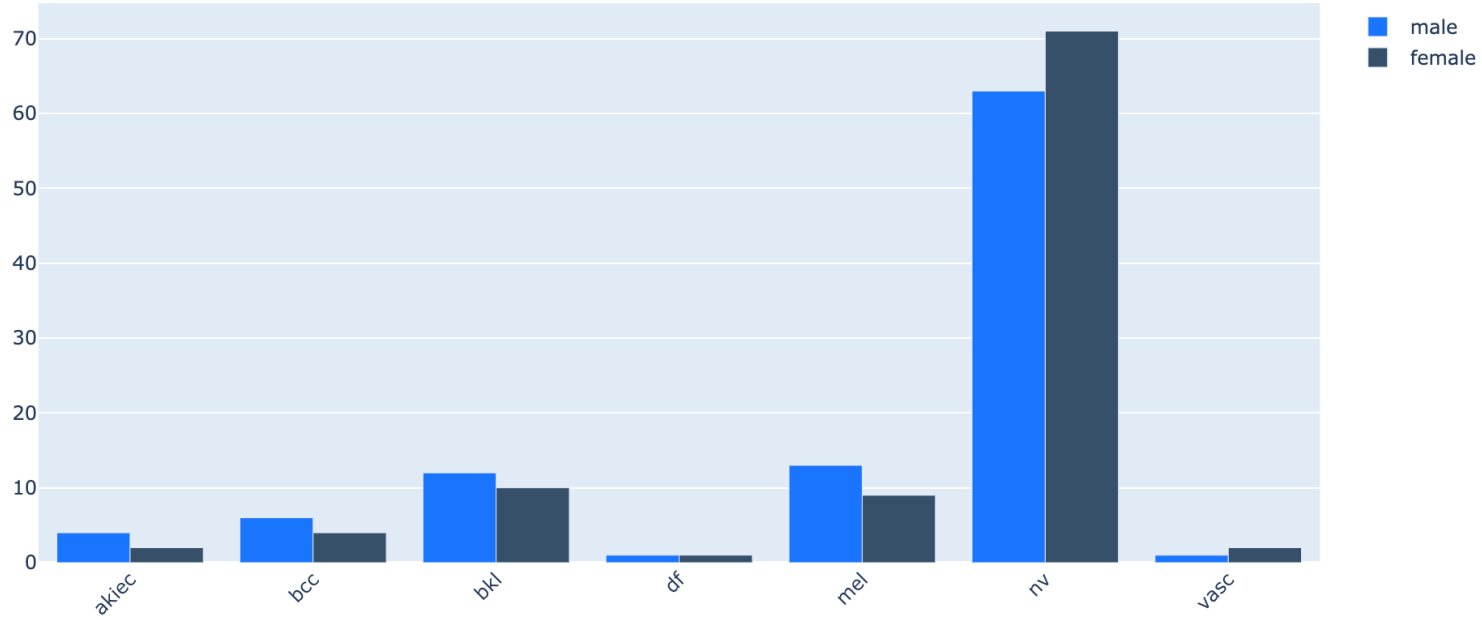
Metadata:

Median Age per diagnosis:



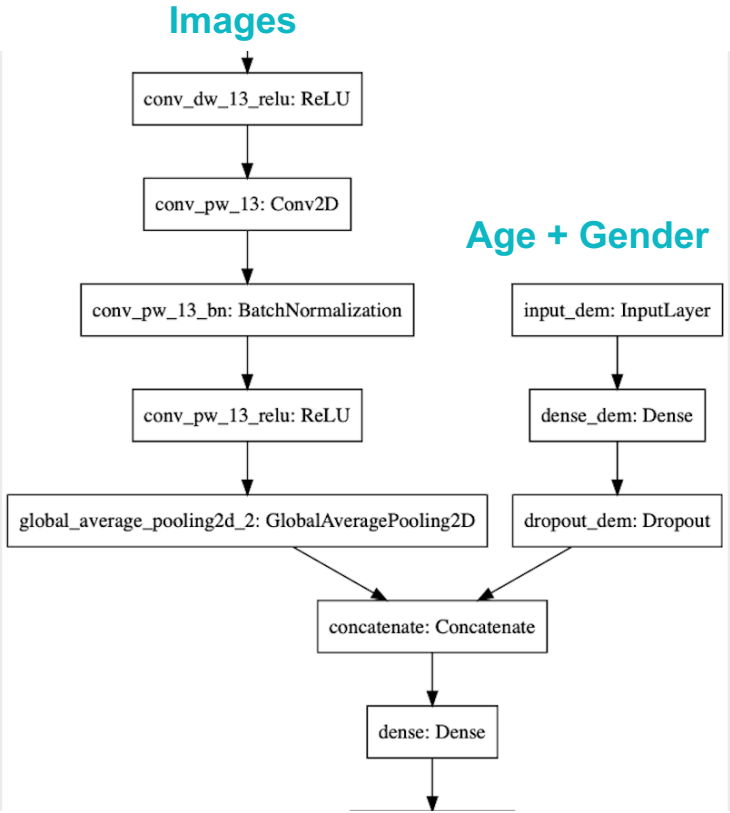
Metadata:

Proportion of diagnostic label per gender in %:



The ANN: Image-CNN + Metadata

- Transfer Learning from **MobileNetV1**
- ~ 90 layers + auxiliary input
- less parameters (~**4.5 M**) than other pre-trained CNNs
- → Better suited for web applications



The ANN:

Validation Accuracy:
~ 78 – 80 %

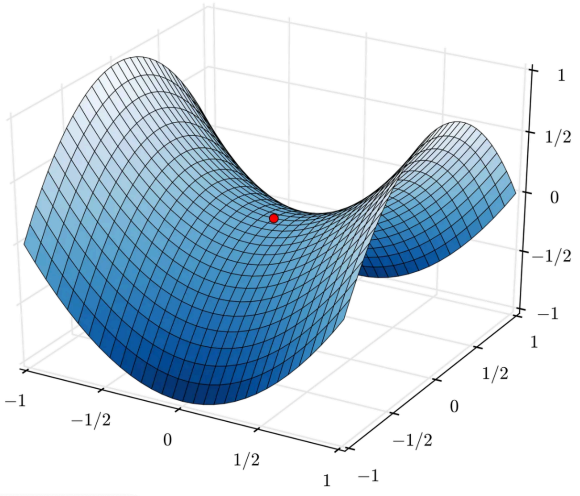
Cyclical Learning Rates and **1shot** learning

Common Practice:

- Using a fixed or decreasing learning rate

▷ New Approach:

- Learning rate continuously oscillates
  - ▷ between minimum and maximum LR
- Checkout https://course.fast.ai



Flask Server

Literature

The data for this project was extracted from the “ISIC 2018: Skin Lesion Analysis Towards Melanoma Detection” grand challenge datasets [1][2].

[1] Tschandl P., Rosendahl C. & Kittler H. The HAM10000 dataset, a large collection of multi-source dermatoscopic images of common pigmented skin lesions. *Sci. Data* **5**, 180161 doi.10.1038/sdata.2018.161 (2018)

[2] Noel C. F. Codella, David Gutman, M. Emre Celebi, Brian Helba, Michael A. Marchetti, Stephen W. Dusza, Aadi Kalloo, Konstantinos Liopyris, Nabin Mishra, Harald Kittler, Allan Halpern: “Skin Lesion Analysis Toward Melanoma Detection: A Challenge at the 2017 International Symposium on Biomedical Imaging (ISBI), Hosted by the International Skin Imaging Collaboration (ISIC)”, 2017; arXiv:1710.05006.