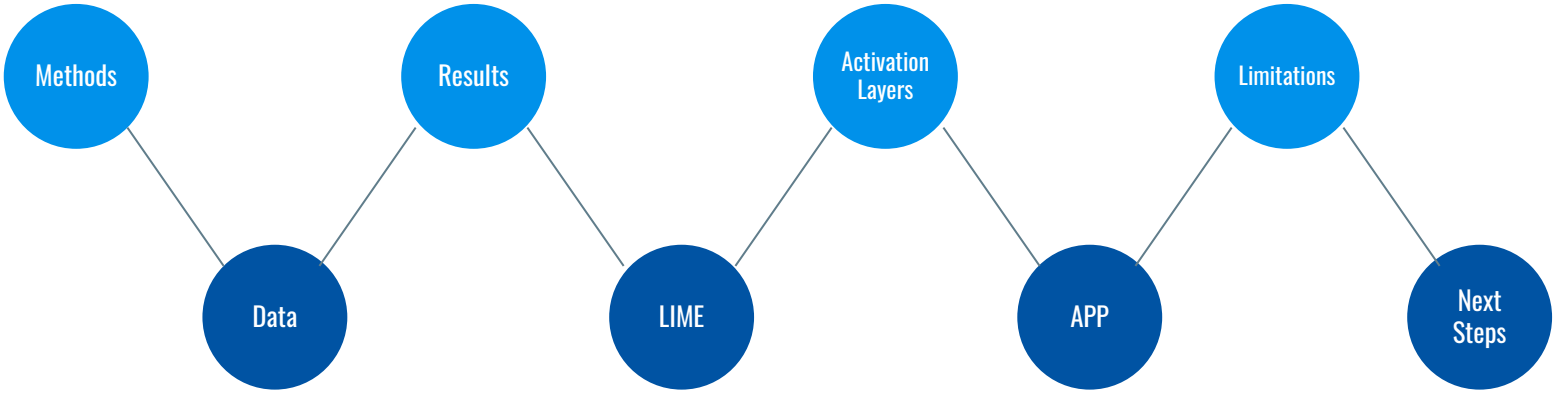
Skin Cancer detection

with Convolutional Neural Networks

- Skin cancer is the most common type of cancer
- App to support doctors of AAD making a diagnosis
- This project presents the core model for the app

Roadmap


Methods
Data
Results
LIME
Activation Layers
APP
Limitations
Next Steps

Methods

- *Data Preparation*
- *9 classes Naive Model*
- *Grid Search and Tuning 9 class model*
- *Division in 2 classes*
- *2 classes Naive Model*
- *Grid Search and Tuning 2 class model*
- *LIME*
- *Activation Layers*

The data

- 2357 images of skin anomalies from ISIC
- Divided into **9 classes**

  5 benign 4 cancerous
- Size 256x256 pixels total file 2 GB

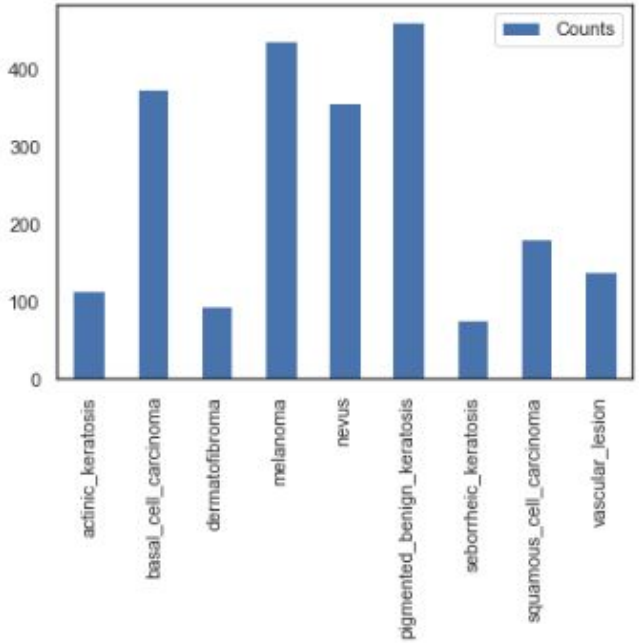
The 9 classes

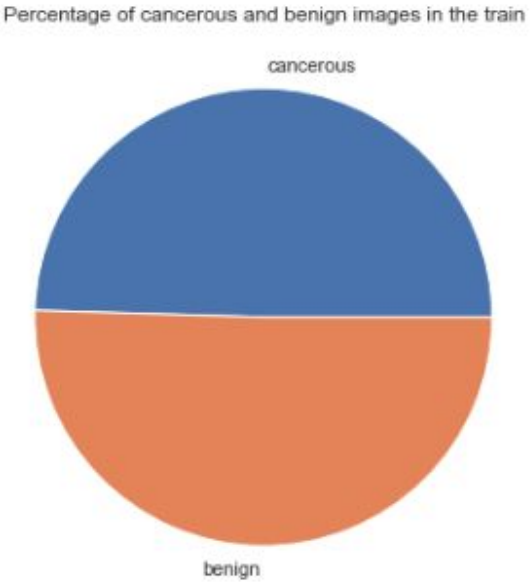
benign

cancerous

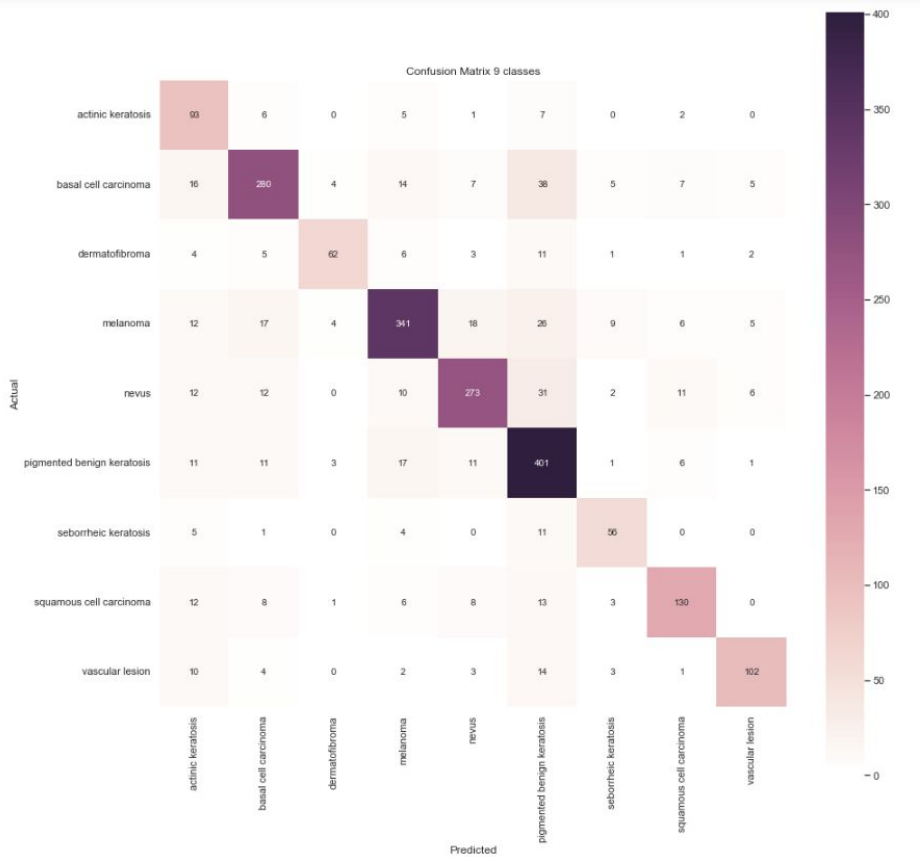
Distribution of the classes

Distribution of 9 classes in the Train set





Results



9 classes model

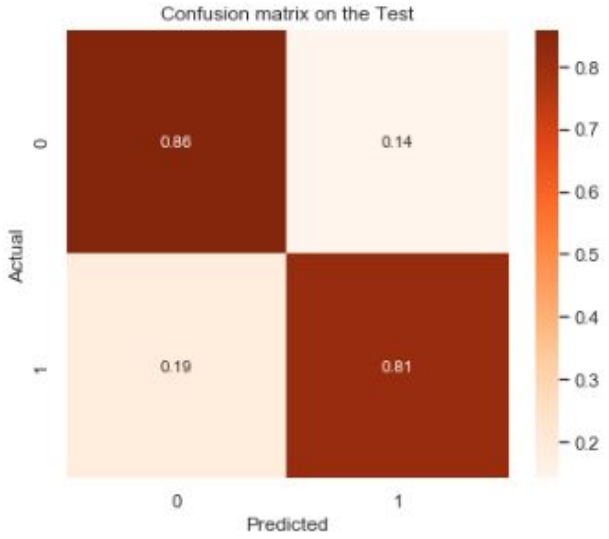
70% - 80%

Accuracy train

15% - 20%

Accuracy test

2 classes model:



0 = benign 1= cancerous

~ 80%

Recall train

~ 65%

Recall test

~ 85%

F1 train

~ 70%

F1 test

LIME

Local Interpretable Model-Agnostic Explanations

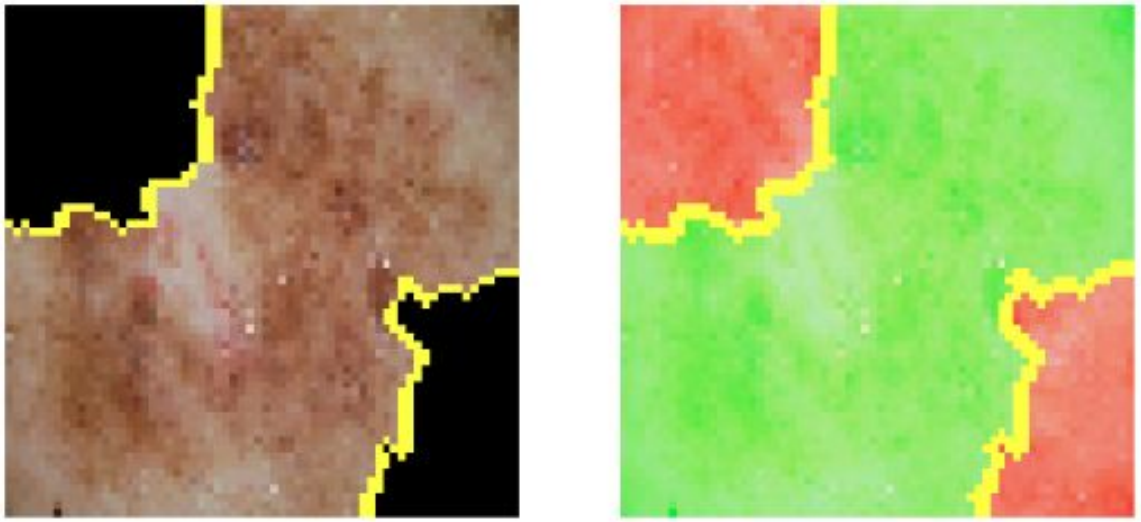


Image classified correctly by the model

LIME

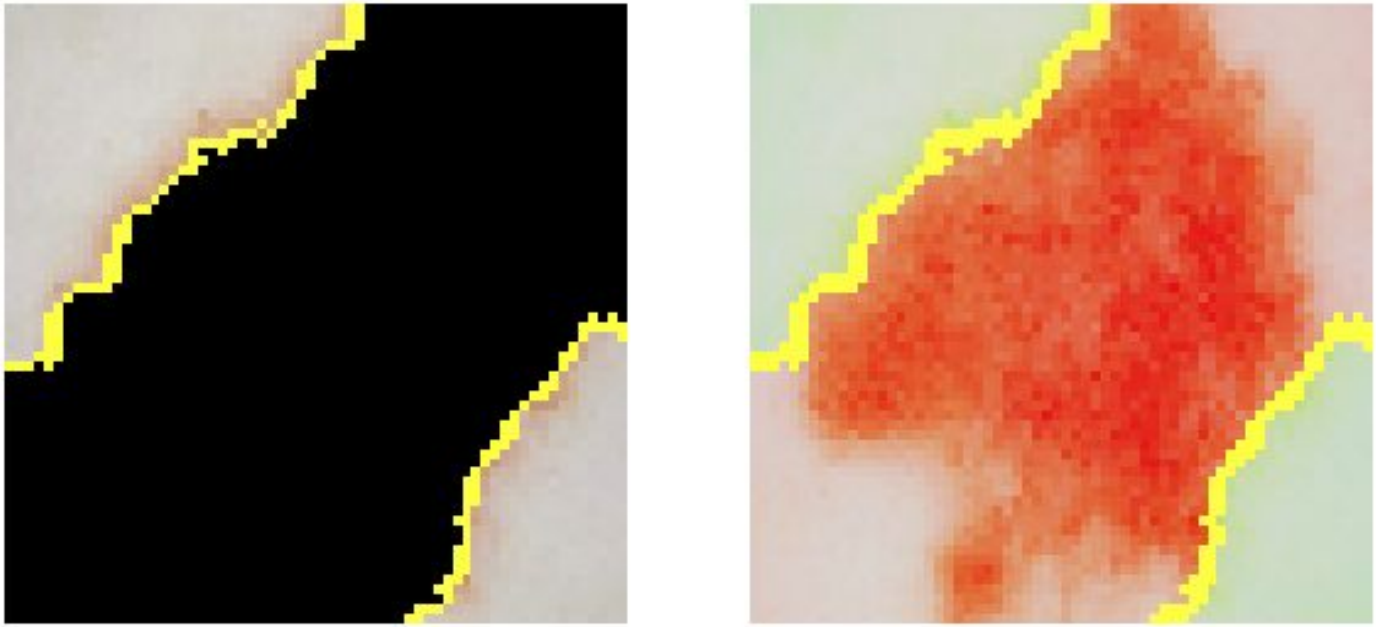
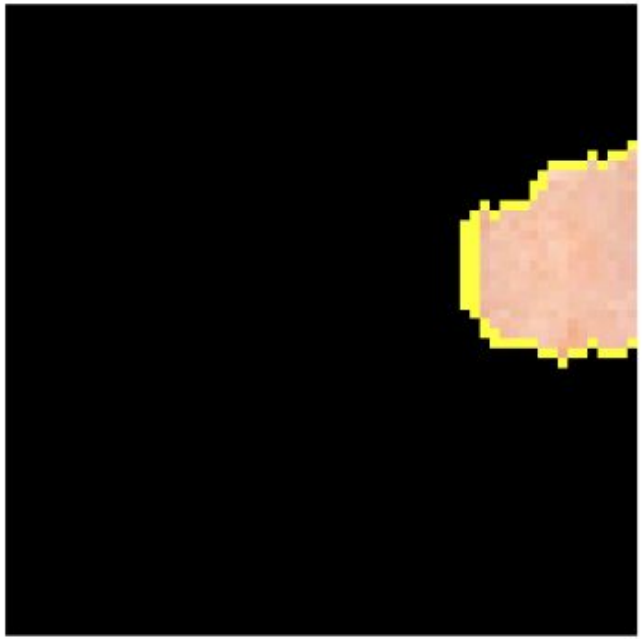


Image classified incorrectly by the model

LIME



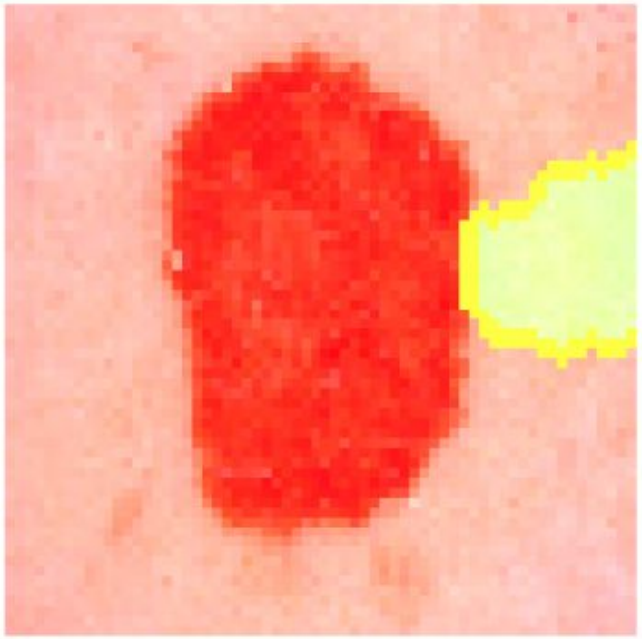
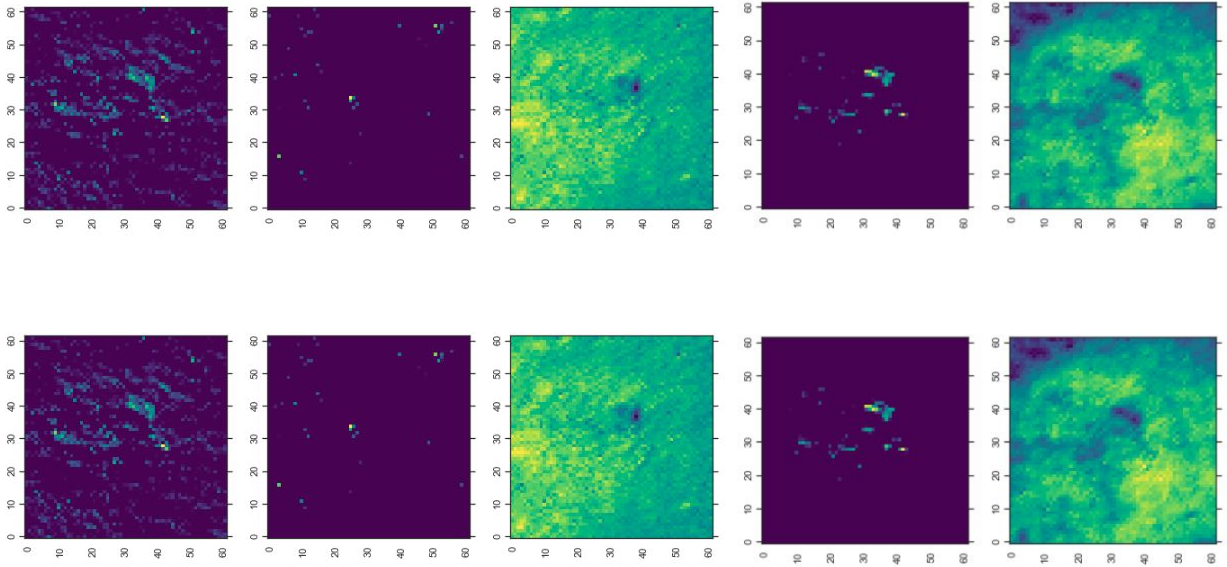


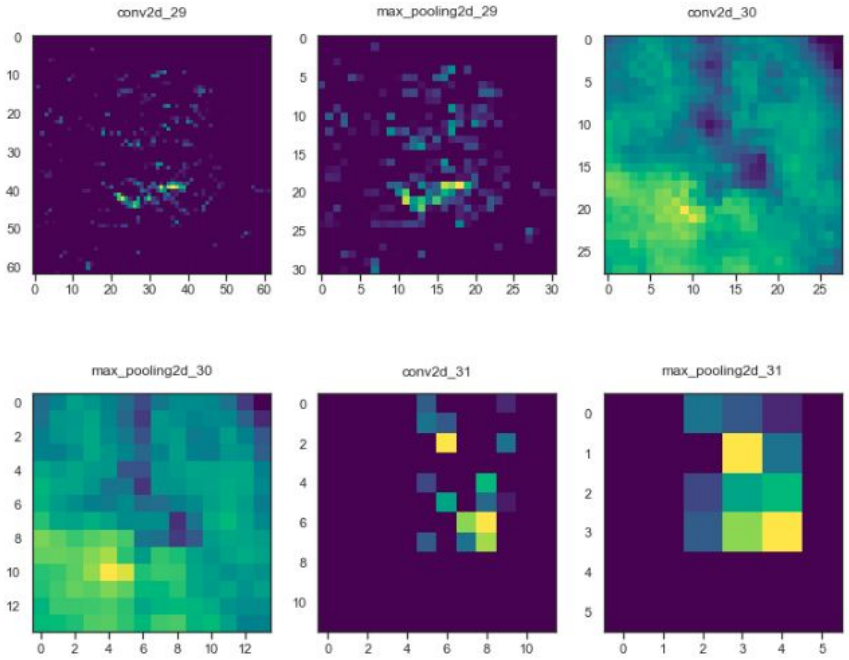
Image classified incorrectly by the model

Visualizing activation layers



Visualizing the 10 different channels of the first layer

Visualizing activation layers



Visualizing the six layers of the sixth channel

APP Features

Dr receives result with % of certainty and explanatory visualizations

Dr can set the threshold for cancerous or “at risk“ cases

Dr can upload pictures to database to make model always more precise

Limitations

Limited Data

With more data and balancing the 9 classes the model will be able to perform even better

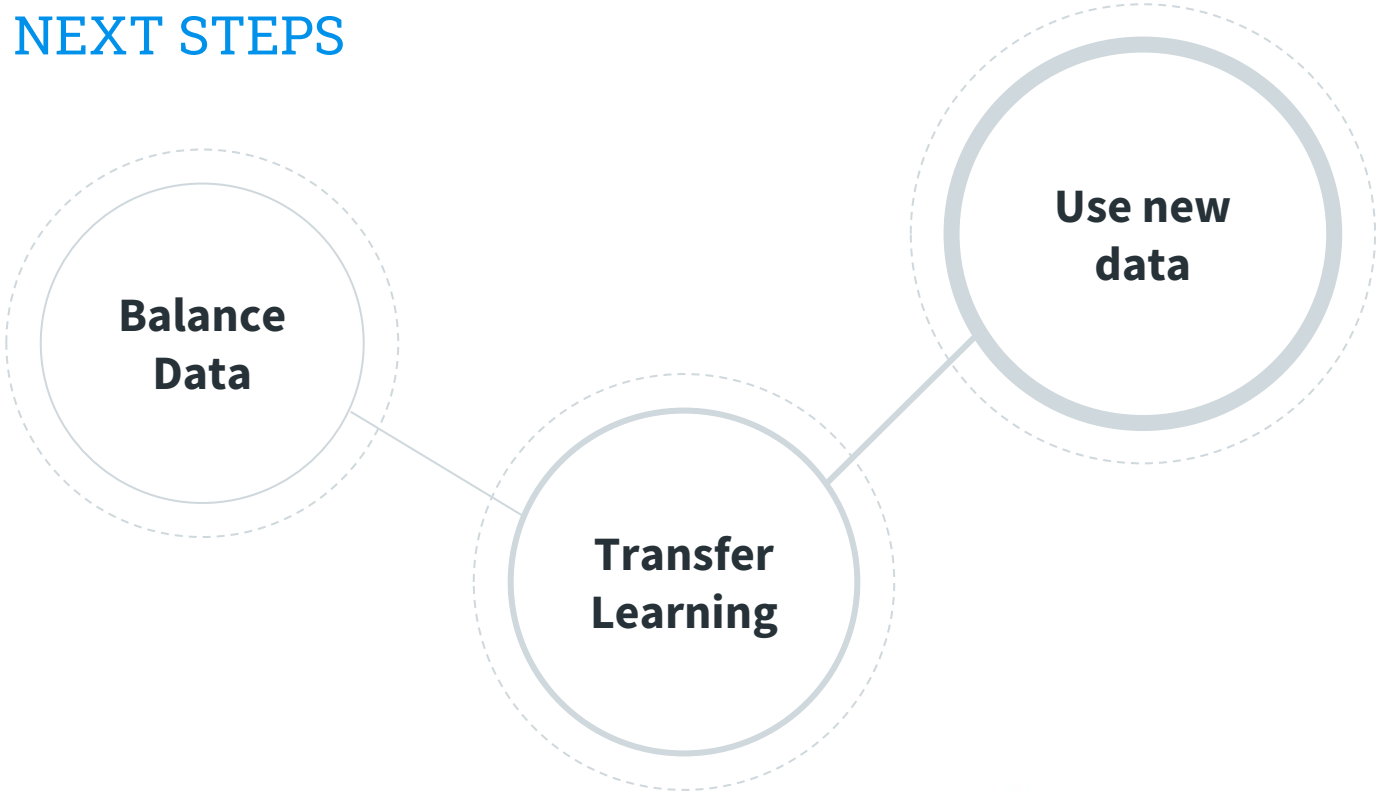
Patient Privacy

To upload pictures to database the patient has to agree and sign a HIPAA form

Computational Power

Limited computational power and running time - Cloud system could solve this

NEXT STEPS



Thank you

Any questions?

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