



**JOHANNES KEPLER  
UNIVERSITÄT LINZ**

# AI and Visualisation

## Assignment 2



December 12, 2024 | Group name: Lazy Legends

# Agenda

- Dataset.
- The models.

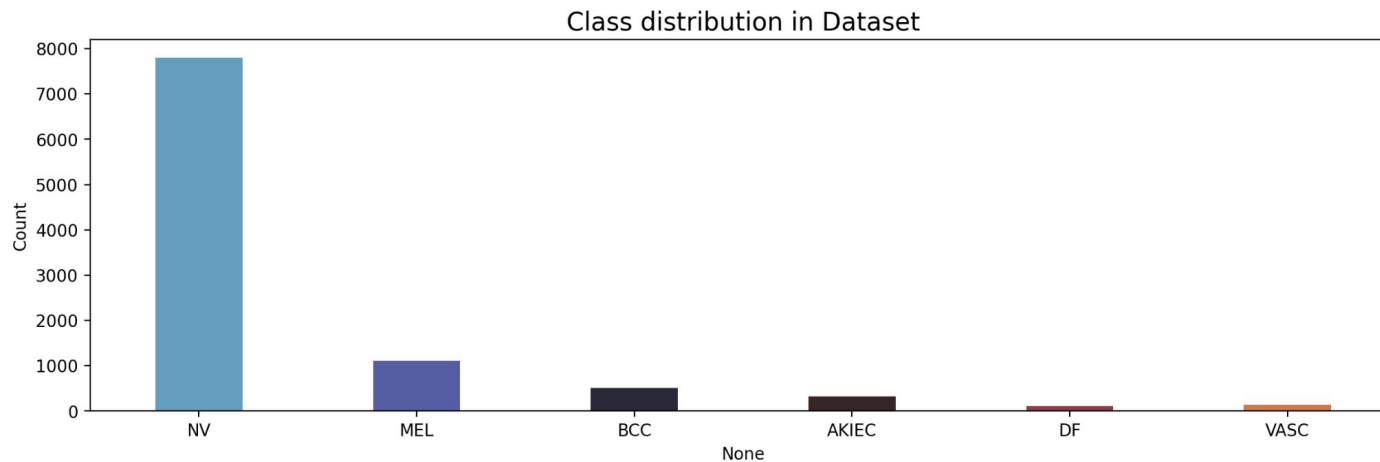
Classification XAI techniques.

Segmentation XAI techniques.

- Summary.

# Dataset: Skin cancer

- kaggle dataset
- 7 types of skin cancer
- imbalanced data distribution



source:

<https://www.kaggle.com/datasets/surajghuwalewala/ham1000-segmentation-and-classification/code>

classification

melanoma (MEL)

melanocytic nevi (NV)

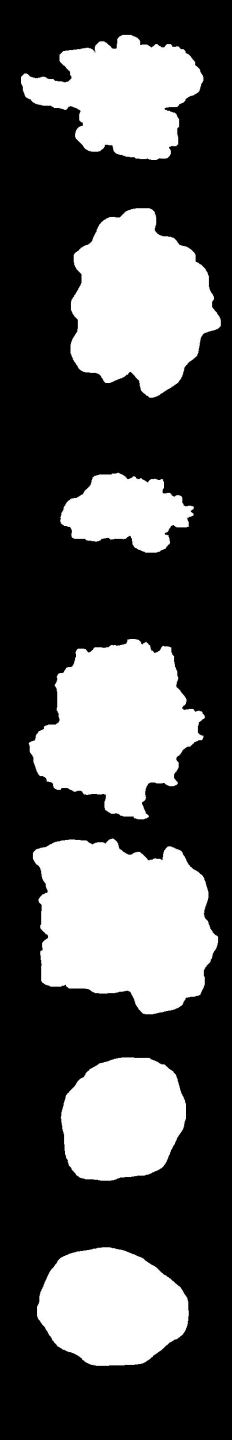
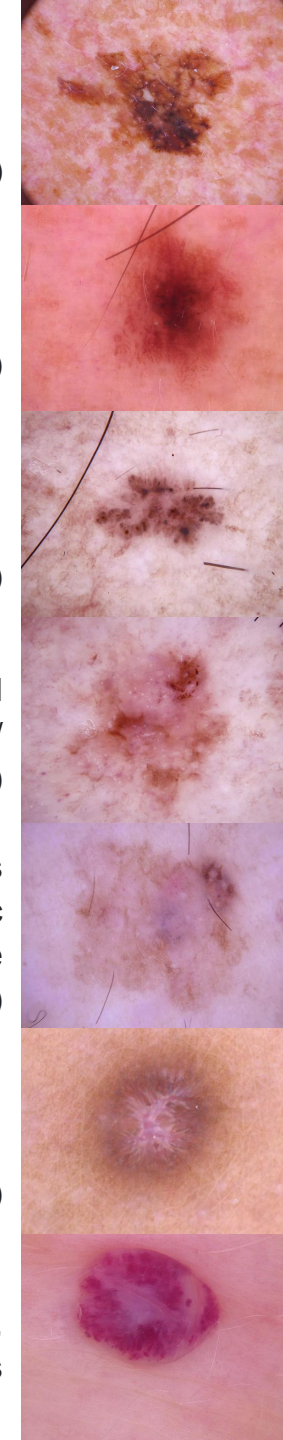
basal cell carcinoma (BCC)

Actinic keratoses and  
intraepithelial carcinoma /  
Bowen's disease (AKIEC)

benign keratosis-like lesions  
(solar lentigines / seborrheic  
keratoses and lichen-planus like  
keratoses, BKL)

dermatofibroma (DF)

vascular lesions (angiomas,  
angiokeratomas, pyogenic granulomas  
and hemorrhage, VASC).

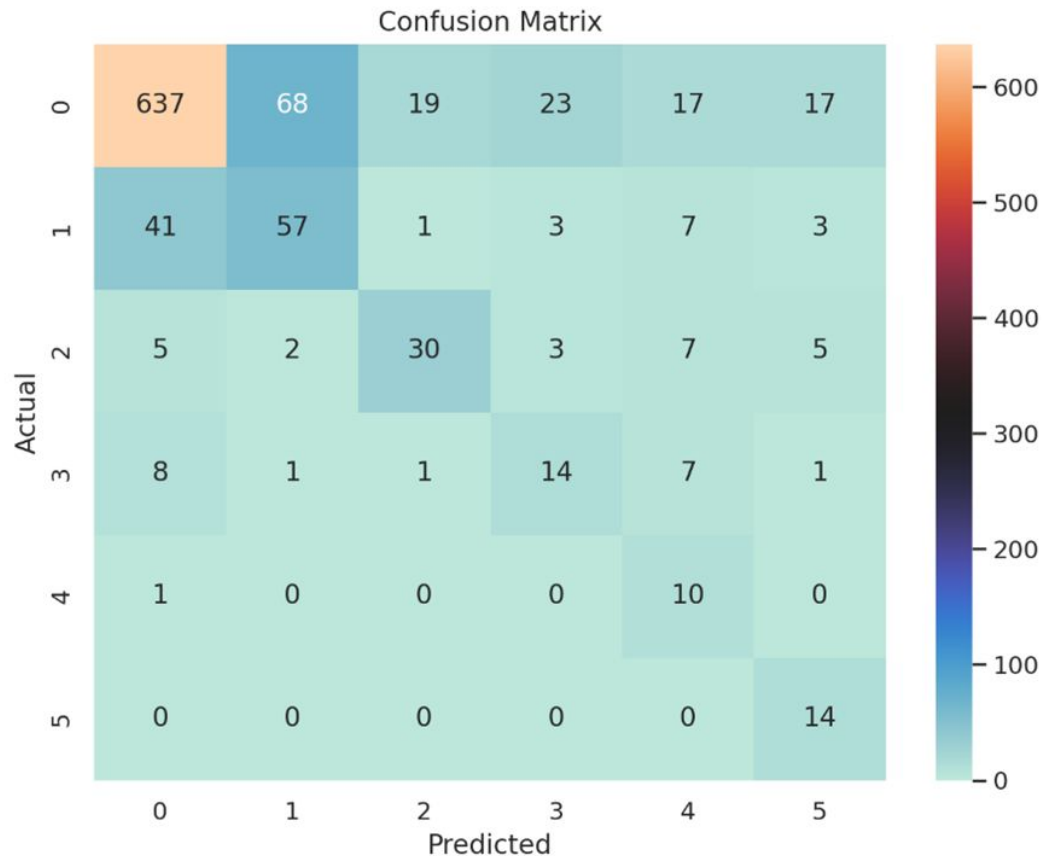


segmentation

# The model

- MobileNetV3

Source for this model: <https://www.kaggle.com/code/dariusfoodeei/multiclass-skincancer-torch>



classification

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vascular lesions (angiomas,  
angiokeratomas, pyogenic granulomas  
and hemorrhage, VASC).

segmentation

# The model

- Fuzzy U-net

Source for this model: <https://www.kaggle.com/code/iakhtar0/2-skin-cancer-images-segmentation-fuzzy-unet>

classification

melanoma (MEL)

melanocytic nevi (NV)

basal cell carcinoma (BCC)

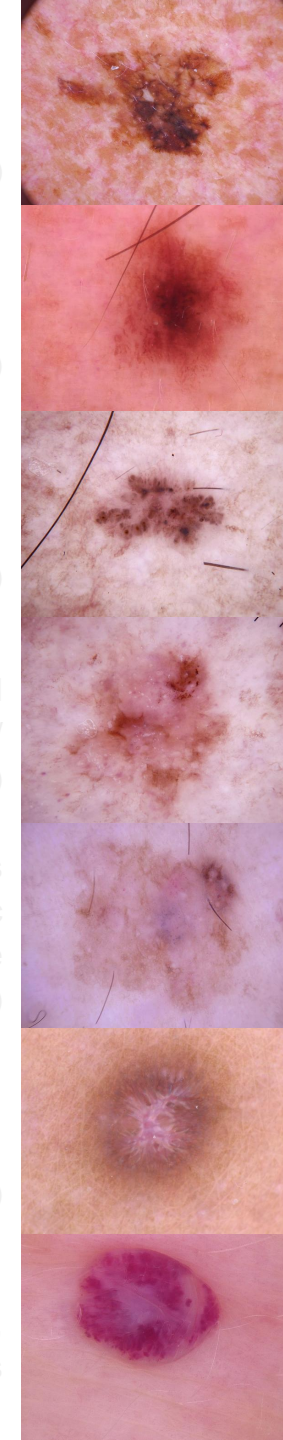
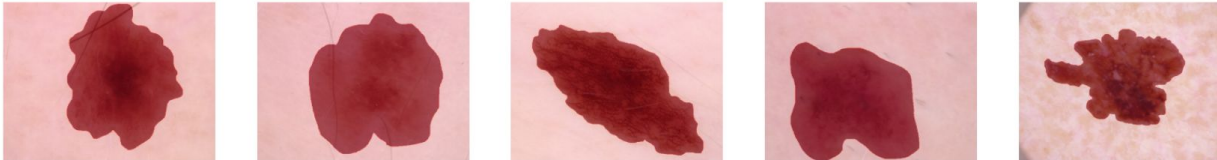
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segmentation



segmentation

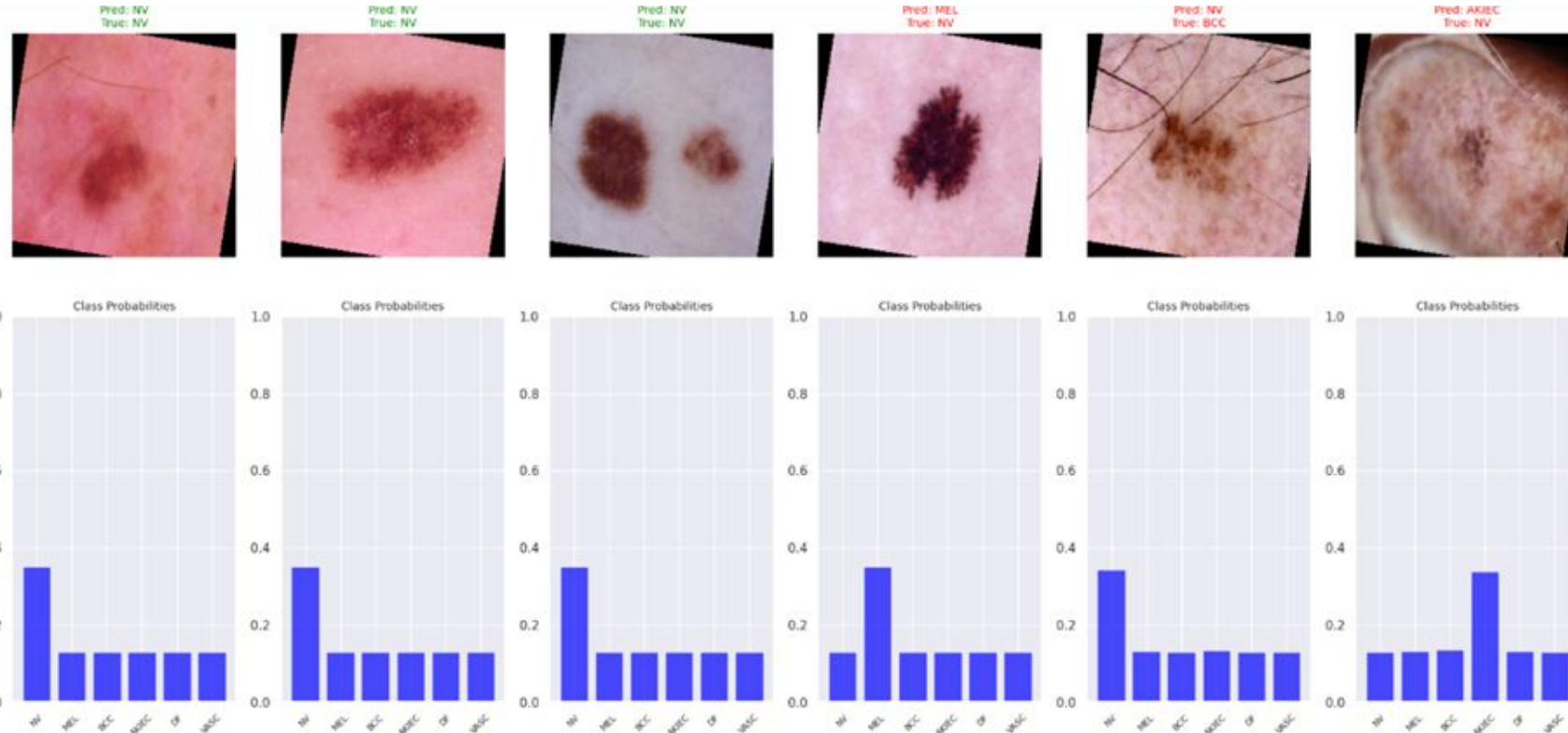
# Classification XAI techniques

**classification**



# Approach 1.1: class prediction probabilities

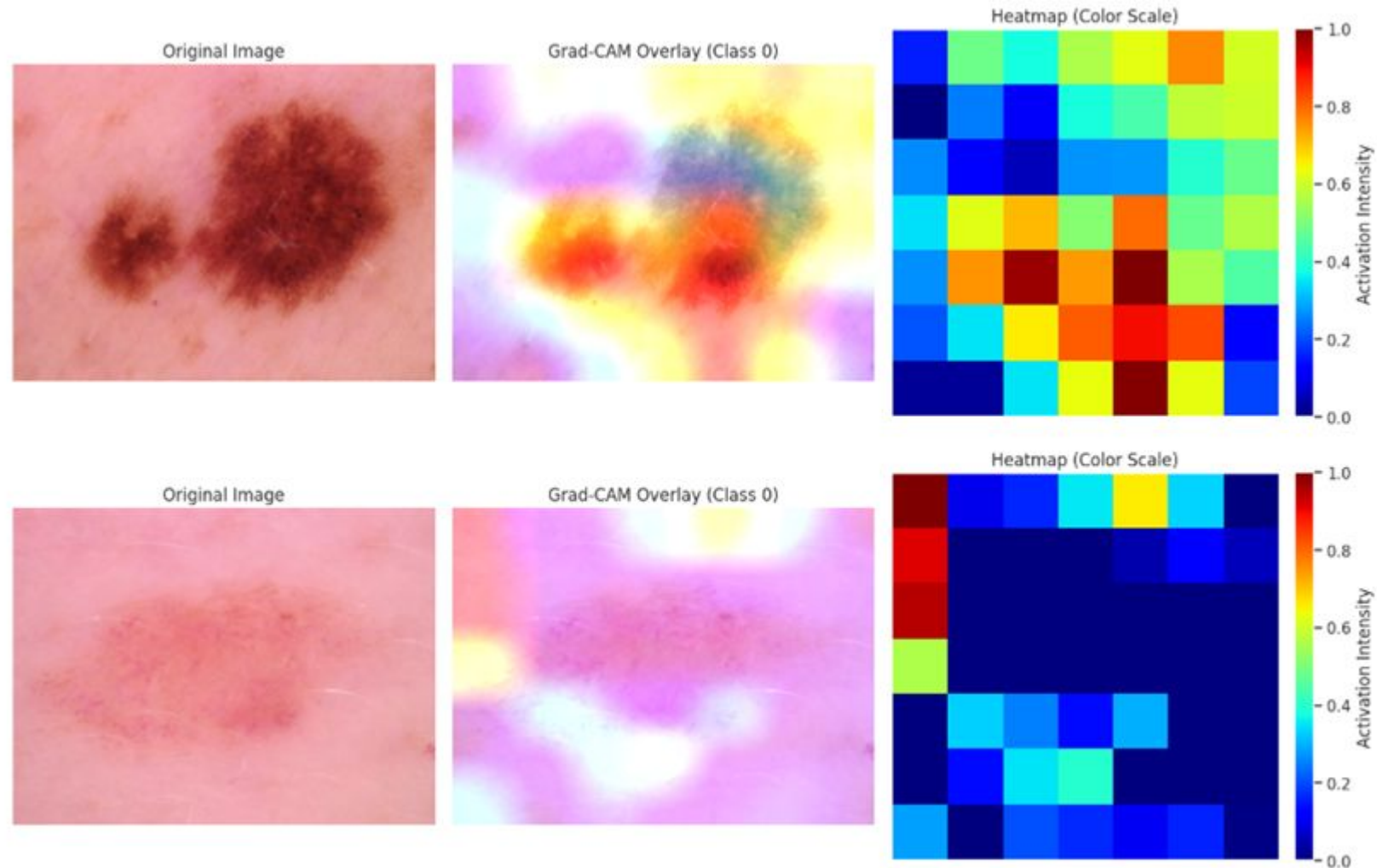
- low probability even for most often used class “NV”
- insight for model developers and non-experts (doctors and patients)





# Approach 1.2: Grad-CAM

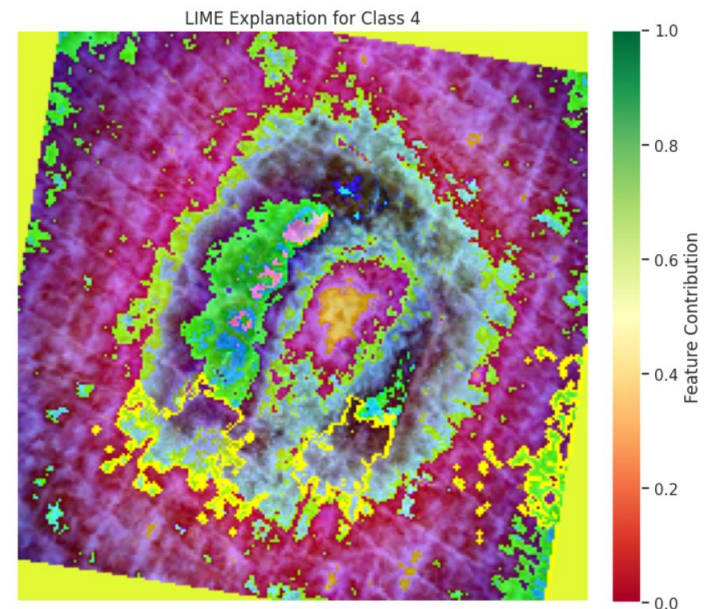
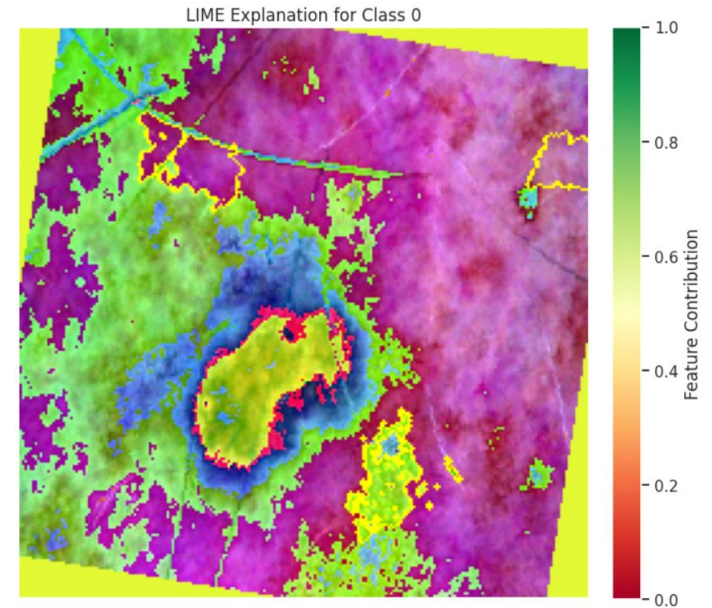
- sharp bordered lesions:
  - model focusses on lesion
- blurry bordered lesion:
  - model focuses on surrounding skin
- insight for model developers and non-experts (doctors and patients)



# Approach 1.3: LIME

- lesion and surrounding skin important for model, not the border
- not only central image parts important for classification
- insight for developers & non-experts (doctors)

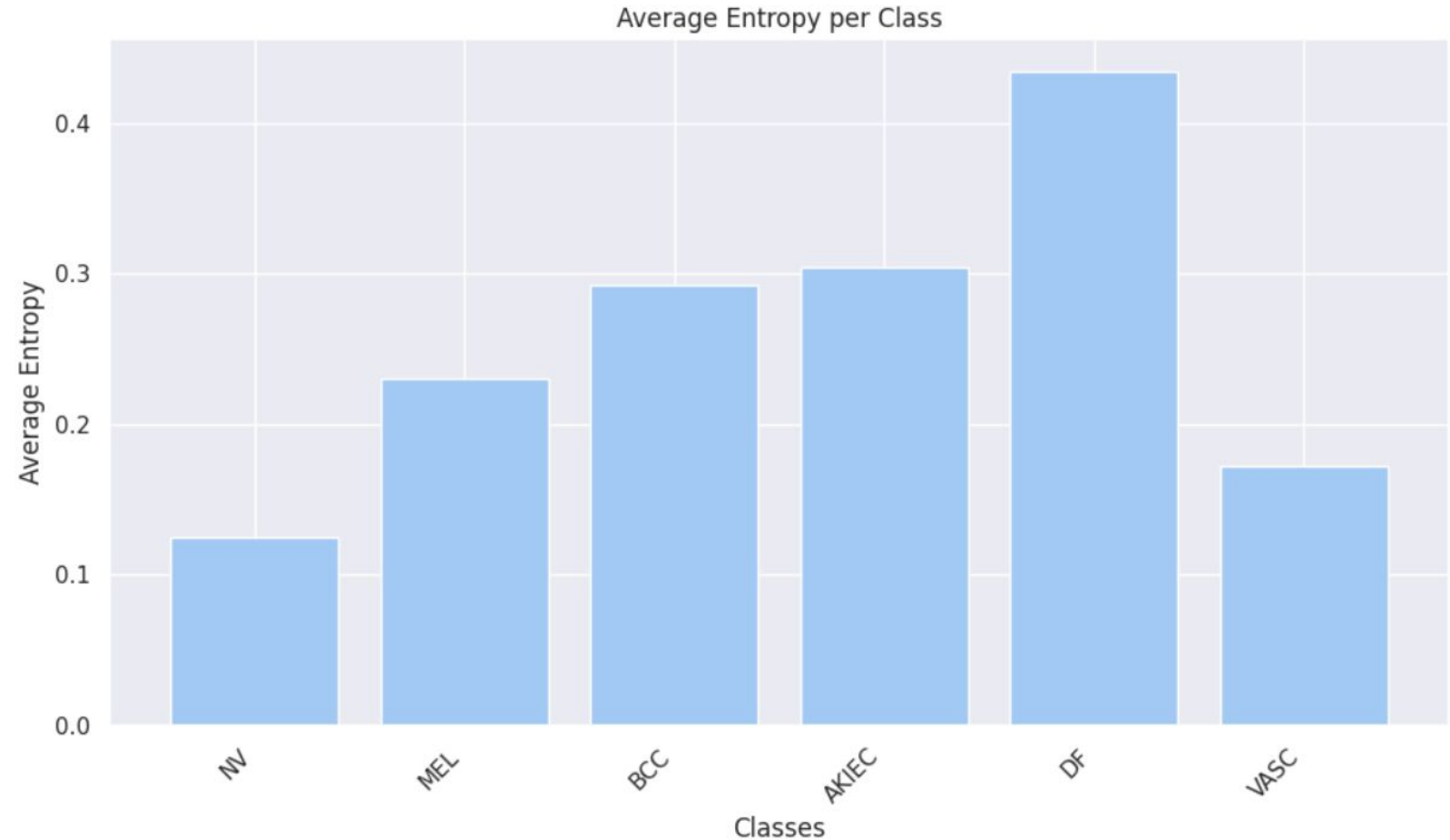
classification



# Approach 1.4: Entropy Visualization

- Average entropy on every class
- Lowest entropy for predictions of class NV
- Highest entropy for predictions of class DF

→ model developers should focus on improving DF classification

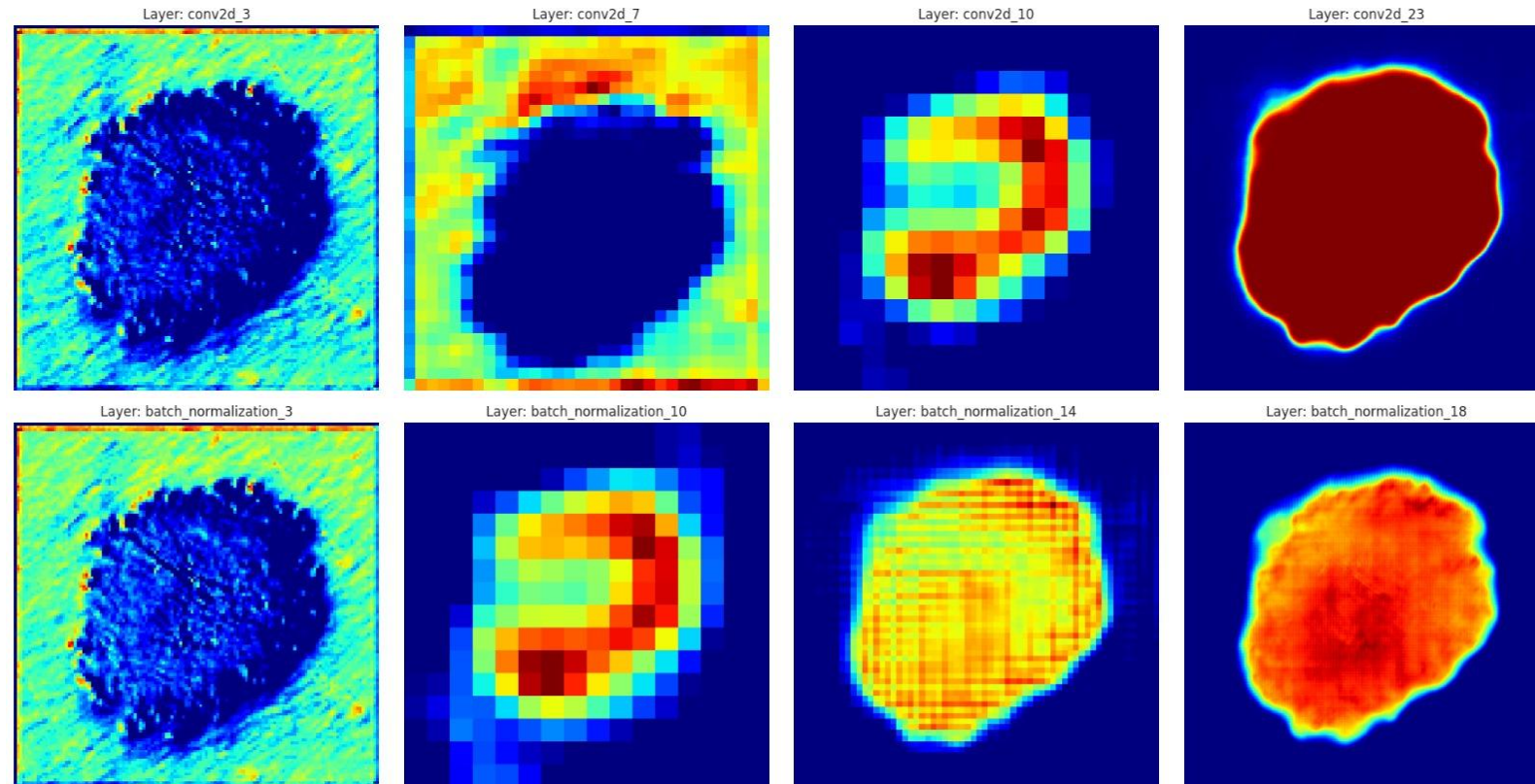


# Segmentation XAI techniques

**segmentation**

# Approach 2.1: Grad-CAM

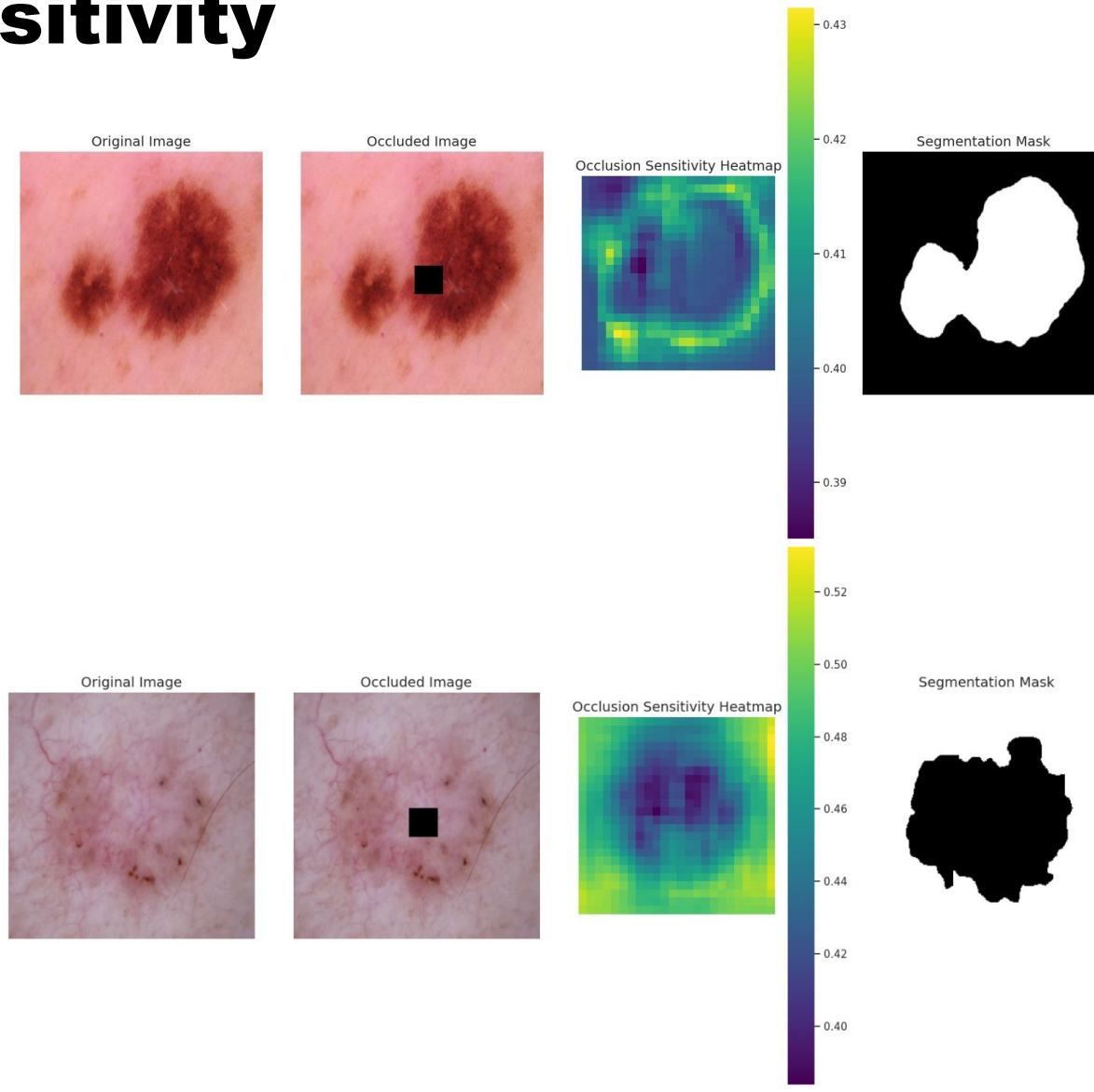
- progression of feature learning visible:
  - early layers focus on low-level features
  - mid-layers focus on lesion-specific patterns
  - late layers focus on boundary detection
- for model developers and non-experts (doctors)





# Approach 2.2: Occlusion sensitivity

- sharp bordered lesion:
  - model focuses on lesion boundaries
- blurry bordered lesion:
  - less focused heatmap
- insight for model developers and doctors



# Summary

**classifi-  
cation**

**segmen-  
tation**



# Summary

- both in classification & segmentation:  
differences for sharp and blurry bordered  
lesions
- XAI techniques useful for both AI developers  
and non-experts such as doctors or patients

# Thank you!



**Group name: Lazy Legends**

Hannah Aster - K51841985

Alba Huti - K12331691

Petra Jósár - K12336312

Liza Lengyel - K12317779