

DGM Project Report 1

Xiaoyan Xue, Vigelius, Xiaoyan Xue, Yunhao Sun
June 17, 2024

1 What we have worked on this week

- Data exploration(All members)
- Research on approaches to balancing the label set(All members)
- Dataset information discussion(All members):
 - The HAM10000 dataset, a large collection of multi-source dermatoscopic images of common pigmented skin lesions. The final dataset consists of 10015 dermatoscopic images which can serve as a training set for academic machine learning purposes. Cases include a representative collection of all important diagnostic categories in the realm of pigmented lesions.
- Task distribution(All members):
 - The whole project is divided into three parts for three members:
 - **Dataset Collection and Dataset Processing(YunHao Sun):**
 - * Dataset Selection(HAM10000)
 - * Data Augmentation: Here are some data augmentation methods in our plan:
 - Rotation: Rotate the image by a certain angle (e.g., 90 degrees, 180 degrees).
 - Flip (Horizontal and Vertical): Flip the image horizontally and/or vertically.
 - Zoom: Randomly zoom into the image.
 - Brightness and Contrast Adjustment: Adjust the brightness and contrast of the image.
 - Color Jittering: Introduce random variations in the color of the image.
 - Gaussian Noise: Add random Gaussian noise to the image.
 - * Data Cleaning: Check for and handle any missing or corrupted data in the dataset. Ensure that each image is associated with the correct label.
 - * Image Resizing: Resize images to a consistent resolution.
 - * Normalization: Normalize pixel values to a common scale, typically between 0 and 1.
 - * Class Imbalance: Check for class imbalances and use data augmentation methods to balance them.
 - **Model Selection, Training and Evaluation(Xiaoyan):**
 - * Model Selection: **Need more information and discussion for this specific task.** Here are some models we are considering about:
 - Convolutional Neural Networks (CNNs)
 - Residual Networks (ResNet)
 - Inception Networks (GoogLeNet)
 - DenseNet
 - * Model Training: Implement neural network models and train the data.
 - * Model Evaluation:
 - Accuracy

- Precision
- Recall
- F1 Score
- Confusion Matrix

– **UI Design and Implementation(Manuel Vigelius):**

- * Designing possible functionalities of the final application, some possible functionalities might be:
 - Basic Functionalities: Sign up, login, personal information, password
 - Supported Input: Support camera to take images on mobile devices, or upload image manually
 - Document Exporting: Export a report which includes the image, predicted result and related information or medical advice
 - Archives: Saving past results with different labels
- * UI implementation: Plans to use Flutter for both mobile devices and PC.

2 Results, findings and problems

- Need more discussion for model selection
- Data balancing with data augmentation or giving different weights in model training process is not decided yet.
- A little bit hurry for three members to finish this project, not sure whether have enough time.

3 Future work

1. Discuss details and confusions above. Planned next meeting on 23.12.2023.
2. Follow the task distributions:
 - a) The data processing part should be finished by 27.12.2023(1.5 weeks).
 - b) The model part should be finished by 07.01.2024(1.5 weeks).
 - c) The UI part should be finished by 17.01.2024(1.5 weeks).