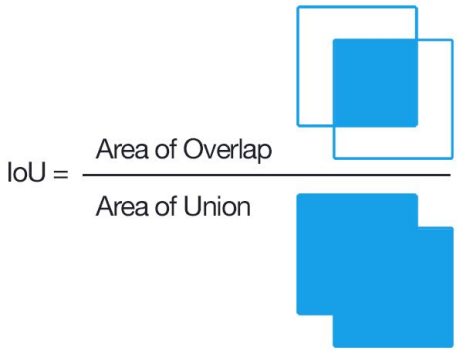
Data Science Survival Skills

Homework 6

Description of the Homework

In this homework assignment, you will implement the IoU score and calculate it on some dummy data. You will then delve into the area of data augmentation with the "albumentations" library.



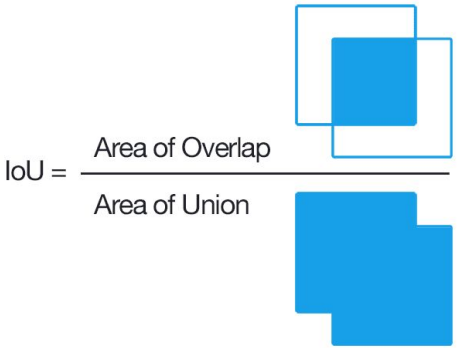
https://pyimagesearch.com/2016/11/07/intersection-over-union-iou-for-object-detection/

Homework 6: Tasks 1/2

Implement the calculation of the IoU score (**don't use any library except numpy**). We provide you with a file "rectangles.dsss" (hdf5 file container, saved with 'flammkuchen') in which you can find two lists. Each list contains 100 rectangles. A rectangle is described in a tuple as (x_coordinate, y_coordinate, width, height). Use your IoU implementation to calculate the IoU score for the rectangles at index 0, 1, 2, ... for the ground truth and the predicted rectangles. Plot all calculated IoU scores in a histogram.

➜ **Slide: Screenshots of your IoU implementation**

➜ **Slide: Screenshot of your plot**



https://pyimagesearch.com/2016/11/07/intersection-over-union-iou-for-object-detection/

Homework 6: Task 2/2

Data Augmentation is the process of artificially expanding the size and diversity of a dataset by creating modified versions of the data points. In the case of image segmentation, it can be useful to apply transformations to the training images, for example random rotation or change in brightness.

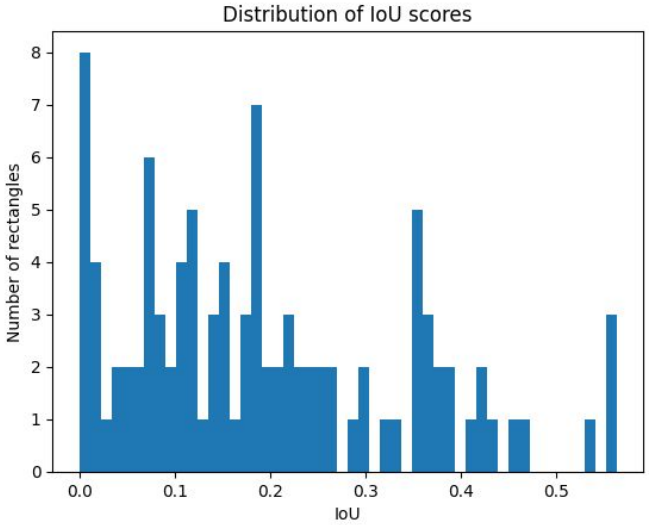
1) Choose a random image with its mask from the MiniBAGLS dataset. Therefore use np.random.choice() and your matriculation number as random seed.

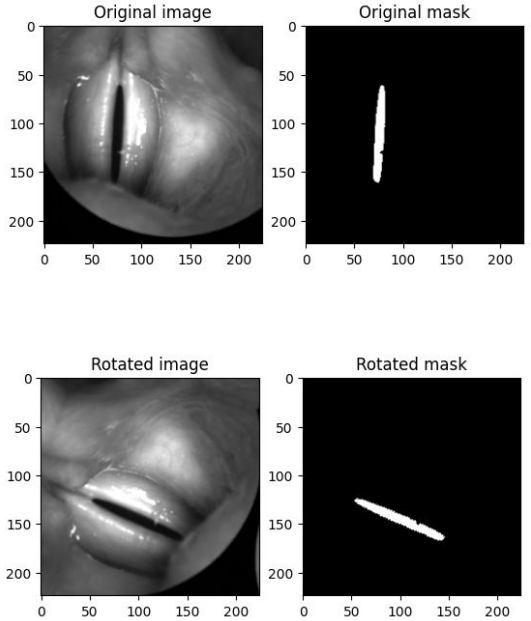
2) Use the python library “albumentations” and apply different data augmentation techniques to the image and the mask.
   - ➜ Installation: *pip install albumentations*
   - ➜ Examples: https://albumentations.ai/docs/examples/example_kaggle_salt/

- ➜ **Slide: Plot of the original image with its mask**
- ➜ **Slide: Plots of 4 transformed images with their masks**

Example solution

```python
def calclate_iou(rect1, rect2):
    ''' TODO'''
    # NOTE: Keep in mind to handle the case where the area of the union is zero
    return iou_score
```





Homework: Requirements

You must complete **all** homework assignments (**unless otherwise specified**) following these guidelines:

- **One** slide/page.
- **PDF** file format only.
- It has to contain your **name, student** (**matriculation**) **number** and **IdM** in the down-left corner.
- Font: **Arial,** Font-size: **> 10 Pt.**
- Answer **all** the questions and solve all the tasks requested.
- Be careful with **plagiarism**. Repeated solutions will not be accepted!