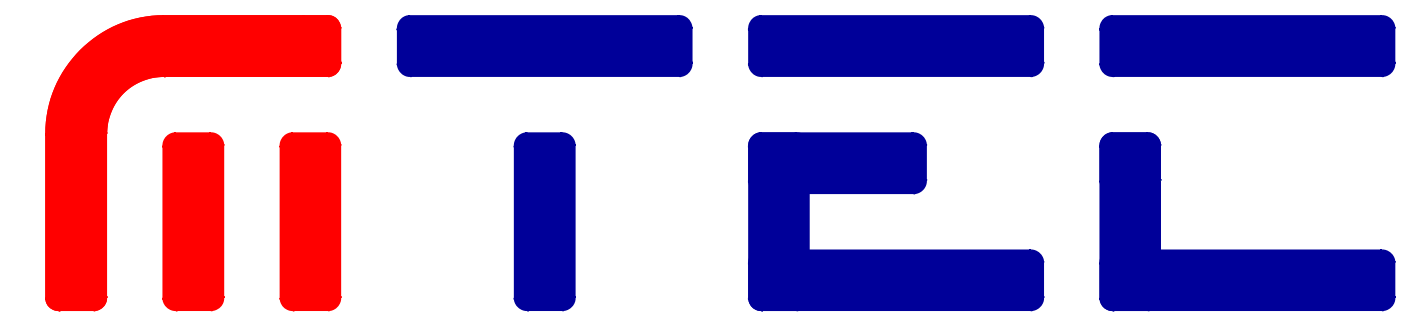


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Medical Technology | Intelligent Systems

Jan 12, 2022

Impact of different Data Augmentation Techniques for Deep Learning with Optical Coherence Tomography

Oberseminar Presentation

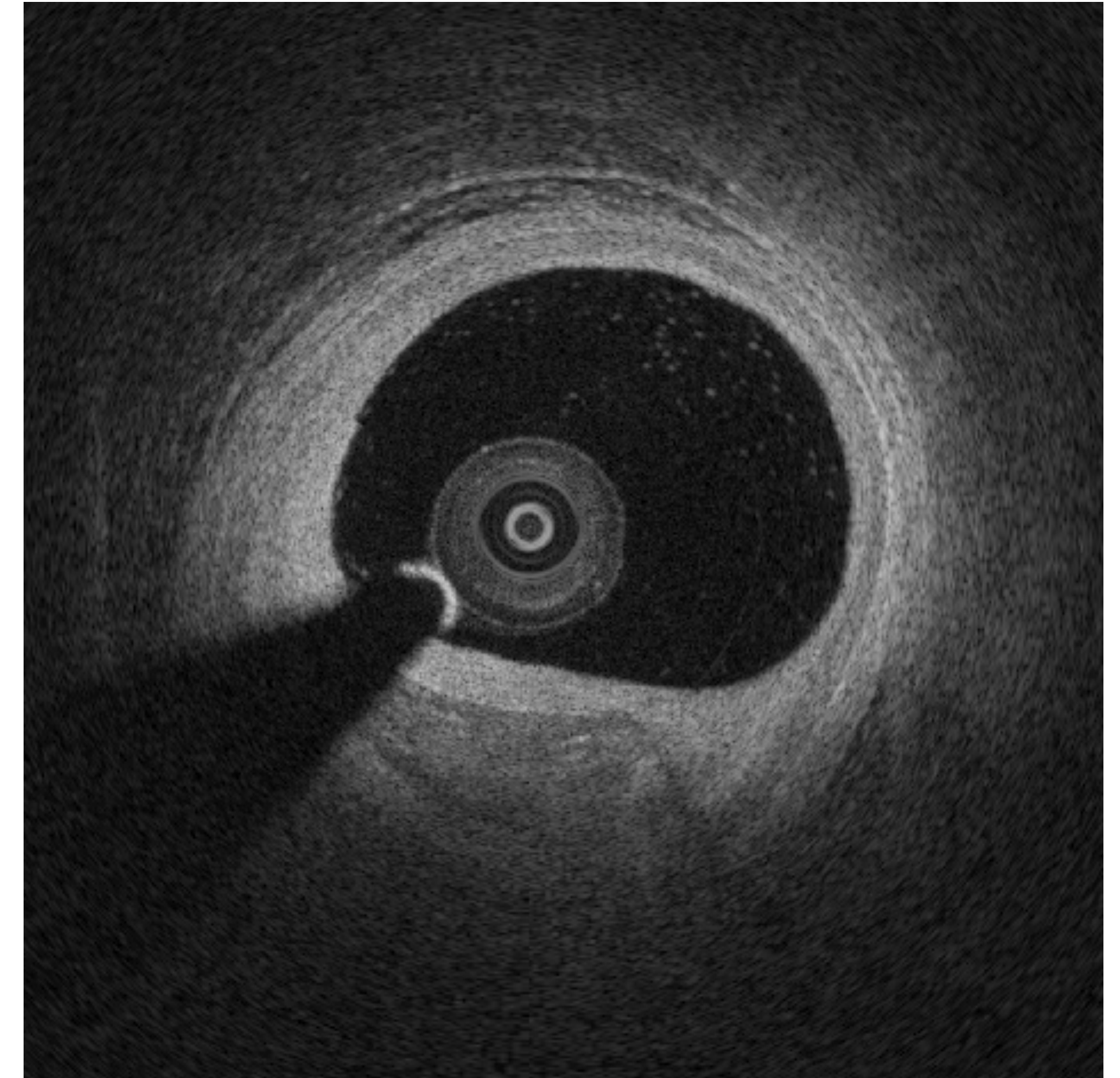
Table of Contents



- Motivation of the topic
- Steps of Procedure
- Preliminary Results
- Further Plans

IVOCT Images

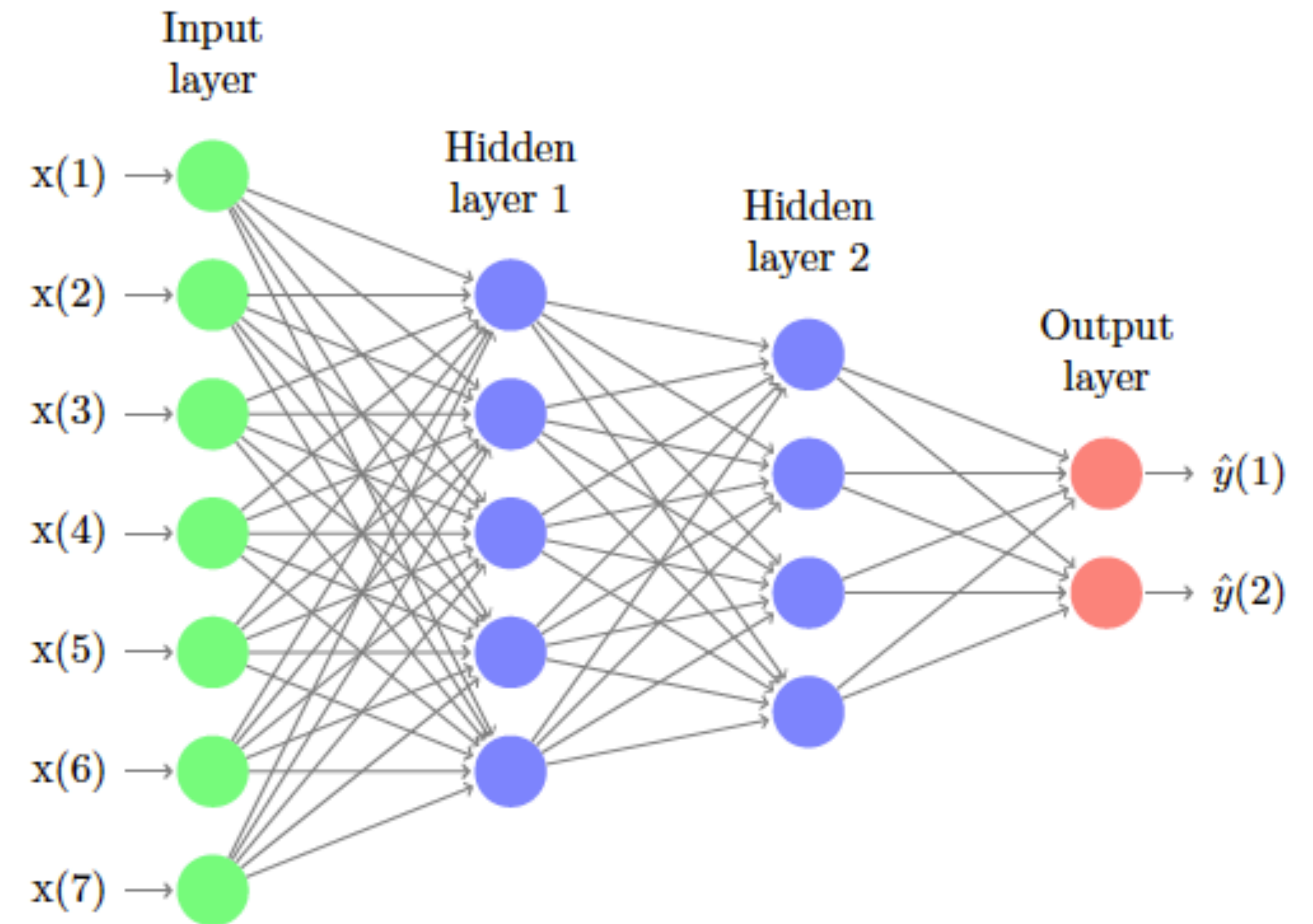
- Intravascular Optical Coherence Tomography
- Rotated catheter
- Image composed of capturing light reflections
- For morphology and planing treatment



Deep Learning

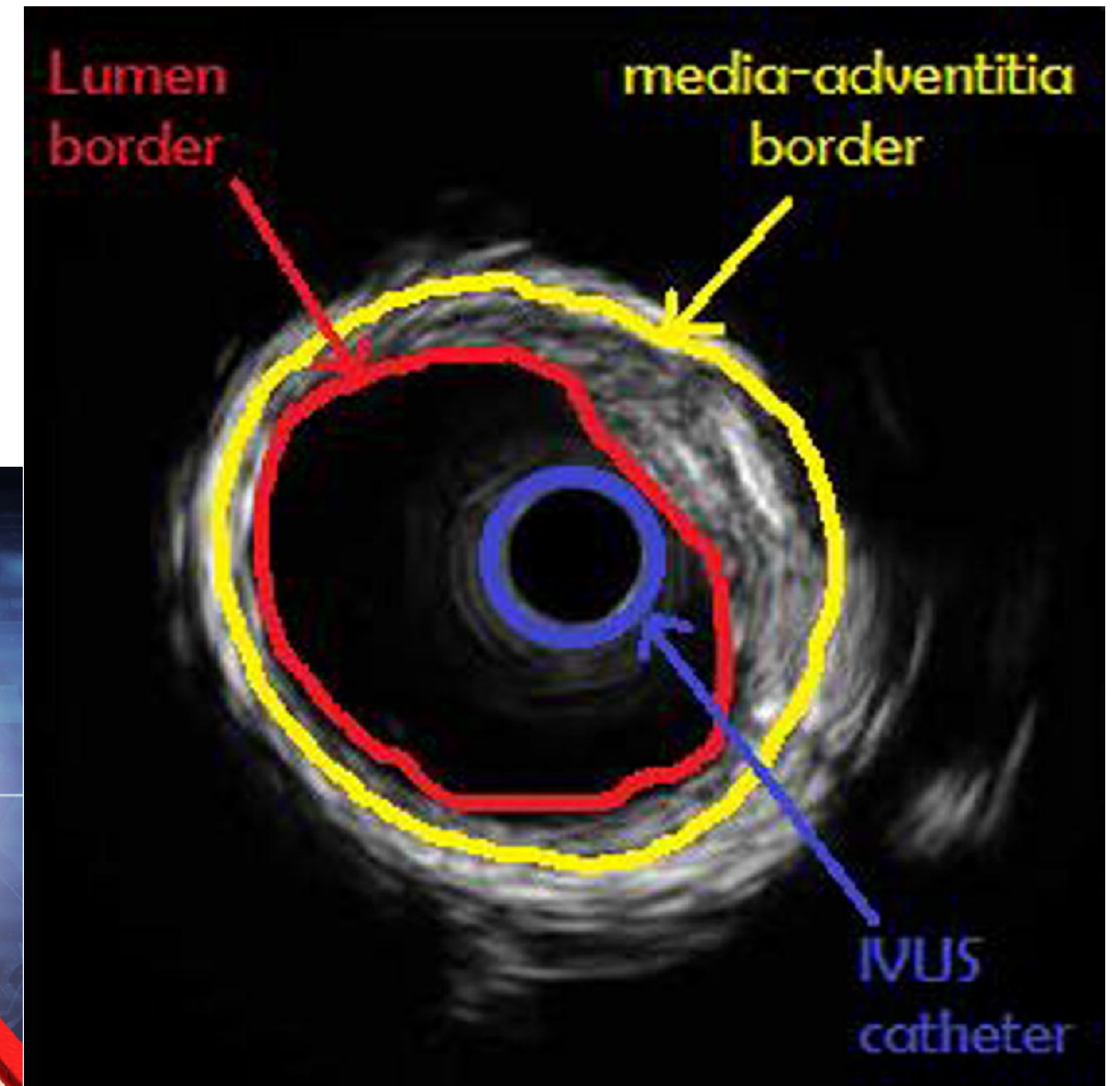
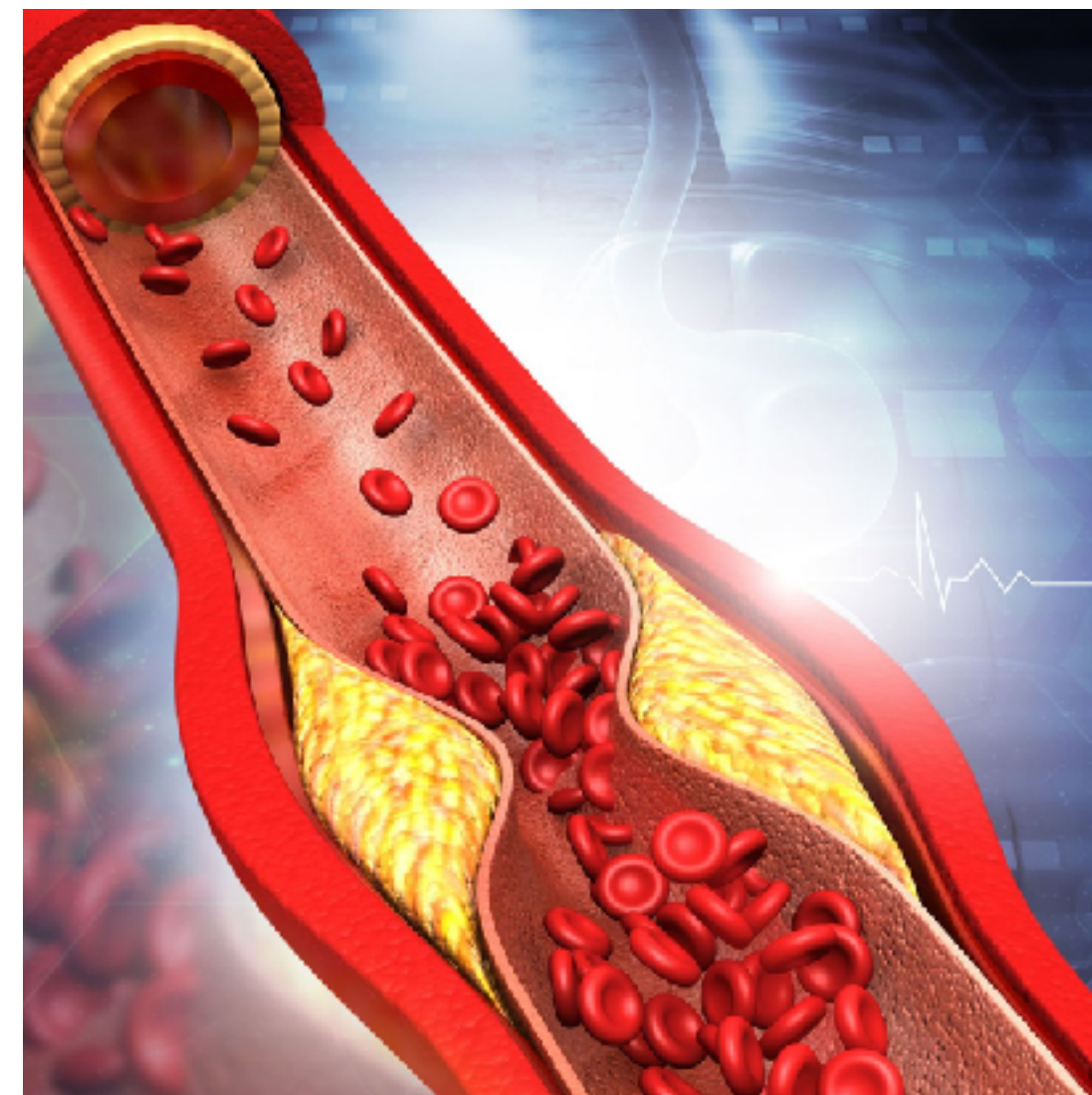


- Neural network
- Determines Predictions
- Analogy to biological brains
- Learning Process with Data and Weights



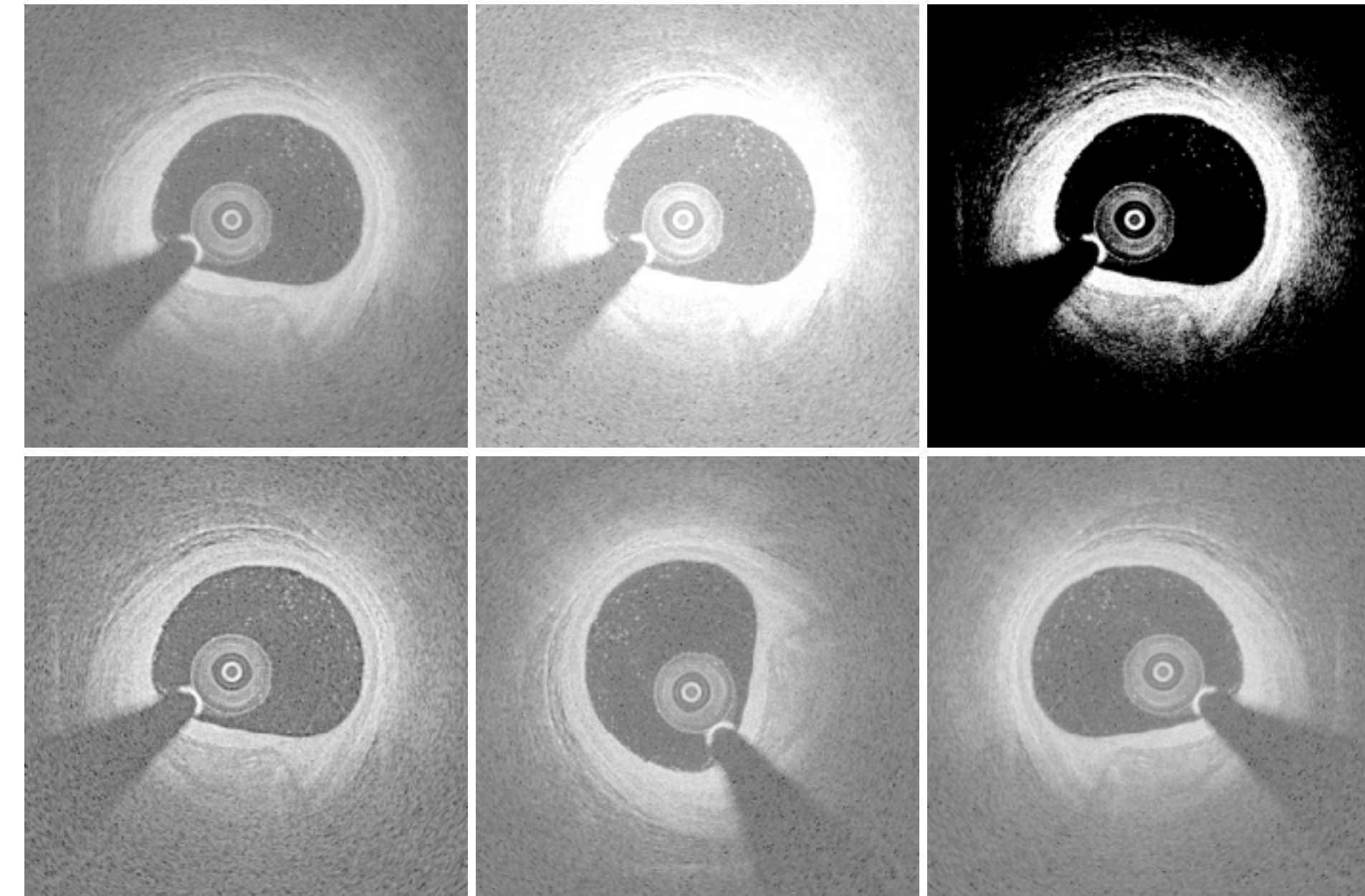
Deep Learning in IVOCT

- Plaque or no Plaque?
- Automatic Prediction



Data Augmentation and its Purpose

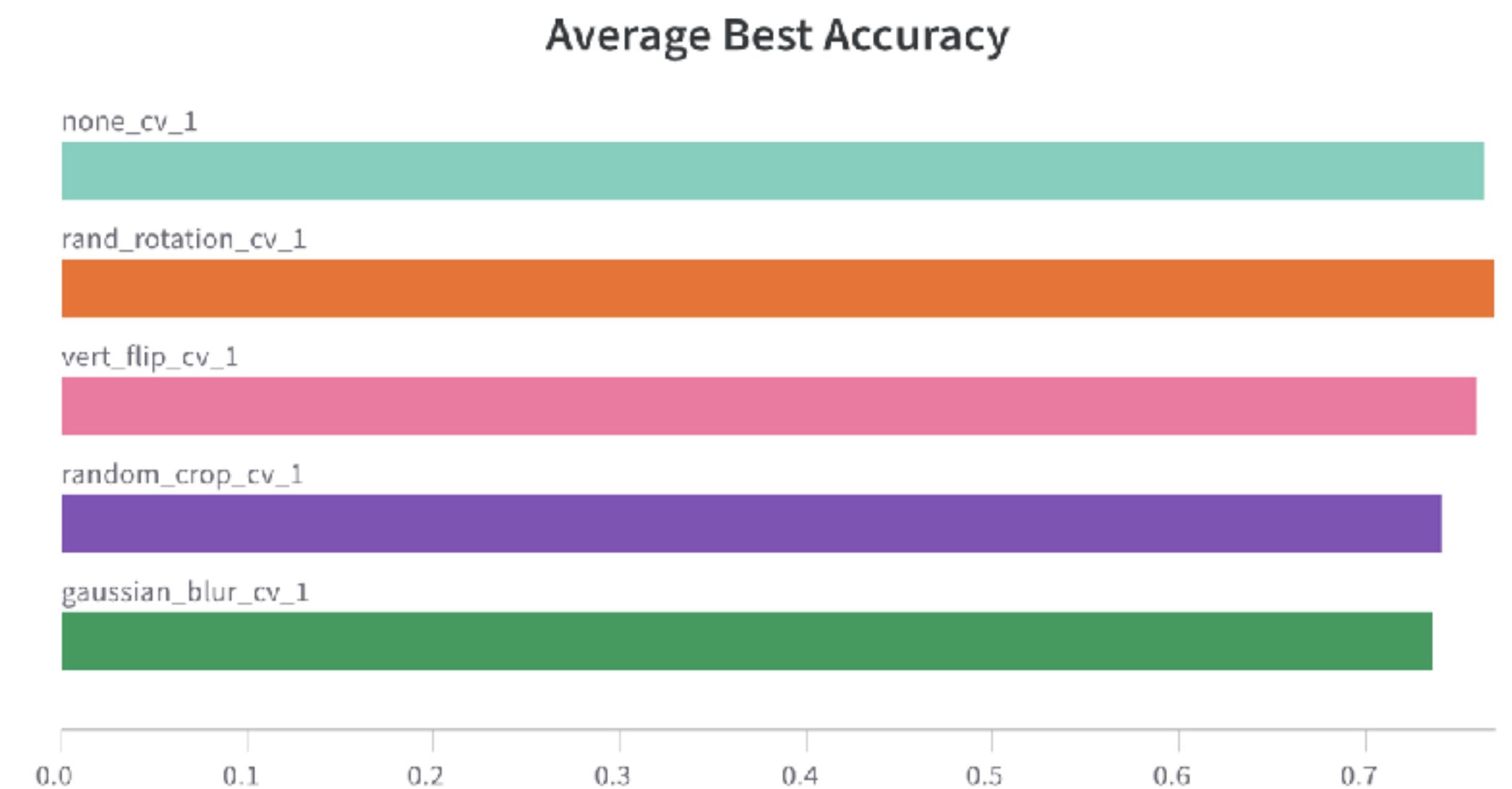
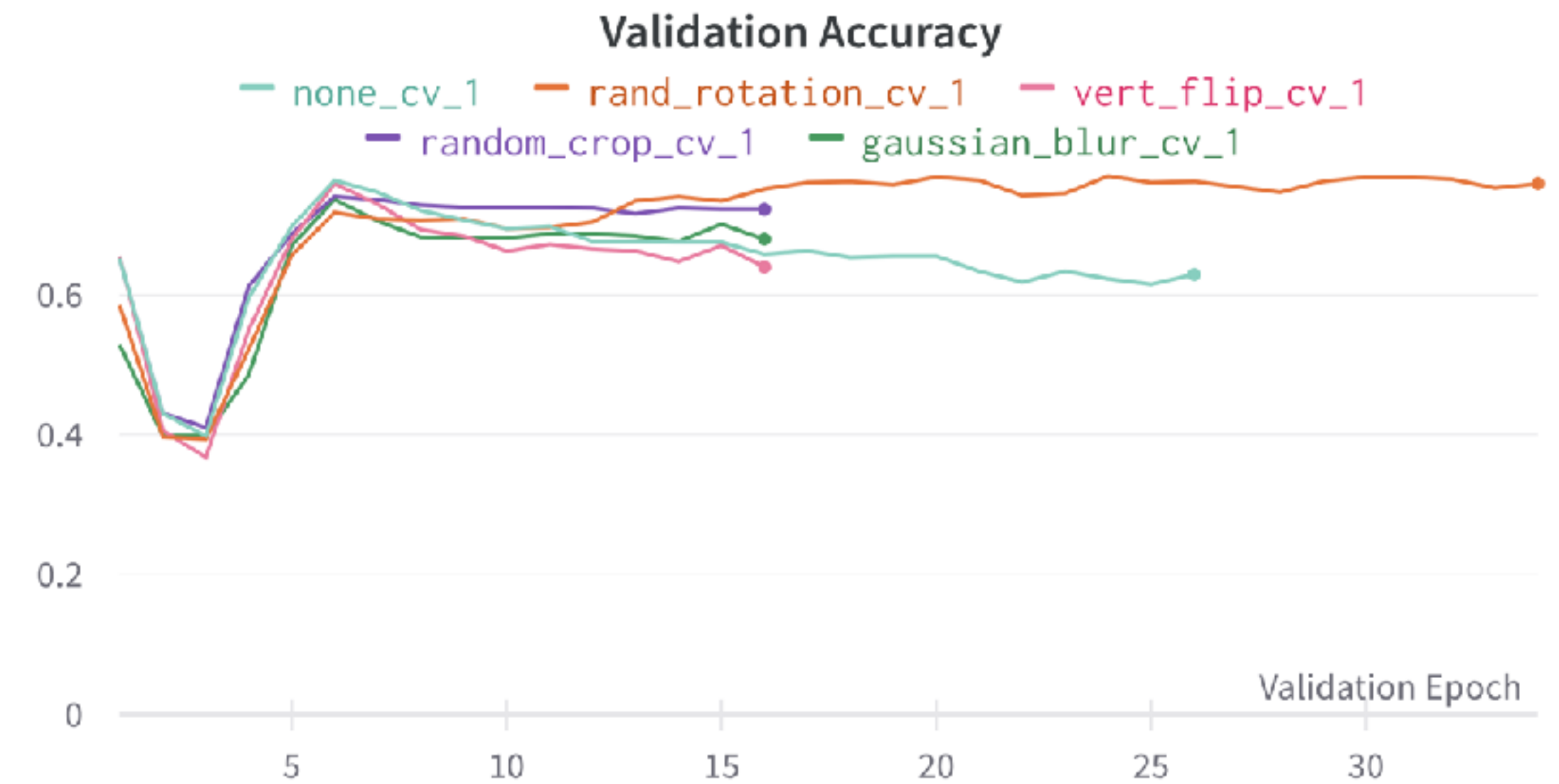
- increase the amount of data
- adding modified copies
- reduce overfitting
- increase performance and resilience



Topic of Bachelor Thesis



- Impact of different data augmentation techniques
- Metrics as Measurement
- Proposal



Preliminary Results

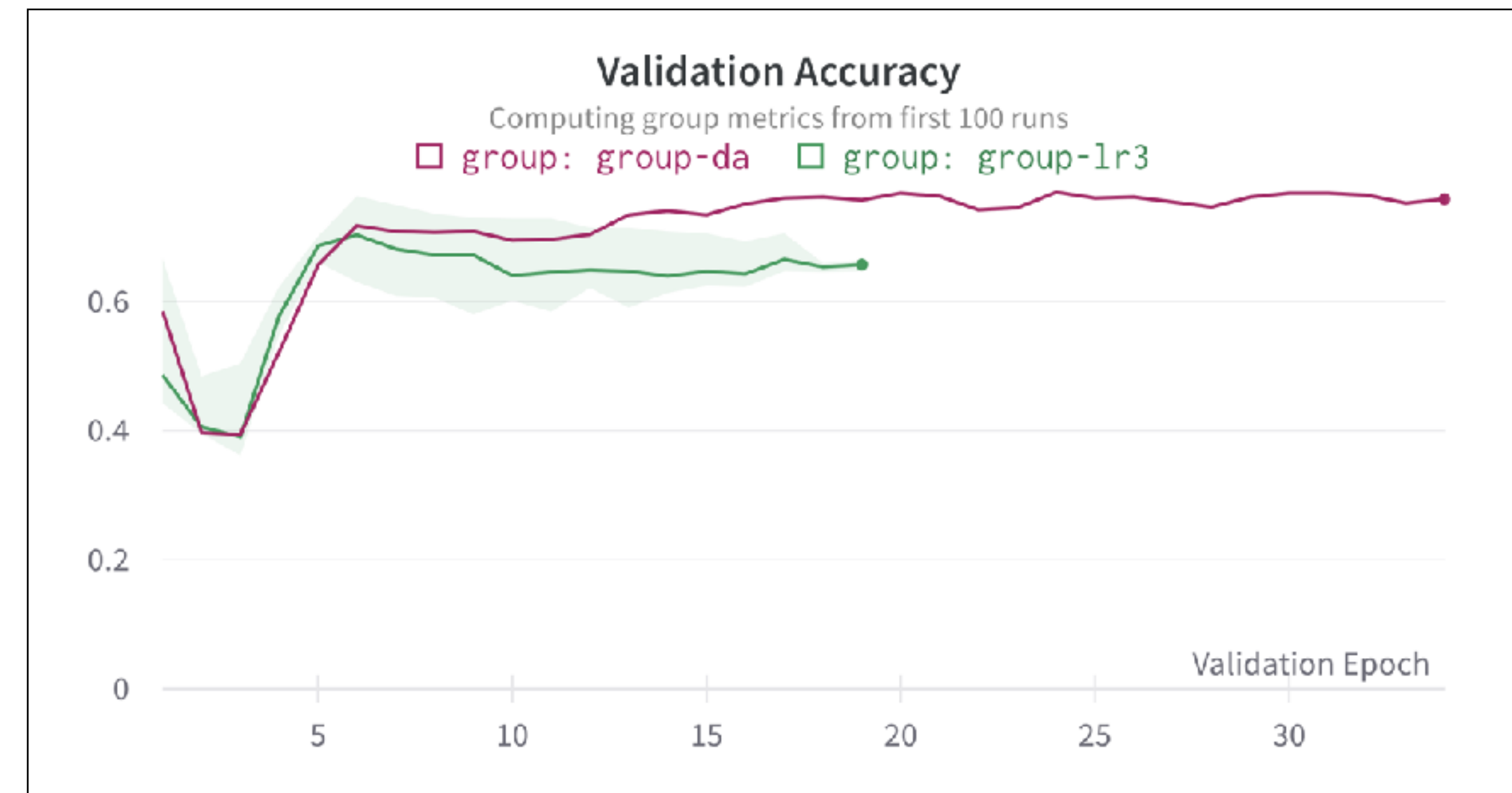


Implement pipeline
for training

Testing for best
learning rates, batch
size, etc.

Testing performance
for first DA techniques

```
src > train_and_test.py > train_and_eval
> Logger
mean_loss_sum += checkpoint.eval_valid.mean_l
metrics_average = [m / config['num_cv'] for m in
mean_loss_average = mean_loss_sum / config['num_c
Logger.printer('Testing Metrics Average Best:', c
Wandb.init(0, checkpoint.wandb_id, config)
Wandb.wandb_log(mean_loss_average, metrics_averag
::
print('Averages already logged in file:', file_log_te
it('')
if __name__ == '__main__':
    parser = argparse.ArgumentParser(description='IDDATDLOCT')
    parser.add_argument('-cfg', '--config', default=None, type=
    parser.add_argument('-gpu', '--gpus', default='0', type=str
    parser.add_argument('-wb', '--wandb', default=None, type=st
    parser.add_argument('-ntt', '--no_trainandtest', dest='trai
    parser.add_argument('-smp', '--show_samples', dest='show_sa
    parser.add_argument('-ycf', '--overwrite_configurations', d
```



Further Steps



Implement more DA Techniques, e.g.:
Elastic transforms, imitation of
artefacts

Compare results of
IVOCT images to those
of other datasets

Try GAN's?

Metric statistics and
analysis for effect of:
techniques, their
combination

Implement Own DA
Techniques



References



- https://en.wikipedia.org/wiki/Intracoronary_optical_coherence_tomography
- <https://www.zentrum-der-gesundheit.de/krankheiten/herz-kreislauf-erkrankungen/arteriosklerose-uebersicht/arteriosklerose>
- <https://towardsdatascience.com/its-deep-learning-times-a-new-frontier-of-data-a1e9ef9fe9a8>
- <https://www.sciencedirect.com/science/article/pii/S1110016817301448>