**Assignment4 - Facial Manipulation Detection**

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**Question 1:** Done.

**Question 2:** Graphical user interface, application

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**Question 3:** Done.

**Question 4:** Done.

**Question 5:** Done.

**Question 6:**

אכן המידע המתקבל מן הjson הגיוני, ניתן ליראות כיצד מדד הaccuracy עולה מepoch לepoch מ49% בהתחלה ל 78% בסוף (עבור הvalidation accuracy) ומאידך הloss יורד מ0.00613 ל0.00359 בסוף (עבור הvalidation loss) כלומר כמעט נחתך בחצי. (כמובן שגם בשאר ערכי הaccuracy והloss ישנה ירידה ערכי הvalidation נבחרו כדוגמה)

**Question 7:**

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**Question 8:**

The highest validation accuracy we got was 0.804 (corresponding to the 4th epoch) and the corresponding test accuracy is 0.757

**Question 9:**

In the test dataset there are 700 fake images and 1400 real images. But we constructed the length of the DB to be the min length of the real/fake DB so it reflects a DB that is equal in size.

**Question 10:**

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**Question 11:**

The reason the graphs show complexly different results is because they show the tradeoff between the false negative results to the true positive results on top of that, as we can we get a much more linear result than the ROC graph

**Question 12:**

Done.

**Question 13:**

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**Question 14:**

The highest validation accuracy is 0.536 and the corresponding test accuracy is 0.515

**Question 15:**

The proportion between the real images and fake images is 551(real)/552(fake)

But the way we implemented the DB is tat we have equal number of samples per DB

**Question 16:**

We got a 50 50 classifier which basically means that our labeling is equal to a coin flip.

Or in other words the synthetic dataset managed to completely fool our SimplNet

**Question 17:**

We can clearly see that the Fake Dataset doesn’t look like real people images while the Synthetic Dataset looks a lot like real people images

**Question 18:**

Xception is pre-trained on the ImageNet Dataset, which is consist of 14197122 annotated images we can get all the papers related to ImageNet on [this link](https://paperswithcode.com/dataset/imagenet)

**Question 19:**

The basic building blocks of Xception are :

Graphical user interface, table

Description automatically generatedtaken from Xception original [paper](https://openaccess.thecvf.com/content_cvpr_2017/papers/Chollet_Xception_Deep_Learning_CVPR_2017_paper.pdf)

**Question 20:**

Same as Q18

**Question 21:**

The input feature dimensions for the final classification block ”fc” is 2048 dimensional vectors taken from Xception original [paper](https://openaccess.thecvf.com/content_cvpr_2017/papers/Chollet_Xception_Deep_Learning_CVPR_2017_paper.pdf)

**Question 22:**

The number of parameters the network holds by default is 22855952 according to the Xception original [paper](https://openaccess.thecvf.com/content_cvpr_2017/papers/Chollet_Xception_Deep_Learning_CVPR_2017_paper.pdf) and from the function utils.get\_nof\_params we get the same number of parameters 22855952.

**Question 23:**

Done. And changed the model to save the pretrained model weights and only trained the FC layer.

**Question 24:**

We have added 23128786- 22855952 = 208927834 to the Xception parameters count

**Question 25:**

Done.

**Question 26:**

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**Question 27:**

The highest validation accuracy is 0.675 and the corresponding test accuracy is 0.709

**Question 28:**

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**Question 29:**

Image-Specific Class Saliency Visualization is a visualization of the convolutional layers that corresponds to each specific label\classification in the procced imaged. basically, since the convolutional layers act as image filters the Saliency Visualization visualize for us humans the relevant part in the picture that the model is “looking” at in order to classify the image.

**Question 30:**

Grad-CAMs is a way to isolate the saliency of each object in the photo in order to see

each labels attention focus which leads the CNN to detrains its label

**Question 31:**

Done.

**Question 32:**

The figure we get after running the command python saliency map.py -m XceptionBased.cpp checkpoints/synthetic dataset XceptionBased Adam.pt -d synthetic dataset is:

A picture containing chart

Description automatically generated

Chart

Description automatically generated with medium confidence

The figure we get after running the command python saliency map.py -m SimpleNet -cpp checkpoints/fakes dataset SimpleNet Adam.pt -d fakes dataset is:

A picture containing graphical user interface

Description automatically generated

Chart

Description automatically generated

**Question 33:**

Done.

**Question 34:**

Done.

**Question 35:**

The figure we got after running

python grad\_cam\_analysis.py -m SimpleNet -cpp checkpoints/fakes\_dataset\_SimpleNet\_Adam.pt -d fakes\_dataset is:

Surface chart

Description automatically generated with medium confidenceGraphical user interface, application

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The figure we got after running

python grad\_cam\_analysis.py -m SimpleNet -cpp checkpoints/synthetic\_dataset\_SimpleNet\_Adam.pt -d synthetic\_dataset is:

Graphical user interface, application

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