

# Deep Learning course

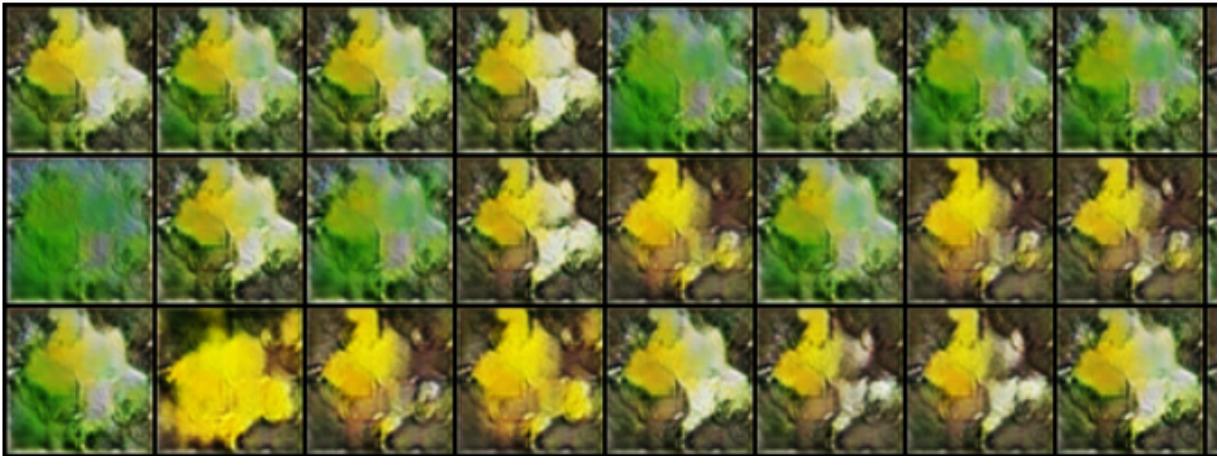
The report, homework 3, part 2

Skoltech, 2021

## Task 1. (all metrics and losses graphs are in the last page)

Compare the performance of two evaluated GAN losses both qualitatively (comparing generated images side-by-side) and quantitatively (via metrics). What objective leads to the best results?

<i>non_saturating</i>

<i>hinge</i>


**Qualitatively:** for me it seems that non\_saturating loss has shown better image quality and higher variety.

**Quantitatively:** FID for non\_saturating loss much lower (177.19) than for hinge loss (237.70) and IS significantly higher (3.07) than for hinge loss (2.04). Therefore non\_saturating loss produces higher quality images with higher variety.

## Task 2.

*Compare (qualitatively and quantitatively) class conditional and non-class conditional models. Which one has better quality and metrics? Reflect and propose an explanation, why is that so?*

---

### **class conditional**

#### **hinge\_class-cond**



#### **Hinge\_class-cond-trunc**



***non-class conditional***

**hinge**



**non\_saturating**



**Qualitatively:** class conditional models generate significantly better quality images.

**Quantitatively:** class conditional models have lower FID (better quality) and higher IS (higher variety).

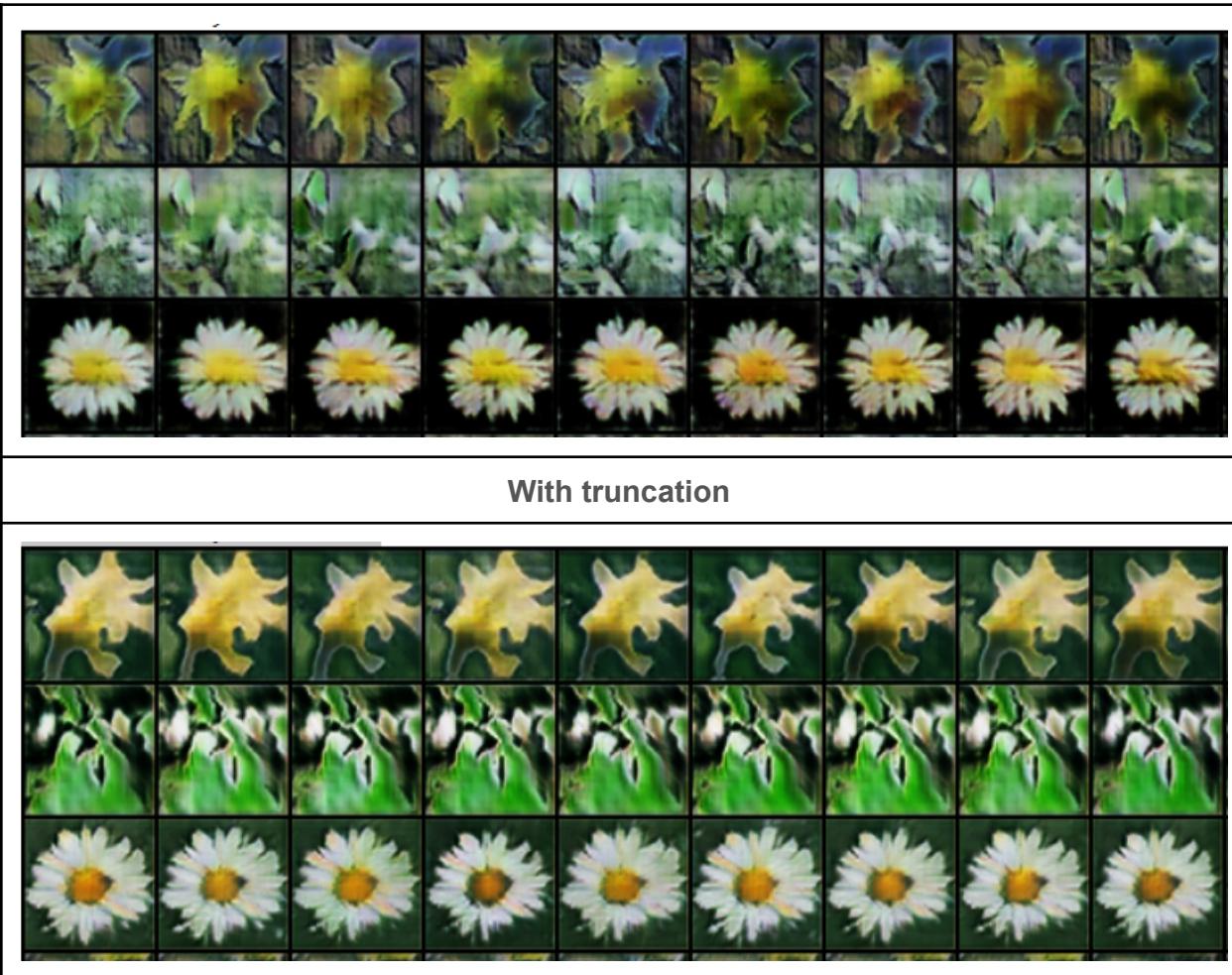
### Task 3.

*Do the same comparison with and without truncation trick. Explain, what changes when this trick is applied, how it affects the results and their quality? Try to explain, why exactly truncation trick works this way?*

“Truncation trick” used during image generation results in an improvement in generated image quality.

The truncation trick uses a different distribution for the latent space of the generator during training and during image synthesis. Truncating by resampling the values with magnitude above a chosen threshold leads to improvement in individual sample quality at the cost of reduction in total sample variety.

Without truncation

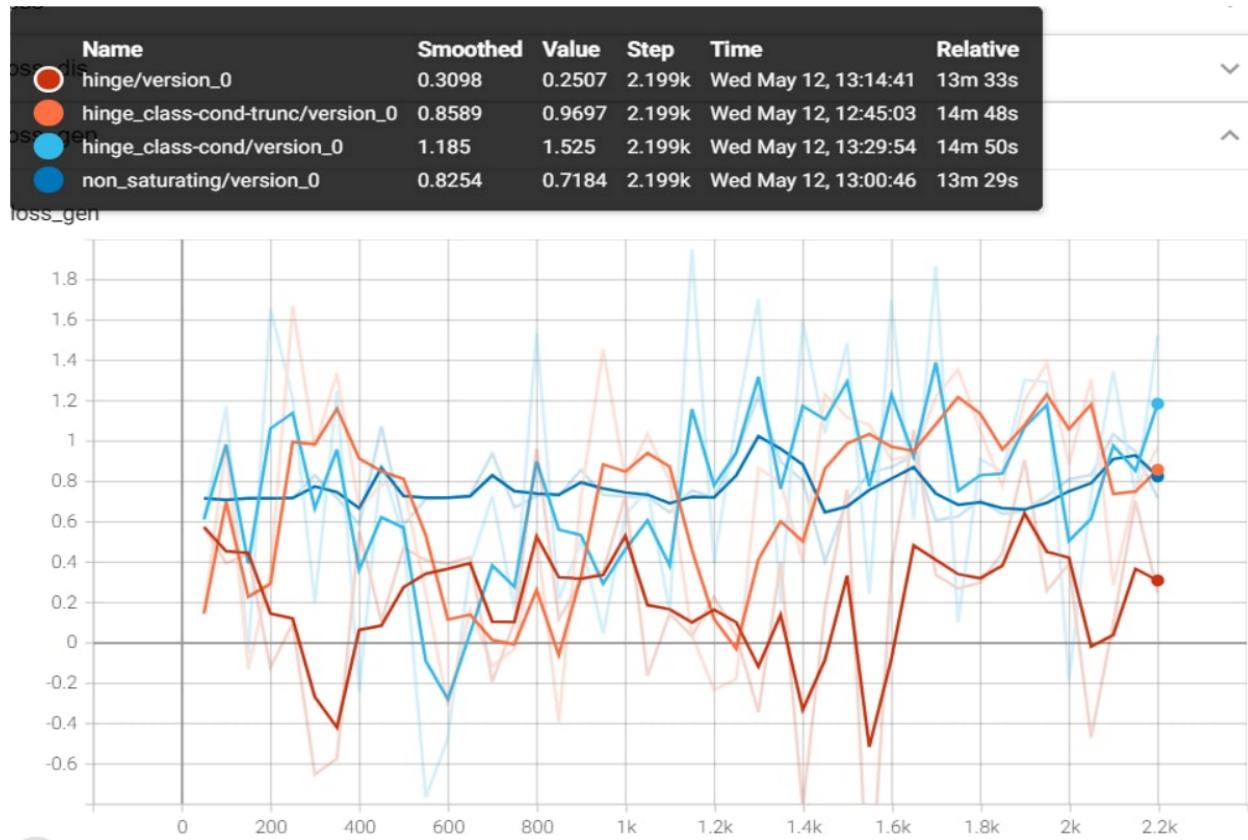


**Qualitatively:** Image quality is really significantly better when using truncation trick and lower sample variety.

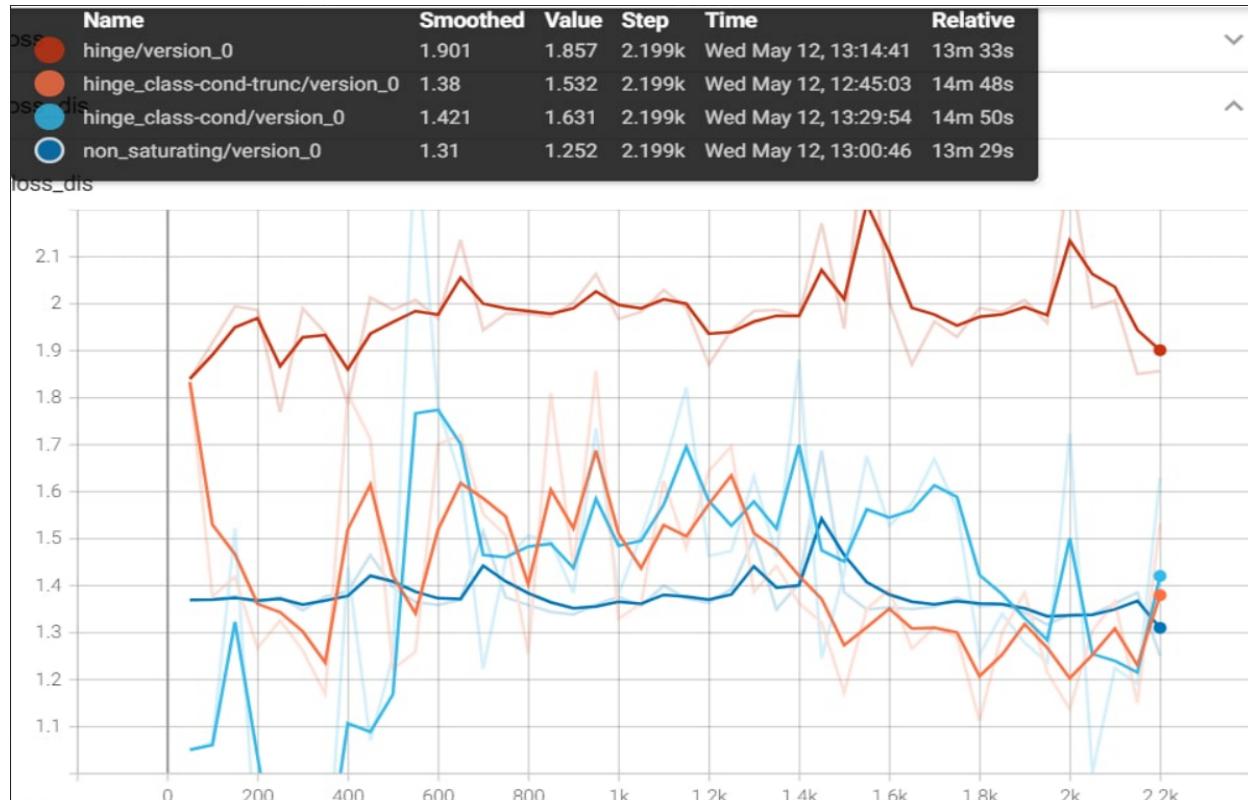
**Quantitatively:** FID with truncation trick (128.99) is a bit higher than without it (126.08) and SI is significantly lower with truncation trick (3.63) than without it (4.09).

## Metrics:

### Gen loss



### Dis loss



	<b>FID</b>	<b>IS</b>
<b>Non_saturating</b>	<b>177.19</b>	<b>3.07</b>
<b>Hinge</b>	<b>237.70</b>	<b>2.04</b>
<b>Hinge_class-cond</b>	<b>128.99</b>	<b>4.09</b>
<b>Hinge_class-cond-trunc</b>	<b>126.08</b>	<b>3.63</b>