

Deep Learning - MAI

Autonomous lab - CNNs

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The rules

- ❖ **Time:** 3 weeks to delivery (start now!)
- ❖ Done in **couples** (if possible)
- ❖ **Evaluation:** 30 minute interview (Why did you do 'X'? Why not 'Y'?)
 - Individual evaluation, non-transferable questions
 - Bring the material you used to take your decisions to support your work (loss/acc plots, histograms, confusion matrices, etc.)

The task



- ❖ **MAMe**: Museum Art Medium dataset
 - High-resolution, variable shape images (*LR&FS* 256x256 available)
 - 29 classes of materials and techniques
 - Train: 700 samples/class, Validation: 150 samples/class, Test: varies
- ❖ Get the highest possible accuracy
- ❖ Run the test set once, the last thing before the interview



The links

❖ **MAMe**: Museum Art Medium dataset

- *High-resolution, variable shape images:*

https://storage.hpai.bsc.es/mame-dataset/MAMe_data.zip

- *Labels:*

https://storage.hpai.bsc.es/mame-dataset/MAMe_metadata.zip

- *Low resolution, fixed shape:*

https://storage.hpai.bsc.es/mame-dataset/MAMe_data_256.zip

The tip

- ❖ Focus on the low resolution version
- ❖ Only if you find you reached the limit... (~80%)
 - Consider using higher resolutions (training time will go UP!)
 - Consider avoiding deformation
- ❖ Try your own design using the methods introduced in theory

The DO NOTs

- ❖ Do not use pre-trained models
- ❖ Do not replicate well-known architectures
- ❖ Do not use external data
- ❖ Do not share code
- ❖ Do not wait until the last week

The next steps

1. Explore the data. Visualize it. See its distributions
 2. Prepare the data pre-processing pipeline. This is the backbone.
 3. Start with a small design. Underfit.
 4. Grow. Overfit.
 5. Regularize and reduce. Fit.
- Thoroughly document old experiments, and the evidence you use to decide the new ones.

Take away

- ❖ The goal **is not** to produce the best possible model for the task
- ❖ The goal is to prove that you can
 - Decide coherently **which techniques** are most likely to maximize performance (easy)
 - Design and conduct **conclusive experiments** (medium)
 - **Diagnose the situation** of a training procedure (hardest)

name and # of experiment

1-Previous observed state. List here the main outcomes from one or more previous experiments that leads to this one (list their #)

2-Current hypothesis. Based on 1, which hypothesis you manage regarding the observed state

3-Experimental setup & details. Describe which experiments you intend to conduct to validate 2 in detail

4-Experimental outcomes List the outcomes of the experiment. Include support visuals in separate slides

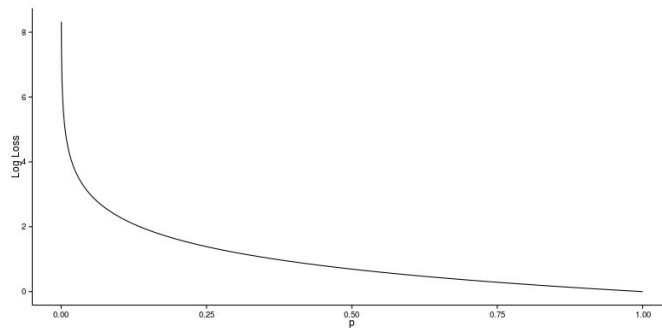
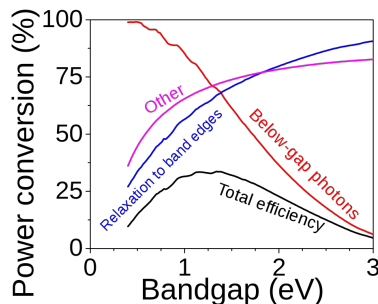
5-Observations Final observations on this experiment considering 1, 2, 3 and 4

#17: Further regularizing #16

#16 shows an **overfitting** of the model

we test **dropout rates** 0,2 to 0.5 at increments of 0.1 **between the two FC**

Since the **model complexity is already adjusted** to the problem (see #12), and **basic regularization has already been added** with limited results (see #14), lets try **more aggressive regularization**. Adding **dropout** on the fully connected layers may reduce OF significantly



Results show the **best rate is 0.3**, based on val acc/loss. Overfitting is reduced, but **training becomes much slower** as the **network manages to converge**. Still **some overfitting left**

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