Deep Learning - MAI

Autonomous lab - CNNs

Dario Garcia Gasulla
dario.garcia@bsc.es

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

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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

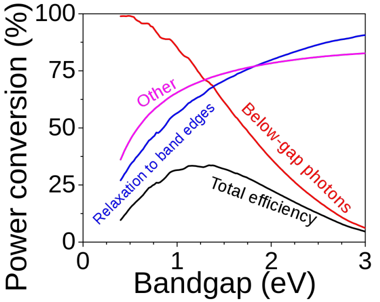
5-Observations Final observations on this experiment considering 1, 2, 3 and 4

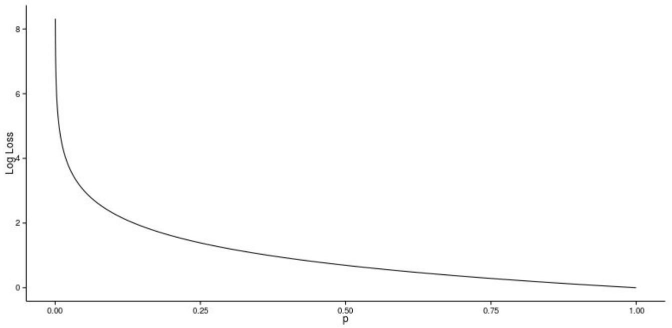
#17: Further regularizing #16

#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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