school of ai Algiers

READING SESSION #1

ImageNet Classification with Deep Convolutional Neural Networks

Krizhevsky, A., Sutskever, I., & Hinton, G. E. (2012).

Paper objectives & achievements

- MLPs overfit on large dataset
- Small CNN used back then doesn't give good results

Problems

- **AlexNet** is a **LARGE** CNN (5 Conv layers + 3 fully connected)
- But how can we train this big model ?
- The paper proposes a series of methods to alleviate model training time.

Solutions

Methodology

Architectural characteristics

- **ReLu** : To avoid saturating neurons (values between a specific range, when using sigmoid). This paper uses max(0, x) as an activation function. This accelerates the training process
- **Training on multiple GPUs:** divide the model into two sub models
- **Local Response Normalization:** normalize along the depth vectors.
- **Overlapping pooling:** When the stride is smaller than the kernel size.

Overfitting Prevention

- **Data augmentation:** with simple transformations (such as rotation) + PCA
- **Dropout**: a regularization technique which consist on not adjusting some weights during each iteration of the training

Conclusions & Links

- **Github repo of the session:** https://github.com/IHlaadj/reading_sessions/tree/main/AlexNet
- A detailed walkthrough of AlexNet
- Podcast with Ilya Sutskever
- To normalize or not ?