Poster 128#

On The Power of Curriculum Learning in Deep Neural Networks

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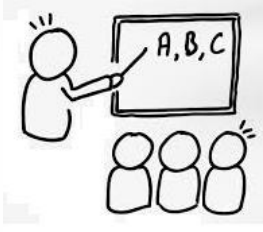
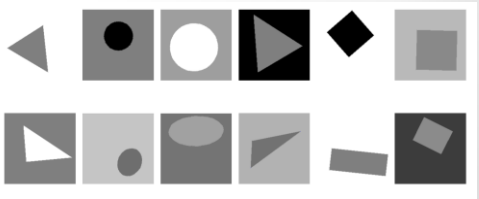
Long beach

Background – curriculum learning

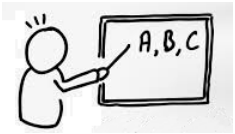
- Teaching is a hard problem.
- Curriculum introduces structure: simple concepts are learned before harder ones.
- Complex concepts are usually based on a composition of easier concepts.
- Wildly used in human training.
- Beneficial in several machine learning paradigms.



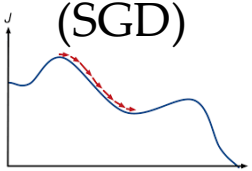


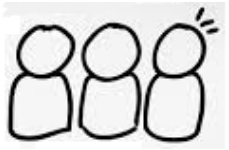
Curriculum in deep learning

- Deep learning: teach a neural network classification task.

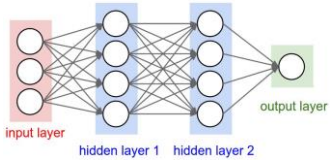


Teacher:
Learning algorithm
(SGD)





Student:
Neural network



- Traditionally, data is presented to the network at random.
- Idea: present data according to some curriculum.

Scoring functions

- Classification task on visual data.
- Determine the hardness of each image.

Which image is harder to classify?

Scoring functions

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Scoring functions

- Classification task on visual data.
- Determine the hardness of each image.

Which image is harder to classify?

Pacing functions

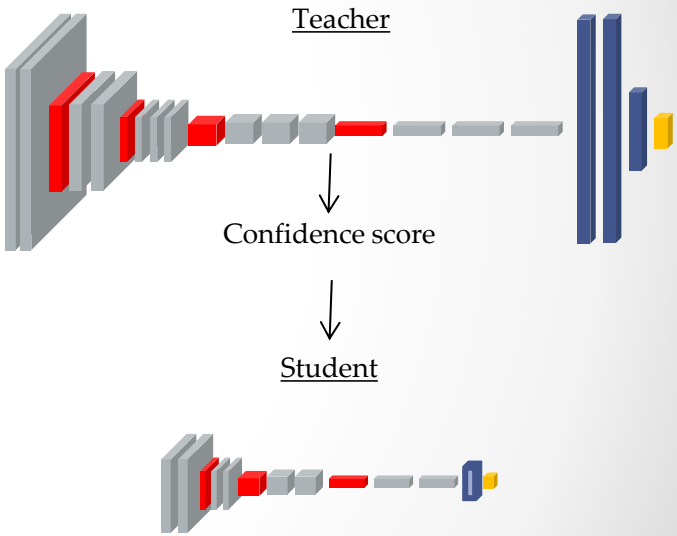
- Pacing – when to present new concepts?

Too slow:
boredom

Too fast:
overwhelmed

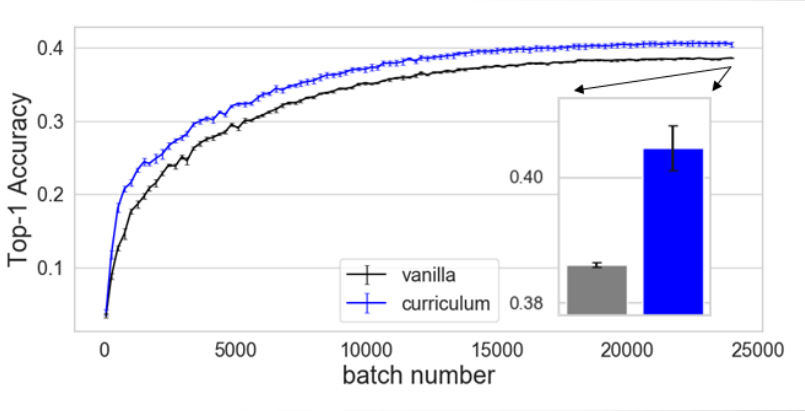
Curriculum by transfer

- Transfer learning from Inception trained on ImageNet.
- Score by the confidence of some linear classifier on the feature space.



Results and analysis

- Curriculum speeds up learning and leads to better solutions.
  - Accuracy is higher all along the learning curve.
- Theoretical and empirical analysis:
  - How curriculum learning affects the objective function of neural networks?



For more details, come visit my poster!

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