Tips and Tricks

By Sam Witteveen

5 Tips & Tricks

- Be Methodical & Document Everything
- Get a GPU
- Keras Callbacks
- Precomputing
- Pseudo Labelling

1. Be Methodical & Document Everything

- You usually won't get right first time
- Document experiments
  - Architectures - Jupyter Notebooks
    - Preprocs
    - Settings
    - Results
- Start with small sample datasets

2. Get a GPU

- High end is 30-50x++ faster
- Low end is 15-30x faster
- 1min per epoch on GPU can be 30min + on CPU
- 50 epochs - 50min vs 1day on CPU
- Google Cloud ML - datalabs

3. Keras Callbacks

- Triggering functions during training
- Can be triggered on Epoc or Batch
- Used to make updates during training
- Used to track data for showing results at the end

Key Callbacks

- History
- TensorBoard
- EarlyStopping
- Learning Rate Scheduling
- Dealing with Plateaus

Notebook

PreCompute

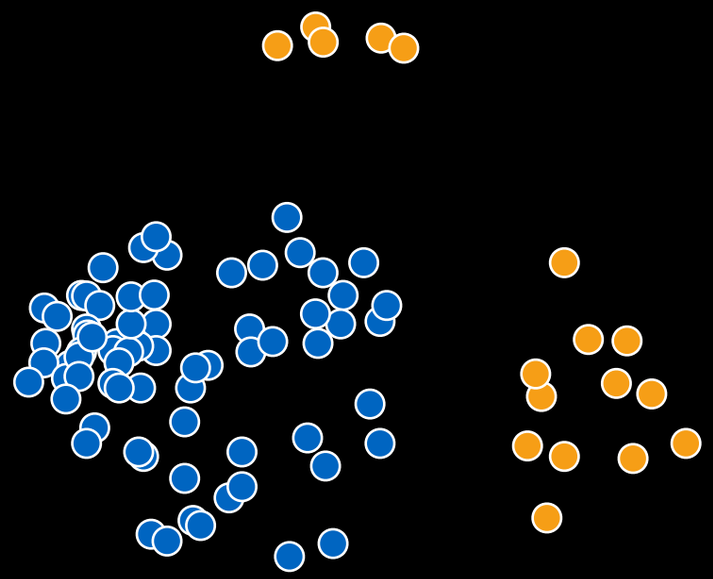
- Precompute any part of the network that won't change
- PreProcessing inputs
  - Center crop
  - Size change
  - Data Augmentation
  - Bcolz array
- Ideal for TransferLearning where you are adding just layers at the end
- Enables much quicker training time

What is Pseudo Labelling

- Semi Supervised learning
- Making use of all your data
- Even non labeled data
- Using your Test data for prediction

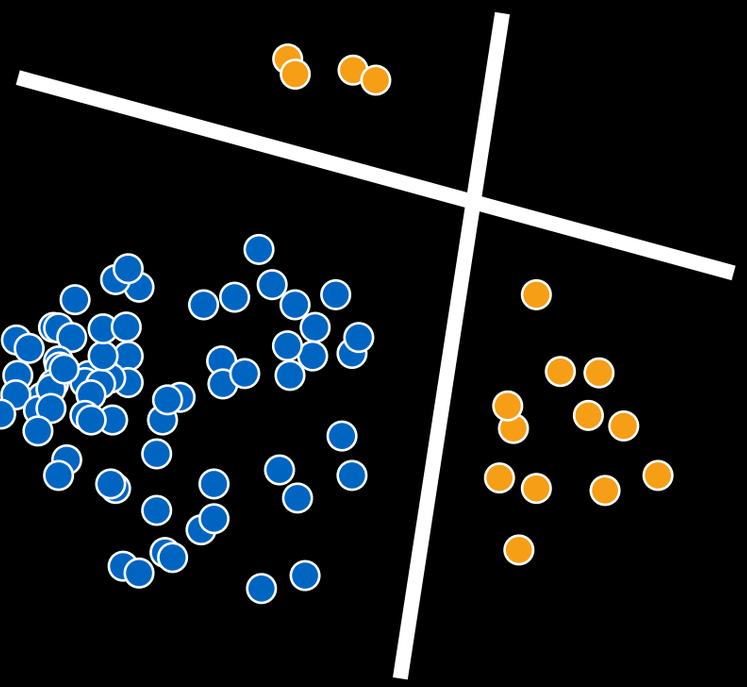
What is Pseudo Labelling

Train set

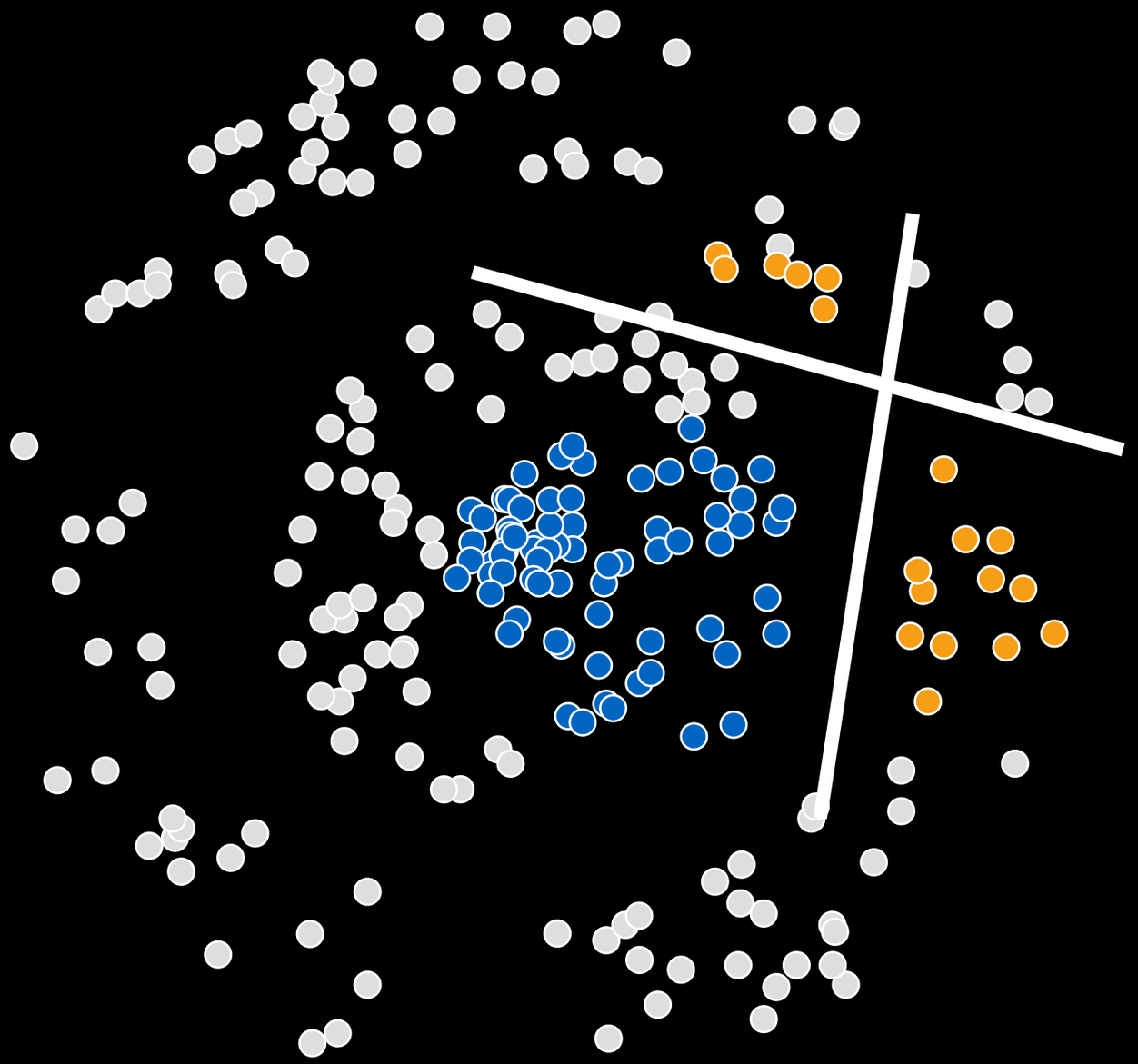


What is Pseudo Labelling

Train set

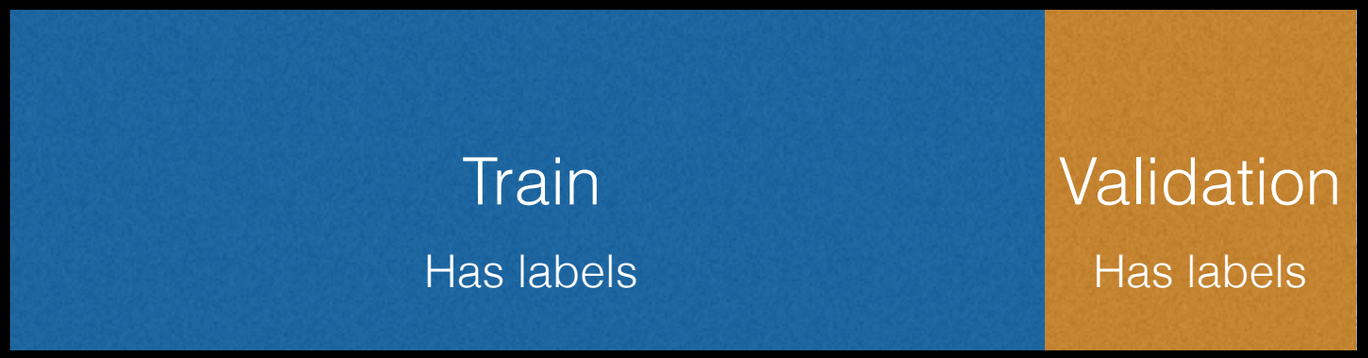


What is Pseudo Labelling



Train + Test set

Data Sets



Normal Training

Train on this

Train

Has labels

Validate on this

Validation

Has labels

Predict on this

Test

No labels

Pseudo Training

Train on this

Train

Has labels

Test

Predicted labels

Validate on this

Validation

Has labels

Predict Final on this

Test

No labels

Batches

Make batches that have a set mix between the 2 datasets

65-75%

Train

Has labels

25-35%

Test

Predicted labels

Kaggle Results

1st Entry - Basic VGG19-Image net

76	—	Alvysinger	0.98666	21	24d
77	new	SamWitteveen	0.98665	1	~10s

Your Best Entry ↑

Your submission scored 0.98665your previous score of . Great job! Tweet this!

2nd Entry - Basic VGG19-Image net + Pseudo Labels

54	▾ 1	cueb statistics	0.98887	12	17d
55	▲ 22	SamWitteveen	0.98885	2	now
56	▾ 1	YingxiYu	0.98863	7	1mo

Your Best Entry ↑

Your submission scored 0.98885, which is an improvement of your previous score of 0.98665. Great job! Tweet this!

Papers

Distilling the Knowledge in a Neural Network

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almost any machine learning
ame data and then to average
ions using a whole ensemble
onally expensive to allow de-

Pseudo-Label : The Simple and Efficient Semi-Supervised Learning Method for Deep Neural Networks

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Abstract

We propose the simple and efficient method of semi-supervised learning for deep neural networks. Basically, the proposed network is trained in a supervised fashion with labeled and unlabeled data simultaneously. For unlabeled data, *Pseudo-Labels*, just picking up the class which has the maximum predicted probability, are used as if they were true labels. This is in effect equivalent to *Entropy Regularization*. It favors a low-density separation between classes, a commonly assumed

and unsupervised tasks using same neural network simultaneously. In (Ranzato et al., 2008), the weights of each layer are trained by minimizing the combined loss function of an autoencoder and a classifier. In (Larochelle et al., 2008), *Discriminative Restricted Boltzmann Machines* model the joint distribution of an input vector and the target class. In (Weston et al., 2008), the weights of all layers are trained by minimizing the combined loss function of a global supervised task and a *Semi-Supervised Embedding* as a regularizer.

In this article we propose the simpler way of training

Conclusion

- Experiment
- Keep trying new things
- Document your experiments
- Come and give a talk about them here

The End

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https://github.com/samwit/