Week 2

Master Thesis 2020

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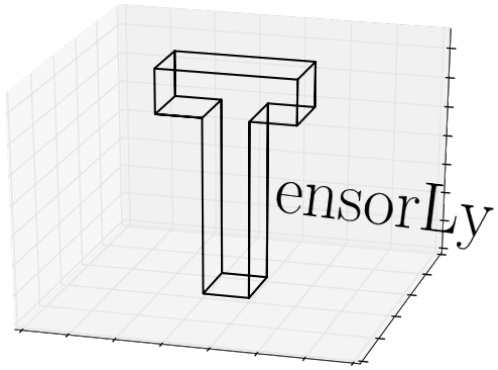
DTU Compute

10. september 2020

Outline

Getting to know everything

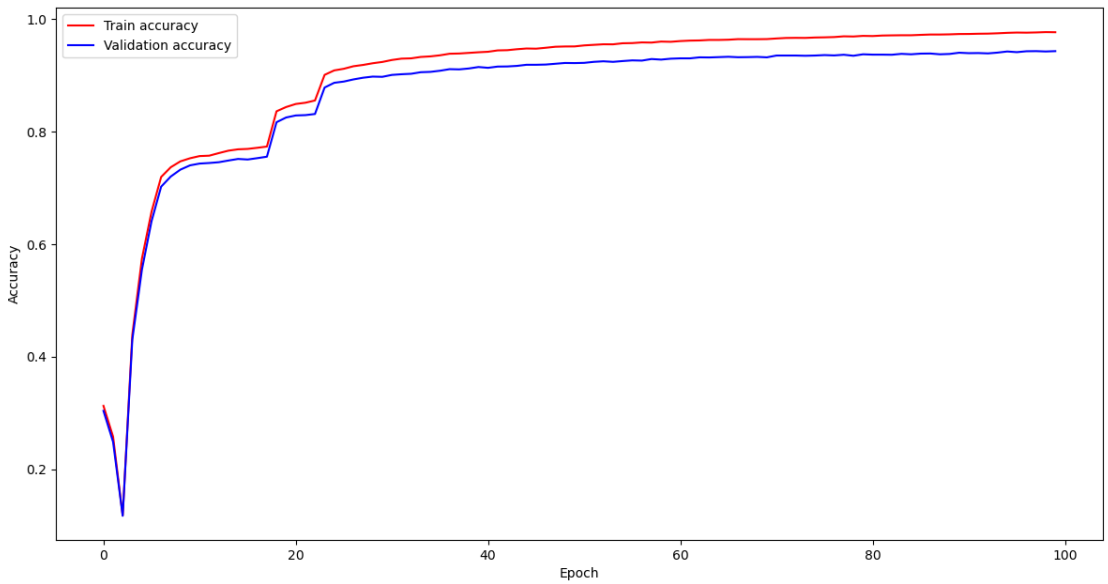


- CNNs in PyTorch
  - Backpropagation / autograd
  - Training / evaluating
  - Dropout, batchnorm, regularization, etc.
- Tensor Decomposition in TensorLy
  - Parafac / Tucker
  - (Tensor-Train / Block Term Decomposition)

Outline

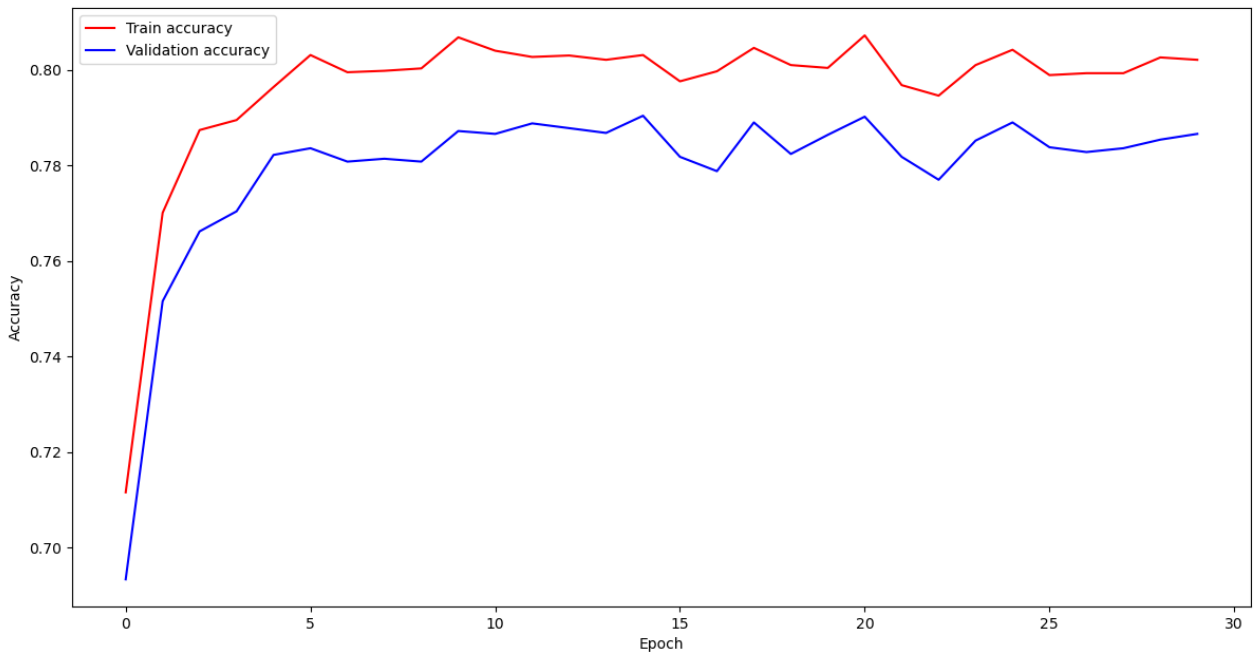
ANN with 2 hidden layers

- 2 hidden layers of each 512 neurons
- Dropout after each layer (p = 0.4)
- SGD optimizer with 0.01 learning rate and 0.9 momentum



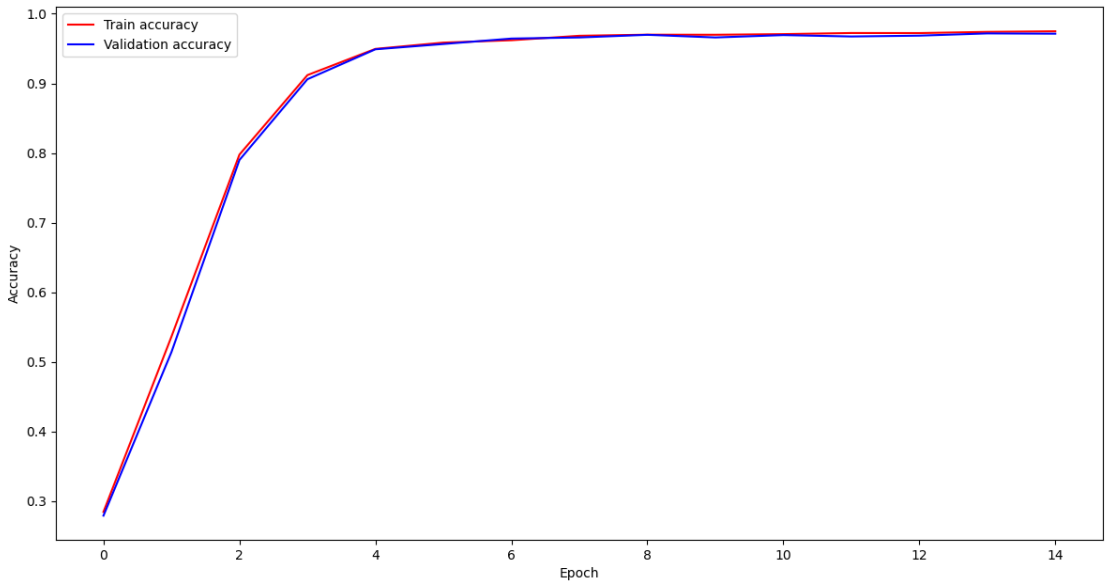
One convolutional layer

- 32 filters, 5 size, 1 stride, 2 padding
- Dense layer of 100 neurons
- Adam optimizer with 0.0001 learning rate and 0.1 weight decay
- 80.1 % testing accuracy



2 convolutional layers

- 2 convolutional layers of each 32 filters
- 2×2 max-pooling after each
- Bigger batch size of 1000 samples each
- Adam optimizer with 0.001 LR and 0.1 weight decay
- 97.1 % testing accuracy



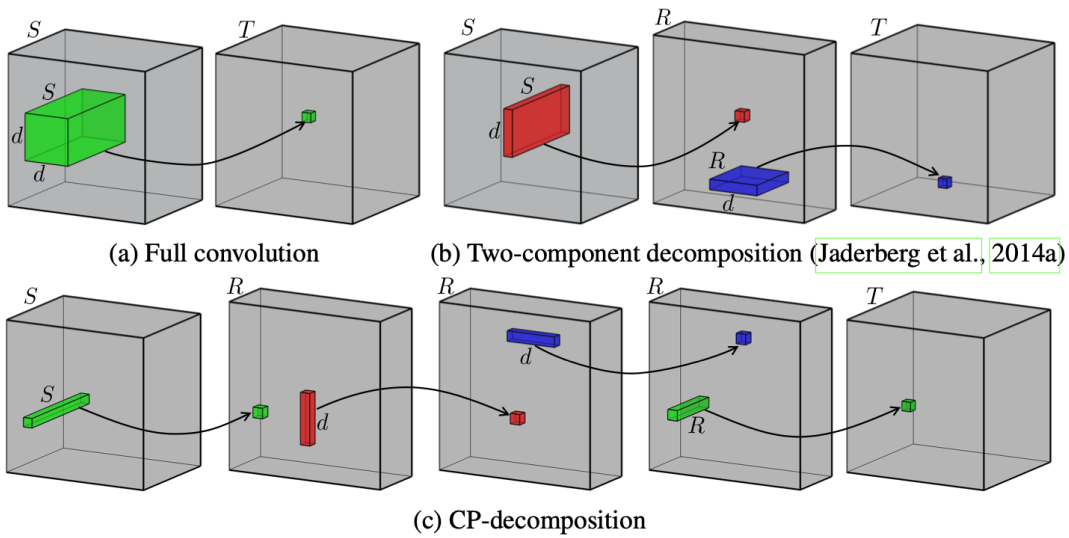
Outline

Tensorizing Neural Networks

- Folding a dense layer of weights into a tensor to decompose
  - Power of (wide) dense layers
- Using *TT-layer* (tensor-train)
  - Easy to do linear transformations
  - Deriving new formulas for back-propagation in these layers
  - Robust algorithms / immune to curse of dimensionality
- Compression up to 200.000 times in a dense layer and 7 times in a whole network.

Speeding-UP CNNs using Fine-Tuned CP-decomposition

- Looking at the general convolutional kernel in 4D ($X \times Y \times S \times T$)
- Generally decomposing using CP to find new way, smarter way of doing the convolutions



- Doing back-propagation on entire network
- Hard time on big CNNs
- Regularizing effect on the net improving overall accuracy

Outline

Project Plan Draft

Week	Start Data	Notes	Risk	Writing
1	31.aug.20	Project plan, initial models on MNIST, litterature study	1	
2	07.sep.20	Litterature study	1	Introduction
3	14.sep.20	Litterature study	1	
4	21.sep.20	Litterature study	1	Previous work
5	28.sep.20	Create and test improved model for MNIST	3	
6	05.okt.20	Create and test improved model for MNIST	3	
7	12.okt.20	Writing	3	Method and results for MNIST
8	19.okt.20	Find new data set and establish baseline / state-of-the-art	3	
9	26.okt.20	Develop and test model for new data set	5	
10	02.nov.20	Develop and test model for new data set	5	
11	09.nov.20	Develop and test model for new data set	5	
12	16.nov.20	Develop and test model for new data set	5	
13	23.nov.20	Develop and test model for new data set	5	
14	30.nov.20	Develop and test model for new data set	5	
15	07.dec.20	Develop and test model for new data set	5	
16	14.dec.20	Writing	2	
17	21.dec.20	Writing	2	Method for new data
18	28.dec.20	Writing	2	
19	04.jan.21	Writing	2	Results
20	11.jan.21	Writing	2	Discussion and future work
21	18.jan.21	Corrections	1	Conclussion
22	25.jan.21	Corrections	1	Abstract

Tonsil removement operation, followed by 2 weeks of staying at home