Week 5 Master Thesis 2020

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DTU Compute

15. oktober 2020

Outline

Since last

Speeding up MNIST Previous work

Since last

- ► Back on track
- ► More digits for MNIST
- Reading
- ▶ Draft for "Previous work"

Outline

Since last
Speeding up MNIST
Previous work

More digits for MNIST

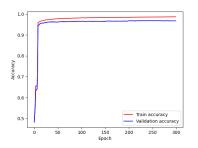
- ▶ Does not seem to generalize well
- ► Has a hard time when digits look alike (4 and 9)

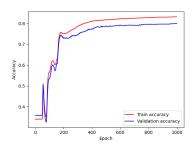
3s, 4s, and 7s

4	3	4	3	3	7	4	9	3	7
		7		3	3	7		9	4
97	ч	7	3	7	7		Ţ	7	ч
7	3	9	7	3	3	4	7	9	3
4	3	3	9	3		9		3	
3	ч		4	9	7	3	7	7	7
4	ч	3	3	7			3	ч	4
7	8	7	3	ч	3	7		3	3
4	7	7	9	4	ч	3	3	7	4
3	9	4	4	3	7	7	7	4	3

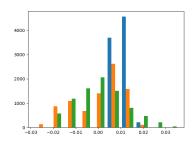
	Full data	Decomposed
# inputs	784	3
# hidden neurons	3	5
Total $\#$ parameters	3145	33
Testing acc. (%)	≈ 98	≈ 83

3s, 4s, and 7s





Histogram of loadings of A matrix

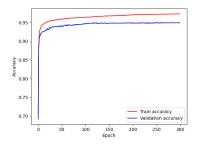


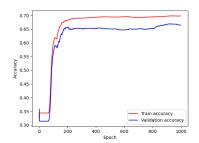
3s, 4s and 9s

9	9	3	9	3	3	9	9	9	9
3	3	9	9	3	9	3	3	3	9
9	9	9	9		9	3	3	3	9
q	q	3	3	9	3	9	q	9	3
9	9	3	3	9	9	3		9	93
3		9	9	9	9	q			3
9	9	9	9	3	3		3	9	9
	9		3	q	3	9		3	3
9	9	9	9	q	q	3	9	3	9
9	9	3	9	9	9	3	9	9	9

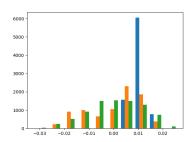
	Full data	Decomposed
# inputs	784	3
# hidden neurons	3	5
Total # parameters	3145	33
Testing acc. (%)	≈ 96	≈ 68

3s, 4s and 9s





Histogram of loadings of A matrix



All digits

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504/9

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19612

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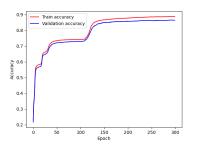
1969

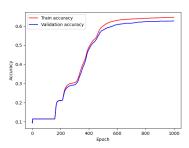
196
```

5	0	\mathcal{A}	1	9	$\boldsymbol{\mathcal{B}}$	3	3	3	4
3	(8)	3	6	30	7	\mathfrak{a}	8	6	9
4	0	9	1	2	2	4	3	2	7
3	æ	6	9	0	3	6	0	3	
1	8	7	9	3	9	8	8	3	3
3	0	7	#	4	8	O	9	4	1
(c)	9	6	0		(2)	6	1	Ö	0
1	7	1	6	3	0	\mathbf{z}	1	1	7
B	0	á	6		8	3	9		9
6	7	4	6	8	O		8	3	1

	Full data	Decomposed
# inputs	784	15
# hidden neurons	10	15
Total # parameters	8724	390
Testing acc. (%)	≈ 88	≈ 64

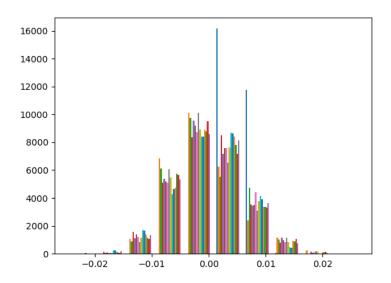
All digits





All digits

Histogram of loadings of A matrix



Outline

Since last
Speeding up MNIST

Previous work

Previous work

Outline of section:

- Decomposing the dense layer (Nokinov TT)
- Speeding up the convolution (Jaderberg selfmade / Lebedev CP / Wang BTD)
- ► The entire network (Kim Tucker)
- Comparison