Project: images

Group-404
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Outline

- ➔ Introduction and motivation
- ➔ Steps of building models
- ➔ Evaluate models and Results discussion
- ➔ Conclusion

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Introduction and Motivation

- ➔ Inspired by the paper: Huang, Gao, et al. "Densely connected convolutional networks." *arXiv preprint arXiv:1608.06993* (2016).
- ➔ “DenseNets advantages: they alleviate the vanishing-gradient problem, strengthen feature propagation, encourage feature reuse, and substantially reduce the number of parameters.”(Huang, Gao, et al.)
- ➔ Highest accuracy can be 98.41%

What is a DenseNet...

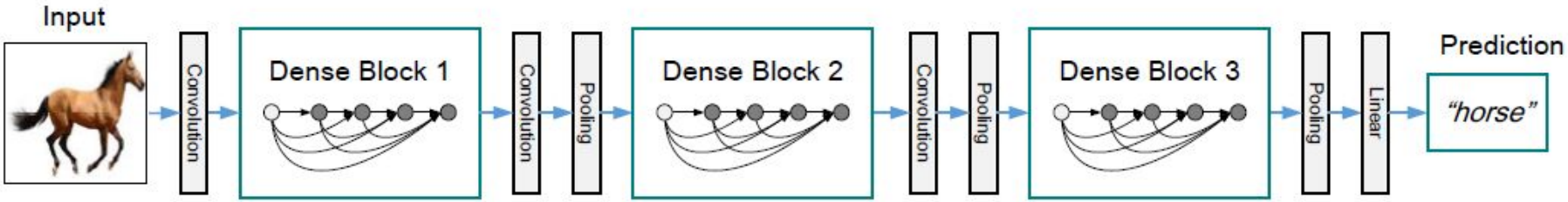
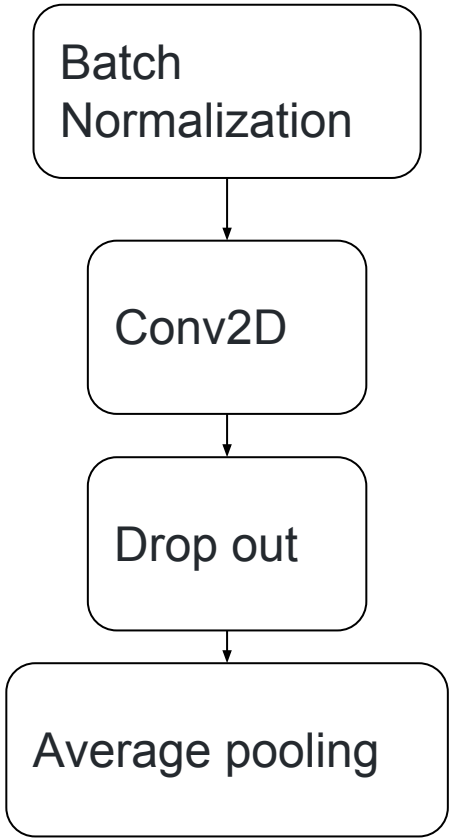


Figure 2: A deep DenseNet with three dense blocks. The layers between two adjacent blocks are referred to as transition layers and change feature-map sizes via convolution and pooling.

A dense block



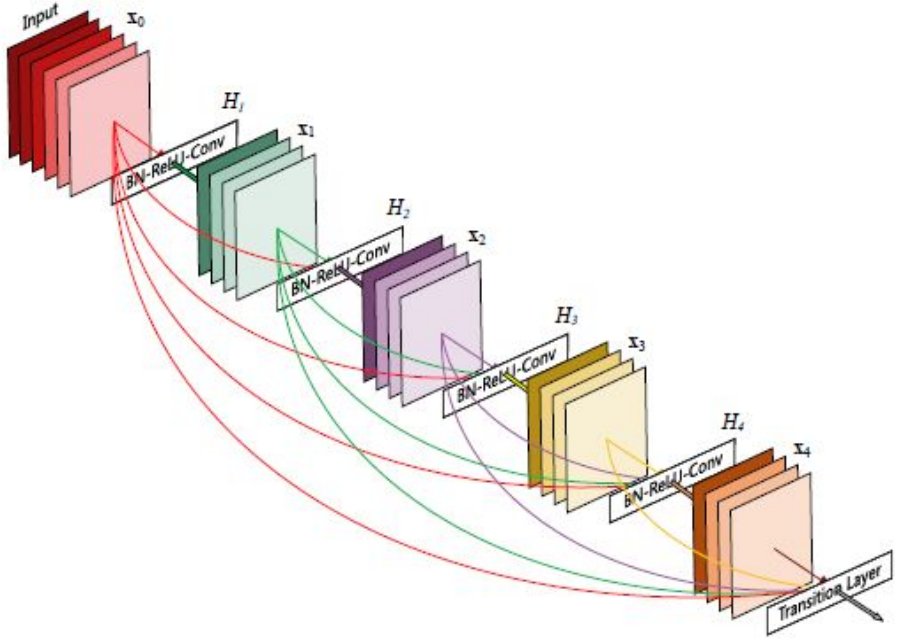


Figure 1: A 5-layer dense block with a growth rate of $k = 4$. Each layer takes all preceding feature-maps as input.

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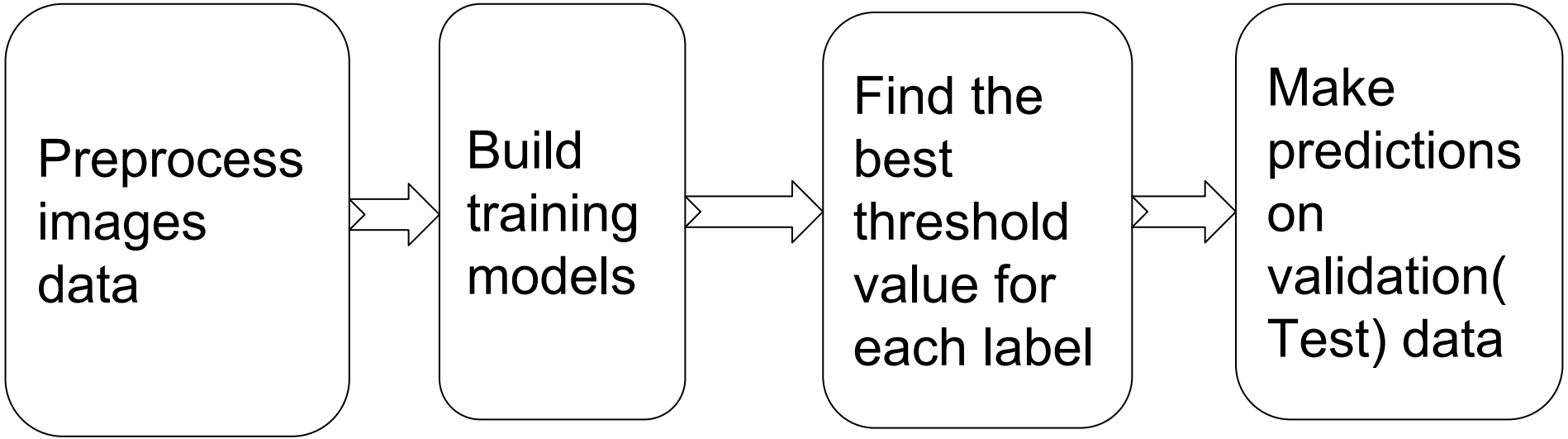
Steps of building models



Preprocess data

- ➔ Images are resized to be 32x32
- ➔ Labels are stored in a matrix of shape 20000x14 consists of only 0 or 1

Find the best threshold value for each label

- ➔ manually select threshold according to f1 score for each label
- ➔ threshold with highest score wins

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Evaluate models and Result discussion

- ➔ We use 5 folds cross validation and f1 score
- ➔ DenseNet 0 and DenseNet 3 are the networks with only their output layer adjusted.
- ➔ DenseNet 1 and DenseNet 2, besides their output layer, have been adjusted, they also have additional layer before output. We replace one global average pooling layer before output with regular average pooling and flatten layer as well.

Models Name	Dense block	layers	filters	Drop out rate	Growth rate	epochs	F1 score
ConvNet(Baseline)	-	-	-	-	-	-	0.356 +/- 0.008
denseNet 0	3	3	32	0.2	36	10	0.232 +/- 0.017
denseNet 1	1	3	32	0.3	24	10	0.364 +/- 0.004
denseNet 2	**2**	**2**	**32/64**	**0.2**	**12**	**10**	**0.392 +/- 0.009**
denseNet 3	5	2	32	0.5	12	10	0.272 +/- 0.023

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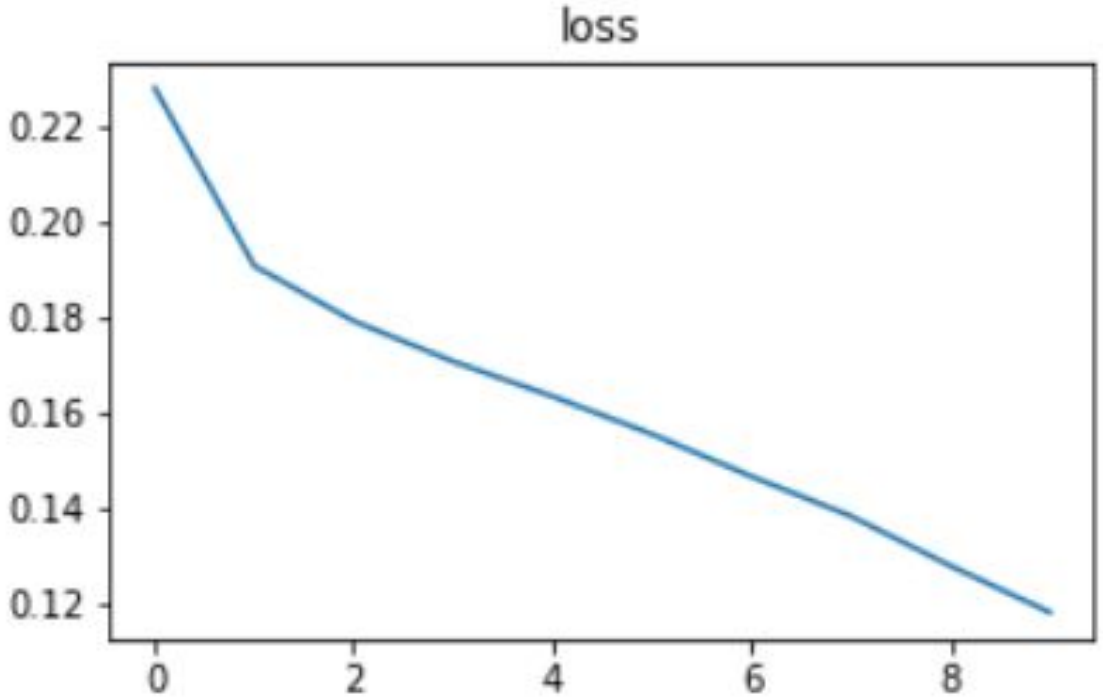
Conclusion

- ➔ Considered running time, we only test 10 epochs. DenseNet 3 still has better performance than normal ConvNet. We expect that if we choose higher epochs value the result can be better.
- ➔ we think DenseNet 0 and DenseNet 3 performed poorly not only because of our over-simplified setup but also due to the lack of parameter complexity in the network.
- ➔ DenseNet 1 and DenseNet 2 have a greater number of parameter than the DenseNet 0 and DenseNet 3 due to the structural modification.

Conclusion



Thanks and questions?