ffNN challenge

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GTSDB

German Traffic Sign
Detection Benchmark

Dataset

- Training: 600 images
- Validation: 252 images
- Test: 48 images
- Categories: 40

Pre processing approaches

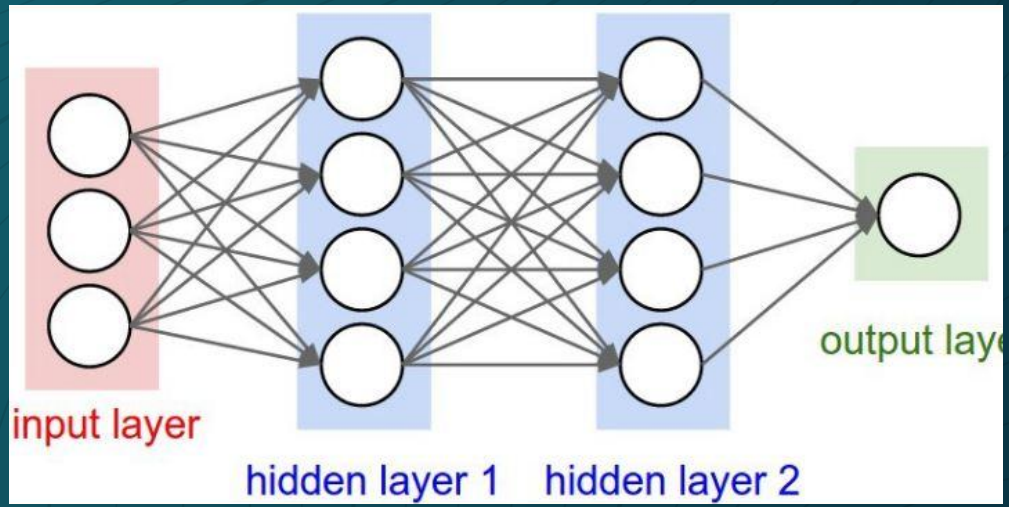
- Normalize the images [0 , 1]
- Convert class vector to binary class matrix
- Convert pictures to grayscale
- Gaussian blur

Hyperparameter

- Number hidden layers
- Dropout
- Activation Function
- Learning rate
- Batch size
- Optimizator

Hidden layers

- Number of hidden layer
- Number of node per layer

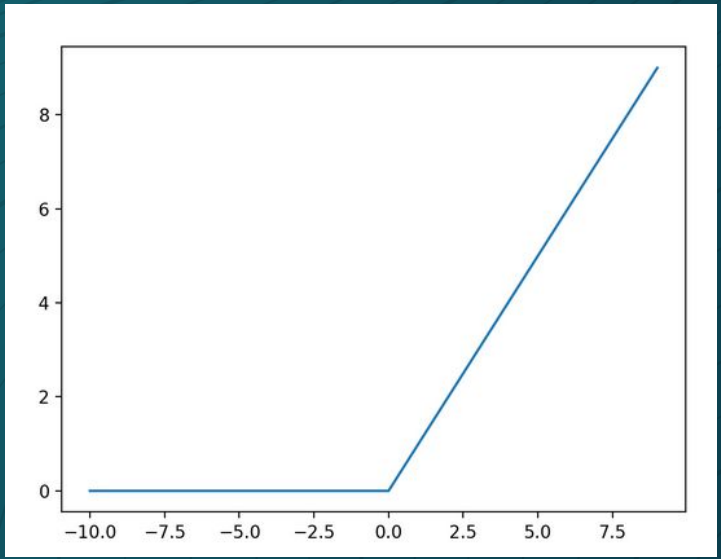


Our configuration - Hidden layers

- Three layer with decreasing number of nodes
- **Two layer with decreasing number of nodes 300-150 neurons**
- Two layer with constant number of nodes

Activation Functions

- **ReLU**
- TanH
- Sigmoid



Rectified Linear Activation

Dropout

In order to avoid overfitting

- 0.1
- 0.2
- **0.3**

Learning rate

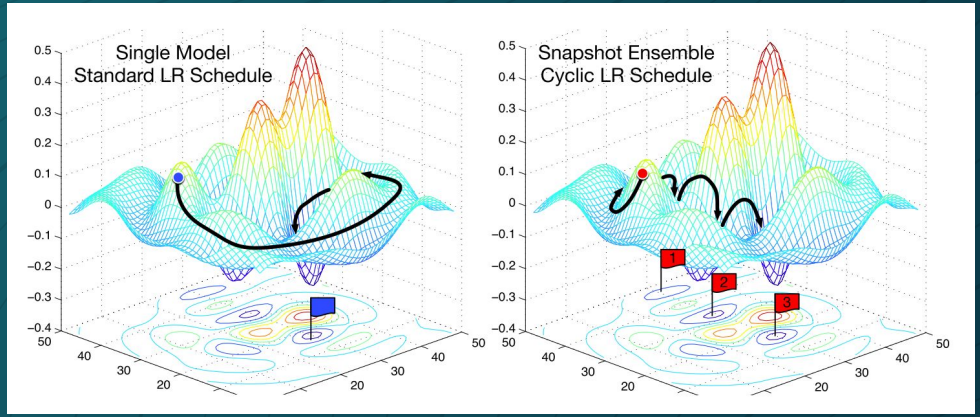
- **0.001**
- 0.0013
- 0.00001
- 0.00005

Optimizator, Batch size, Epochs

- **SGD**
- Adam
- Nadam

Batch size: 128

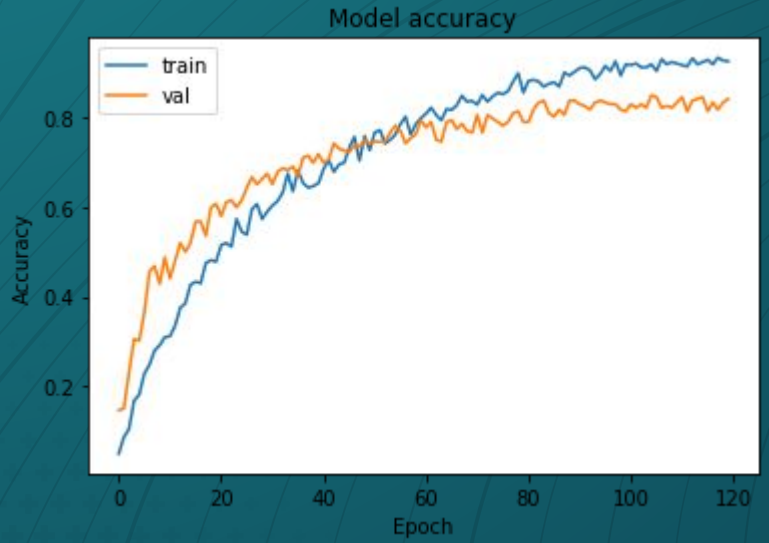
Epochs: 120

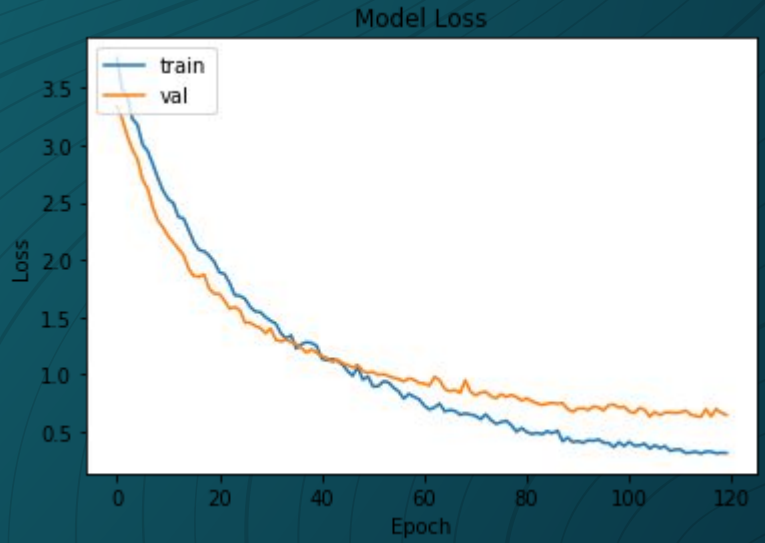


Results

- Training: 92.5%
- Validation: 84.13%
- Test: 89,47%

Graphs


Model accuracy
train
val
Accuracy
0.2
0.4
0.6
0.8
0
20
40
60
80
100
120
Epoch

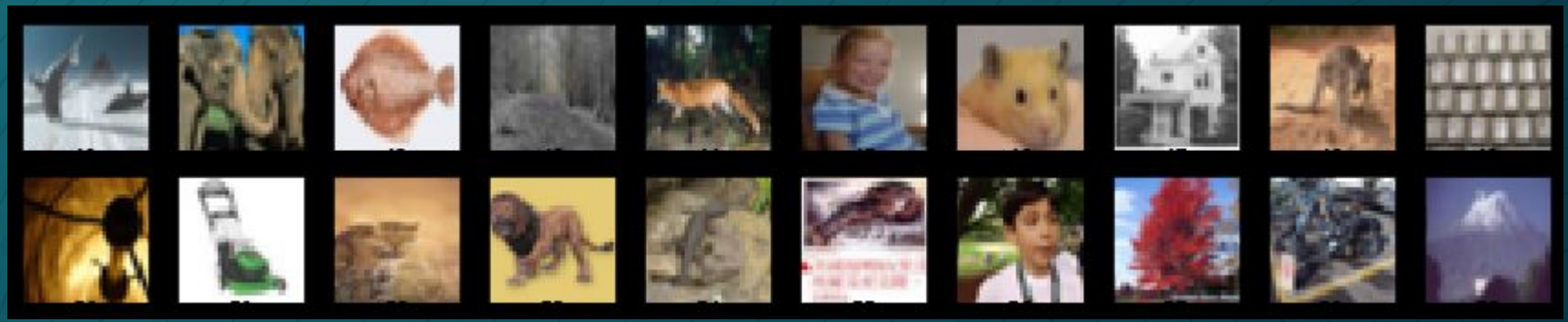

Model Loss
train
val
Loss
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
20
40
60
80
100
120
Epoch

CIFAR Dataset

From Keras

CIFAR Dataset 32x32 color images

- Training: 40,000 images
- Validation: 10,000 images
- Test: 10,000 images
- Categories: 100



Pre processing approaches

- Normalize the images [0 , 1]
- Convert class vector to binary class matrix
- Laplacian and Canny transformations
- Gaussian Blur

Our configuration

Hidden layers

- **Three layer with decreasing number of nodes 1024 - 768 - 512 neurons**
- Two layer with decreasing number of nodes
- Two layer with constant number of nodes

Activation function & Dropout

In order to avoid overfitting dropout:

- 0.1
- **0.2**
- 0.3

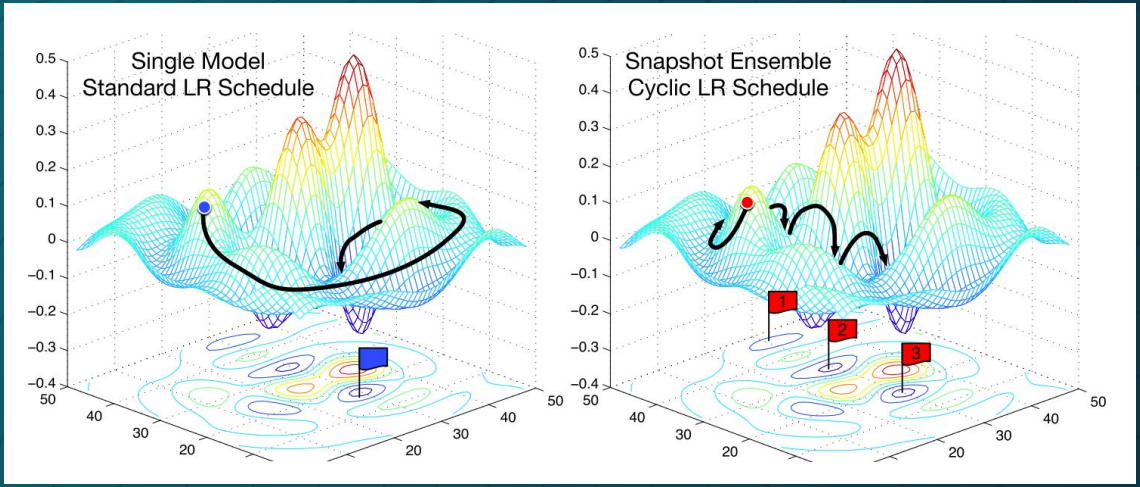
Activation Function: ReLU

Optimizator, Batch size, Epochs

- **SGD**
- Adam
- Nadam

Batch size: 64

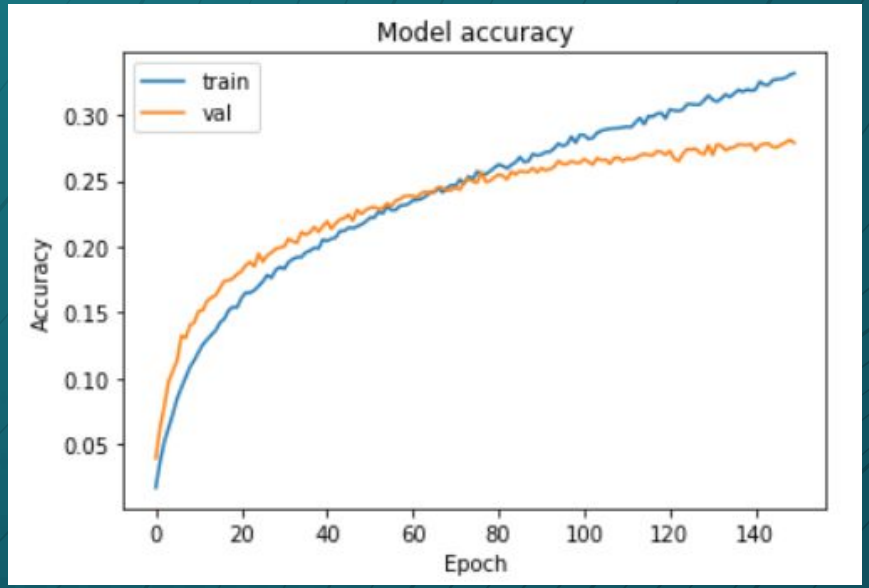
Epochs: 150

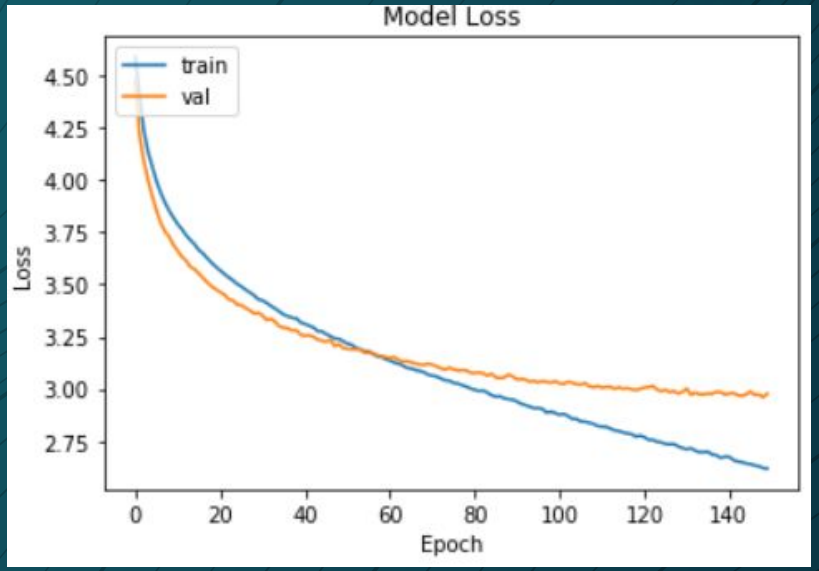


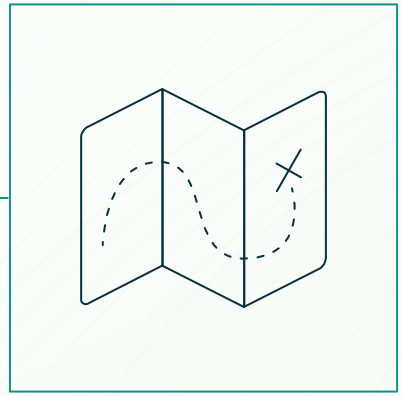
Results

- Training: 33,16%
- Validation: 27,88%
- Test: 28,53%

Graphs


Model accuracy
train
val
Accuracy
0.30
0.25
0.20
0.15
0.10
0.05
0
20
40
60
80
100
120
140
Epoch


Model Loss
train
val
Loss
4.50
4.25
4.00
3.75
3.50
3.25
3.00
2.75
0
20
40
60
80
100
120
140
Epoch



Thanks!

Any questions?