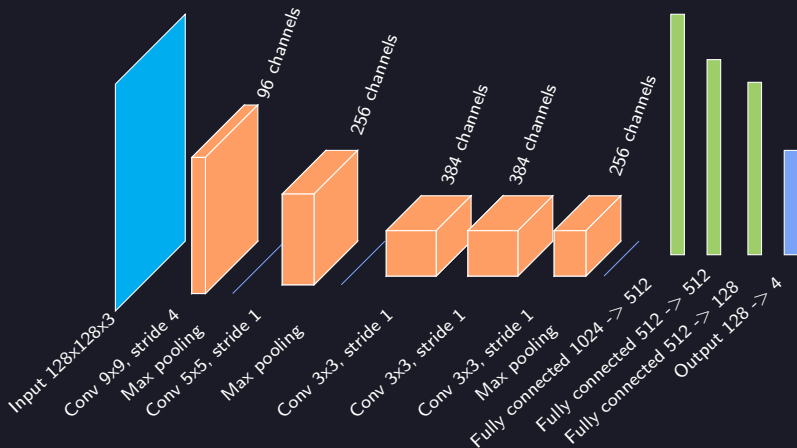


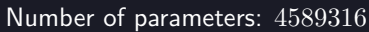
# AlexNet



Number of parameters: 4589316

Dropout rate: 0.4

# VGG



# Setup Differences

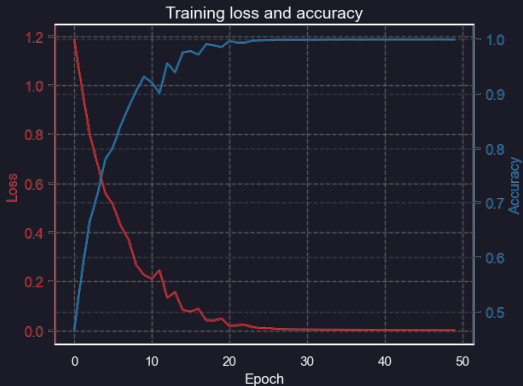
Model	Data augmentation	LR Scheduler	Activation	L2 reg.
CustomCNN	Yes	Yes	<i>Mish</i>	Yes
AlexNet	No	Yes	<i>ReLU</i>	Yes
VGG16	No	No	<i>ReLU</i>	No
VIT	Yes	Yes	<i>Mish</i>	Yes

- All the other hyperparameters and settings are the same for all models(batch size, optimizer, epochs, etc)
- Note that the **CustomCNN** is the one with less parameters (3,001,156) while **VGG16** is the one with more parameters(65,070,916)
- **VGG16** is also the one with the highest dropout rate (0.5)

# Performance Assessment

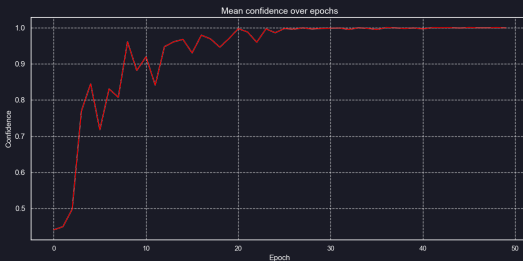
- **Loss function:** Cross-entropy loss  $L(y, \hat{y}) = - \sum_i y_i \log(\hat{y}_i)$
- **Accuracy:** Number of correct predictions divided by the total number of predictions
- **Confidence:** Given by the Softmax function applied to the net output  $S(x_i) = \frac{e^{x_i}}{\sum_j e^{x_j}}$

# Training Loss and Accuracy for AlexNet



- Final training loss:  $1.2 \cdot 10^{-3}$
- Final training accuracy: 99.9%

# Confidence and Test Accuracy for AlexNet



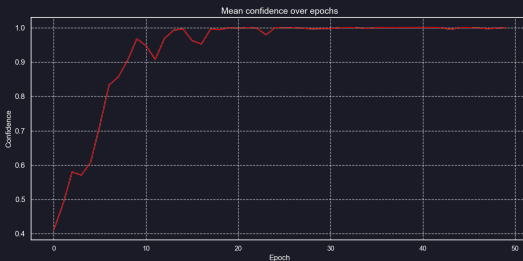
- Final training confidence: 99.9%
- Final test confidence: 96.5%
- Final test accuracy: 90%

# Training Loss and Accuracy for VGG16



- Final training loss:  $8.9 \cdot 10^{-6}$
- Final training accuracy: 99.9%

# Confidence and Test Accuracy for VGG16



- Final training confidence: 100%
- Final test confidence: 98%
- Final test accuracy: 95%



# Training Performance Comparison

Model	Loss	Accuracy	Confidence
CustomCNN	$1.4 \cdot 10^{-3}$	0.99	100%
AlexNet	$1.2 \cdot 10^{-3}$	0.99	99.9%
VGG16	$8.9 \cdot 10^{-6}$	0.99	100%
VIT	0.27	0.90	96.1%

Note that these are the values reached during the last epoch.

# Focus on Accuracy



# Test Performance Comparison

Model	Accuracy	Confidence
CustomCNN	0.99	100%
AlexNet	0.90	96.5%
VGG16	0.95	98.0%
VIT	0.88	93.3%

# Visualizing the first layer filters

