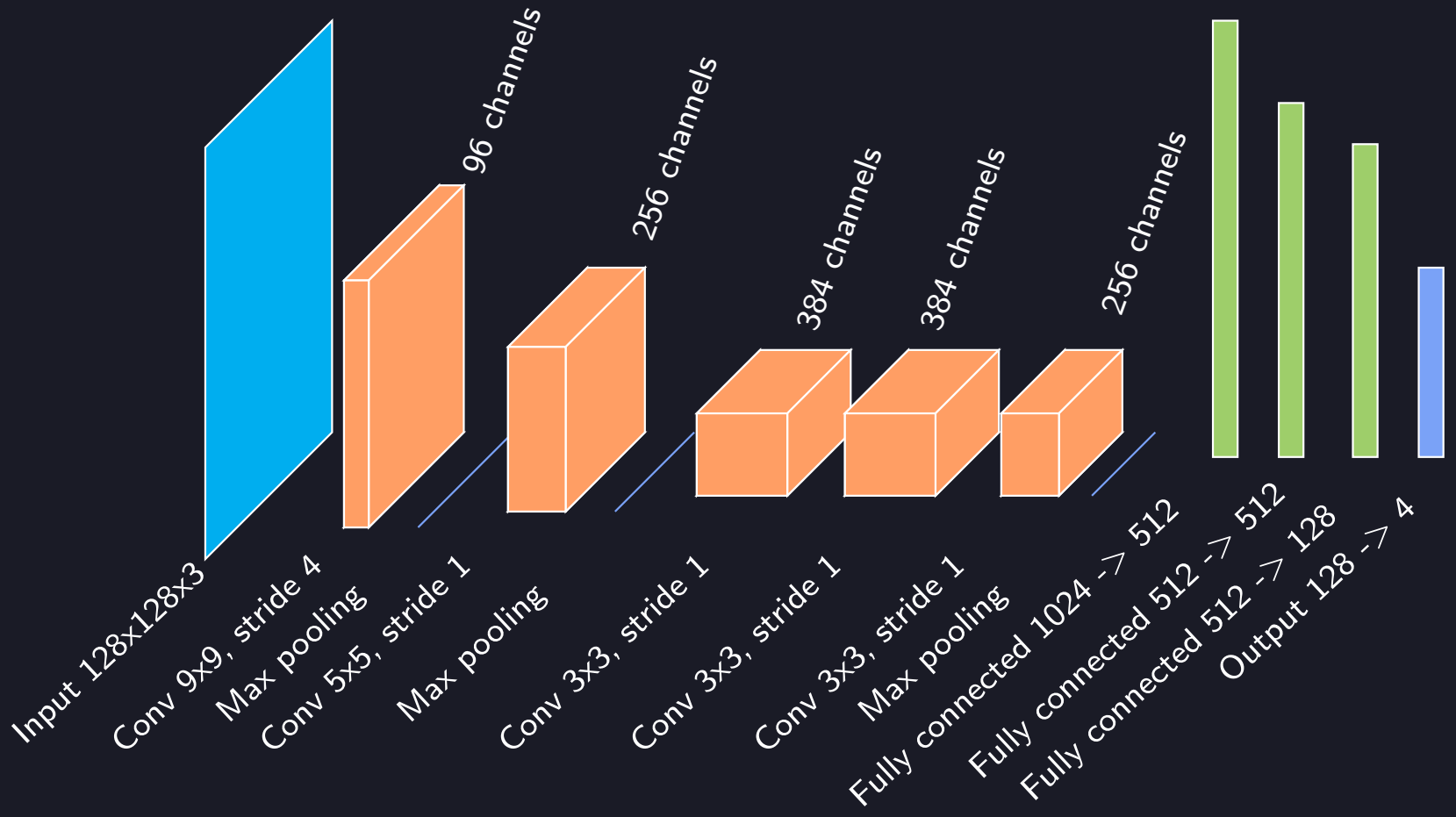
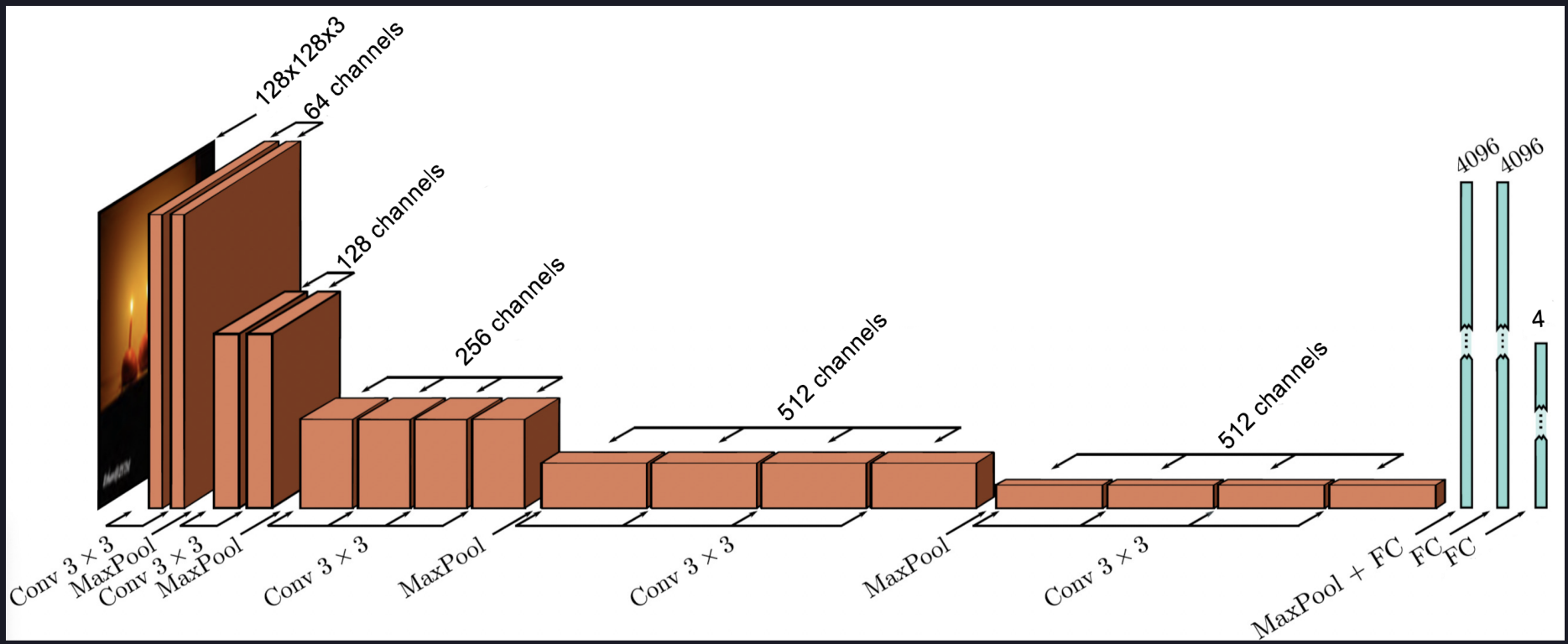
AlexNet



Number of parameters: 4589316

VGG



Number of parameters: 65070916
Dropout rate: 0.5

Setup Differences

Model	Data augmentation	Scheduler	Activation	L2 regularization
CustomCNN	Yes ✅	Yes ✅	*Mish*	Yes ✅
AlexNet	No ❌	Yes ✅	*ReLU*	Yes ✅
VGG16	No ❌	No ❌	*ReLU*	No ❌
VIT	Yes ✅	Yes ✅	*Mish*	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** also has the highest dropout rate (0.5)

Performance Assessment

Loss Function: Cross-entropy loss

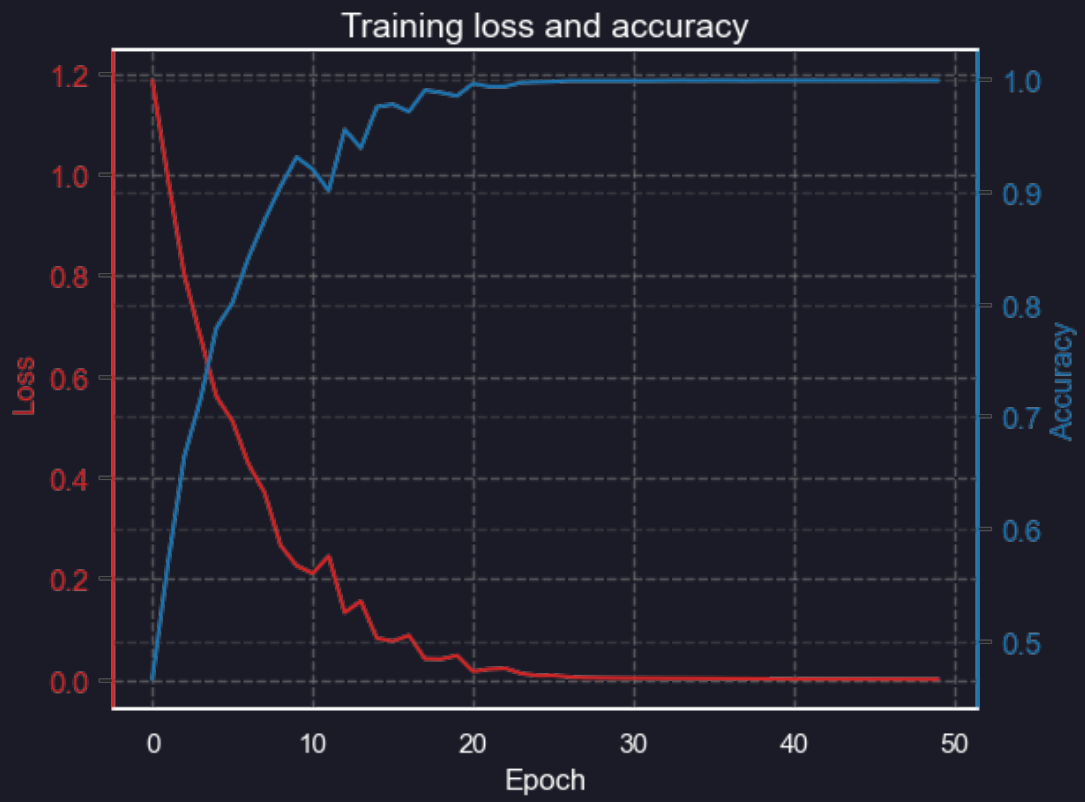
$$L(y, \hat{y}) = -\sum_i y_i \log(\hat{y}_i)$$

Accuracy: Number of correct predictions divided by the total number of predictions

Confidence: Given by the Softmax function applied to the net output

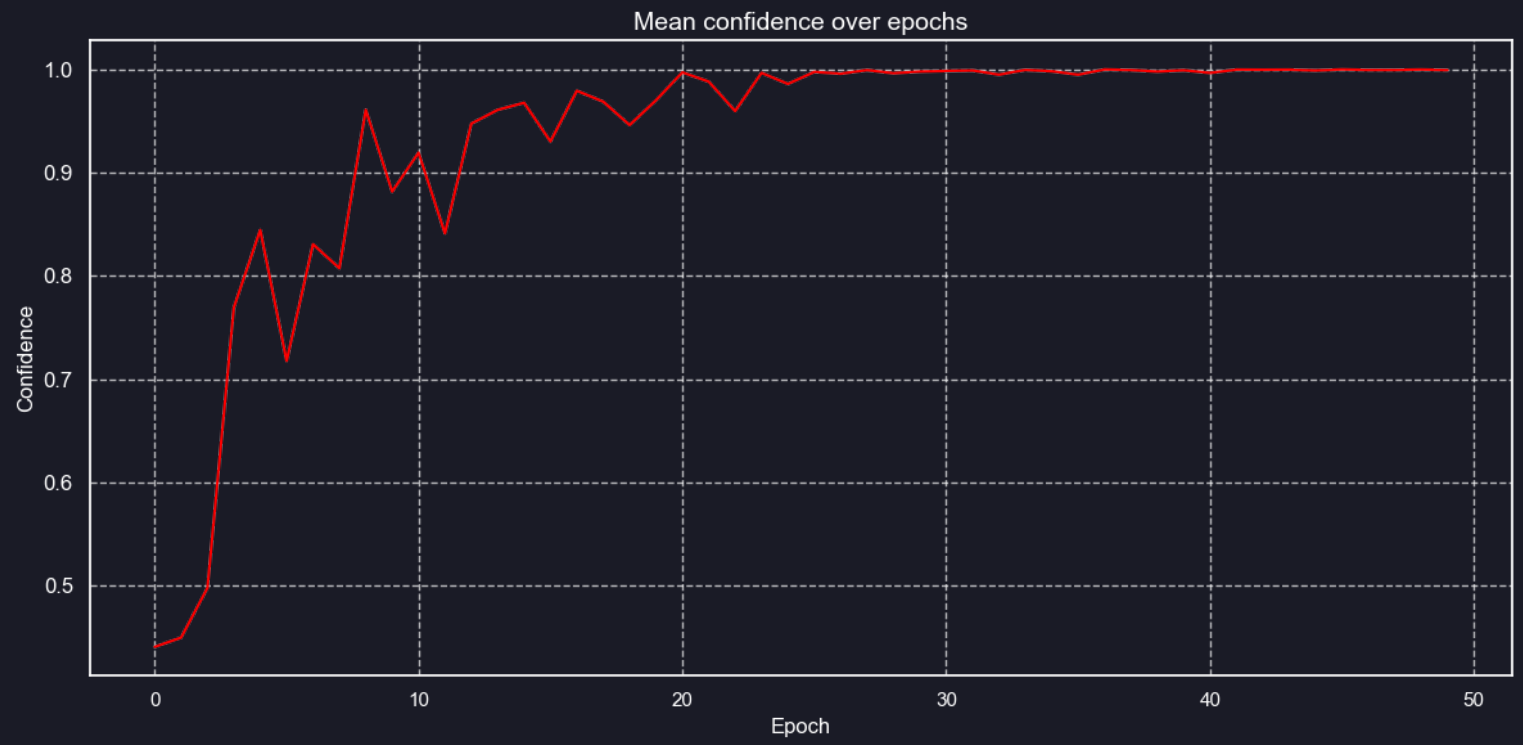
$$S(x_i) = \frac{e^{x_i}}{\sum_j e^{x_j}}$$

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	$1.4 \cdot 10^{-3}$	99%	100%
AlexNet	$1.2 \cdot 10^{-3}$	99%	99.9%
VGG16	$8.9 \cdot 10^{-6}$	99%	100%
VIT	0.27	90%	96.1%

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

Focus on Accuracy

Test Performance Comparison

Model	Accuracy	Confidence
CustomCNN	99%	100%
AlexNet	90%	96.5%
VGG16	95%	98.0%
VIT	88%	93.3%

⚠️ Note that these are the values reached after the **last epoch**.

Visualizing the first layer filters, CustomCNN

Visualizing the first layer filters, AlexNet

Visualizing the first layer filters, VGG16