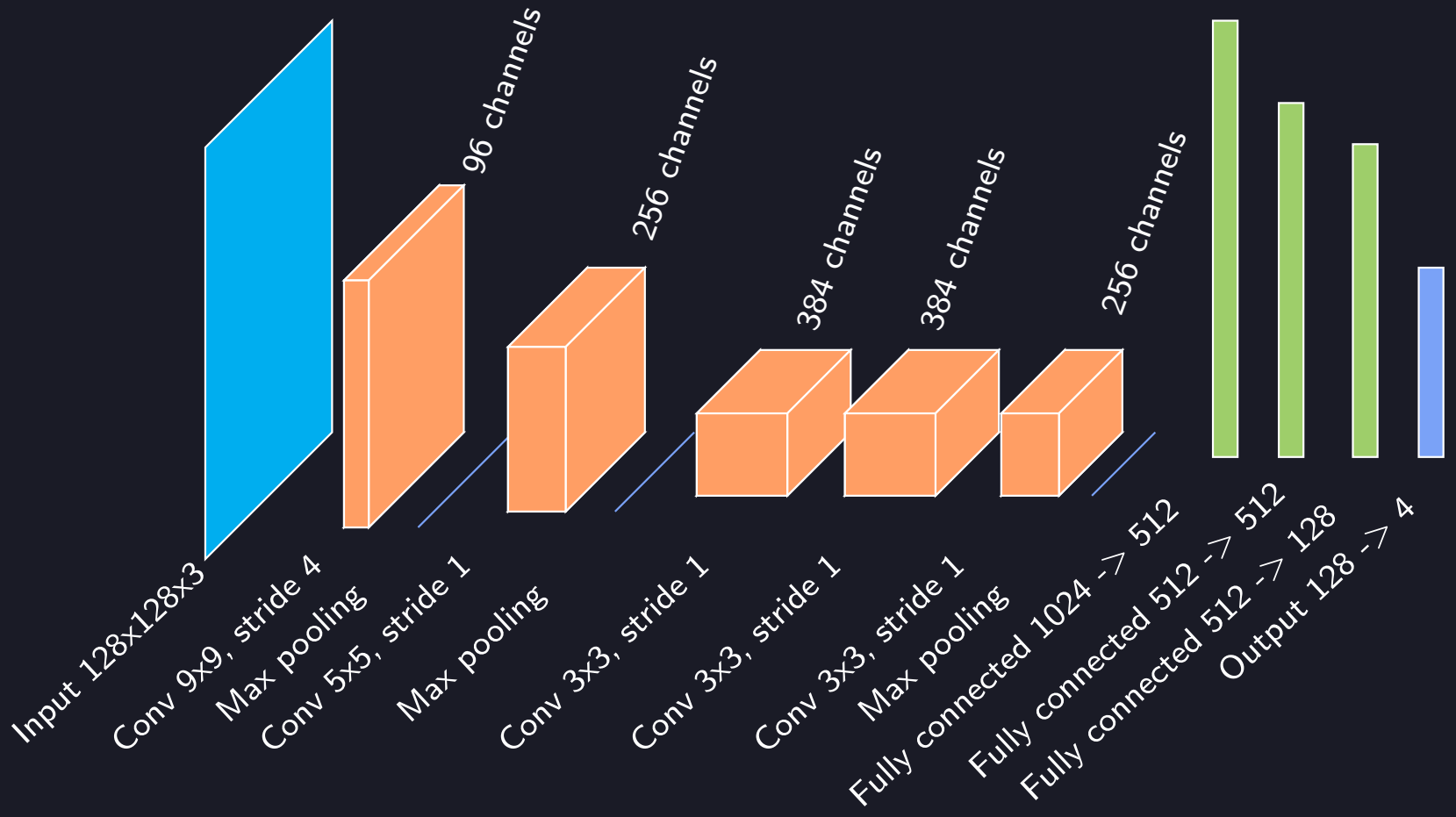
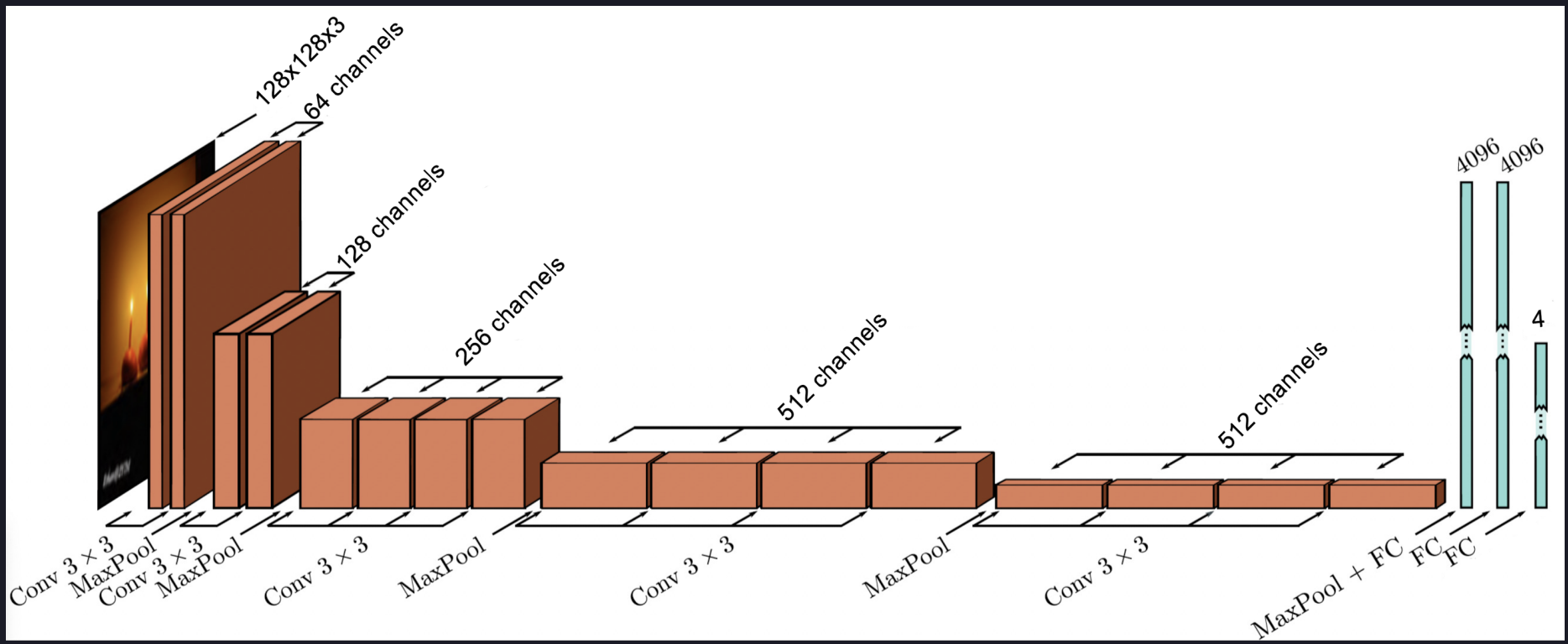
AlexNet



Number of parameters: 4589316

VGG



Number of parameters: 65070916
Dropout rate: 0.5

Setup Differences

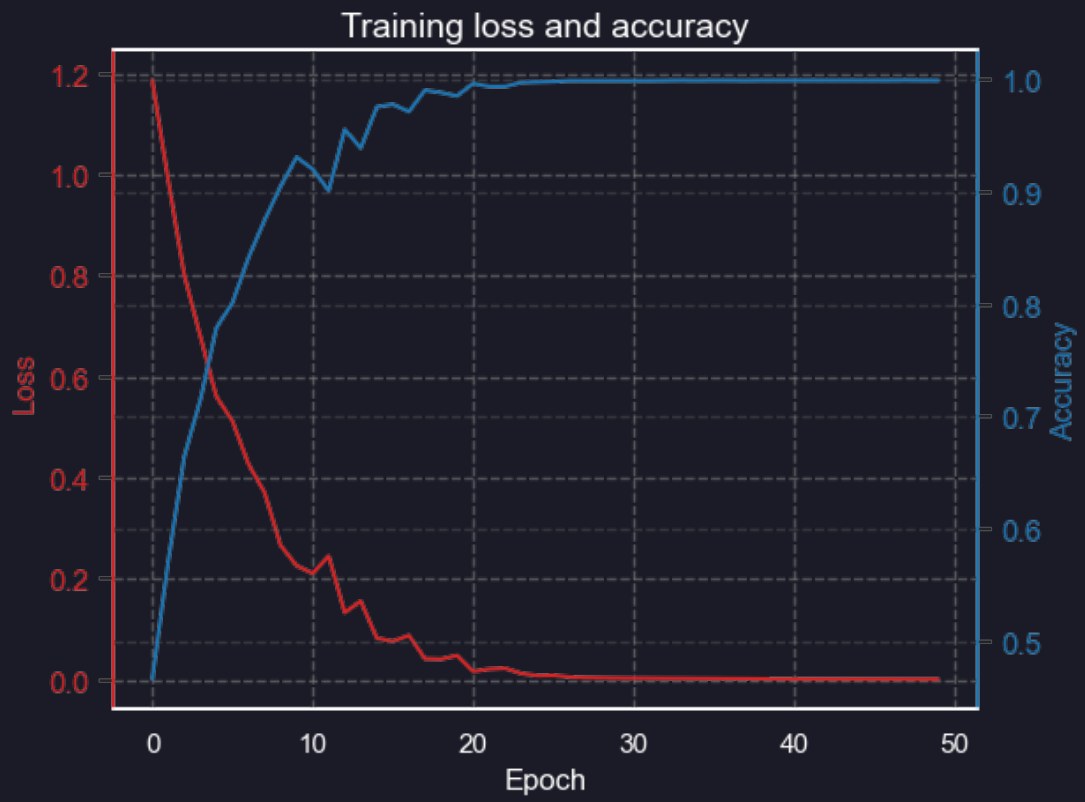
Model	Data augmentation	LR Scheduler	Activation	L2 reg.
CustomCNN	Yes	Yes	*Mish*	Yes
AlexNet	No	Yes	*ReLU*	Yes
VGG16	No	No	*ReLU*	No
VIT	Yes	Yes	*Mish*	Yes

- 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** is also the one with the highest dropout rate (0.5)

Performance Assessment

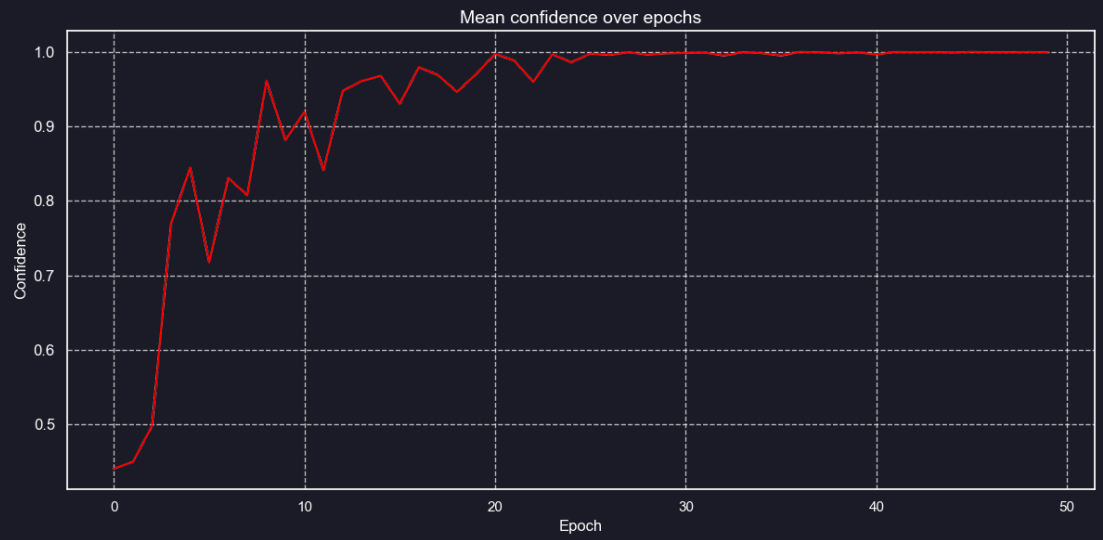
- **Loss function**: Cross-entropy loss $L(y, \hat{y}) = -\sum_i y_i \log(\hat{y}_i)$
- **Accuracy**: Number of correct predictions divided by the total number of predictions
- **Confidence**: Given by the Softmax function applied to the net output $S(x_i) = \frac{e^{x_i}}{\sum_j e^{x_j}}$

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