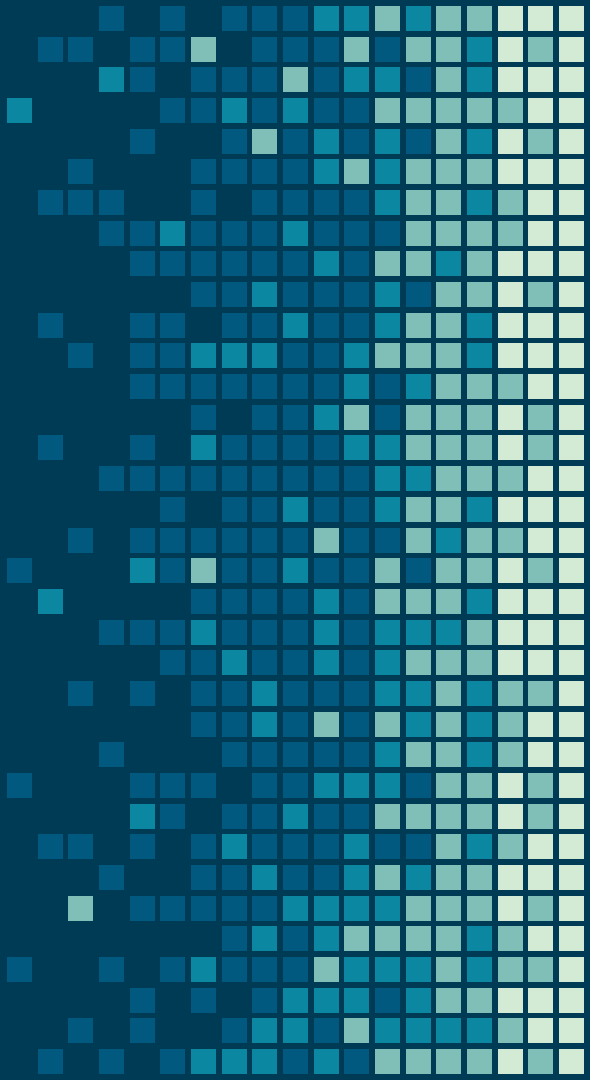
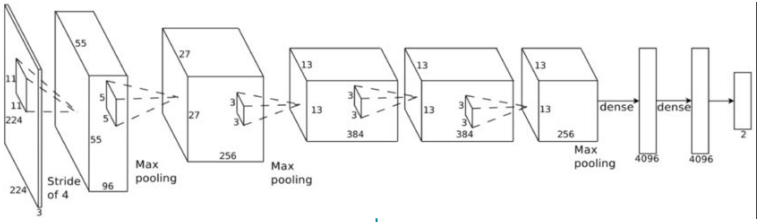
Convolutional Neural Network Assignment



- German Traffic Sign Benchmark
  - Modifying AlexNet
  - Data augmentation
  - Majority vote

- CIFAR 100 Dataset
  - Network Architecture
  - Results

Traffic Signs – Modifying AlexNet

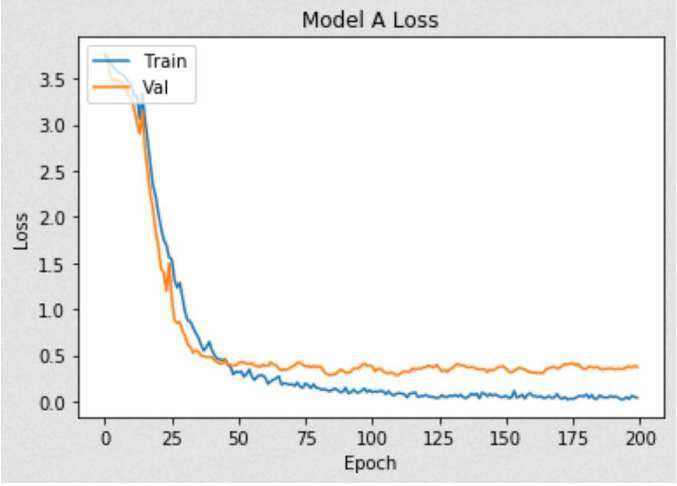


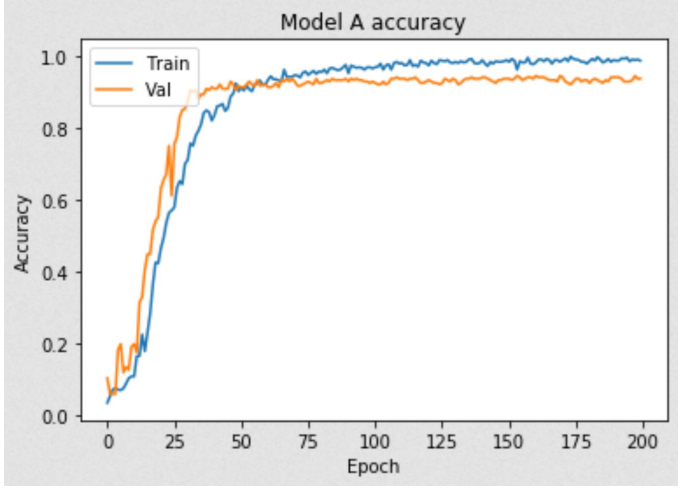
Layer (type)	Output Shape	Param #
conv2d_1 (Conv2D)	(None, 54, 54, 96)	34944
activation_1 (Activation)	(None, 54, 54, 96)	0
max_pooling2d_1 (MaxPooling2	(None, 27, 27, 96)	0
conv2d_2 (Conv2D)	(None, 23, 23, 256)	614656
activation_2 (Activation)	(None, 23, 23, 256)	0
max_pooling2d_2 (MaxPooling2	(None, 11, 11, 256)	0
conv2d_3 (Conv2D)	(None, 9, 9, 384)	885120
activation_3 (Activation)	(None, 9, 9, 384)	0
conv2d_4 (Conv2D)	(None, 7, 7, 384)	1327488
activation_4 (Activation)	(None, 7, 7, 384)	0
flatten_1 (Flatten)	(None, 18816)	0
dense_1 (Dense)	(None, 512)	9634304
activation_5 (Activation)	(None, 512)	0
dropout_1 (Dropout)	(None, 512)	0
dense_2 (Dense)	(None, 43)	22059
activation_6 (Activation)	(None, 43)	0

Total params: 12,518,571
Trainable params: 12,518,571

Traffic Signs – Modifying AlexNet

Test loss: 0.15889032604987088
Accuracy: 0.9806094184476583





Traffic Signs - Data Augmentation

```
lr = 0.01
def lr_schedule(epoch):
        return lr * (0.1 ** int(epoch / 10))
```

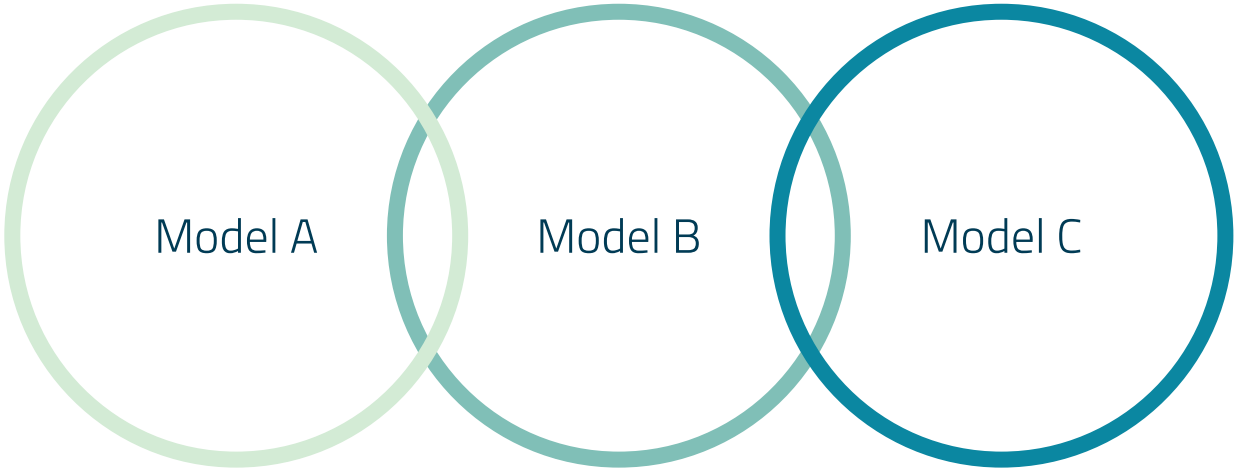
```
width_shift_range=0.1
height_shift_range=0.1
zoom_range=0.2
shear_range=0.1
rotation_range=10.
```

Traffic Signs - Data Augmentation

Test loss: 0.17584015075313533

Accuracy: 0.9806094182825484

Traffic Signs – Majority vote

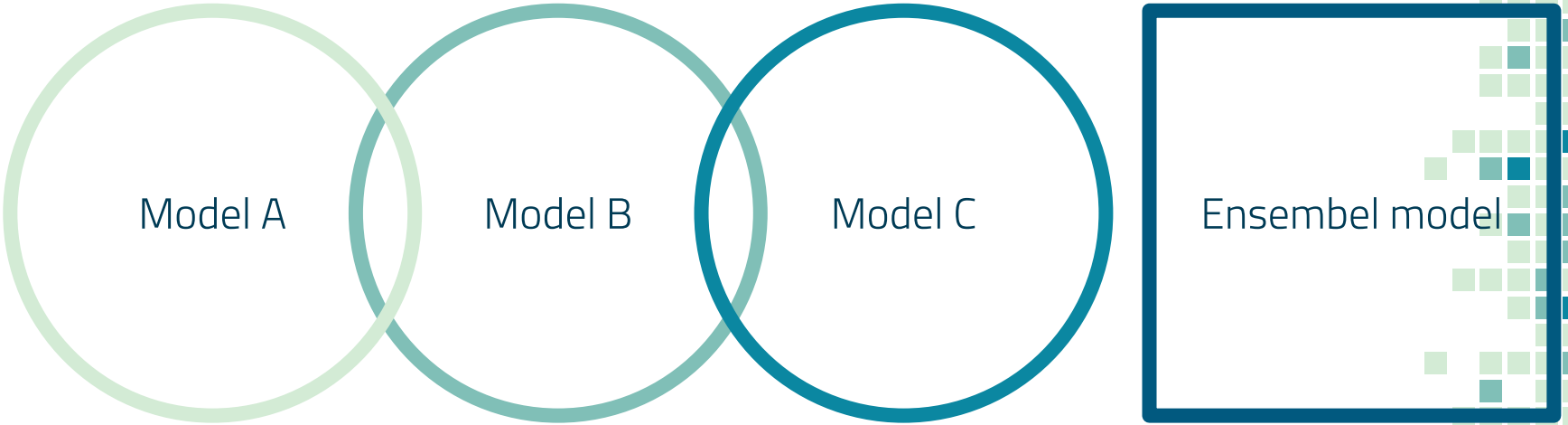


Original model

LeakyReLu
Inverted filters

LeakyReLu
Less layers

Traffic Signs – Majority vote



Model A	Model B	Model C	Ensembel model
Test loss: 0.27712	Test loss: 0.2313	Test loss: 0.4032	Test loss: 0.2293
Accuracy: 0.9668	Accuracy: 0.9557	Accuracy: 0.9474	Accuracy: 0.9612

Cifar 100

Our Model:

-7 Layers

-ZeroPadding

-Dropout(0.2)

-MaxPooling(2,2)

-Elu Activation Function

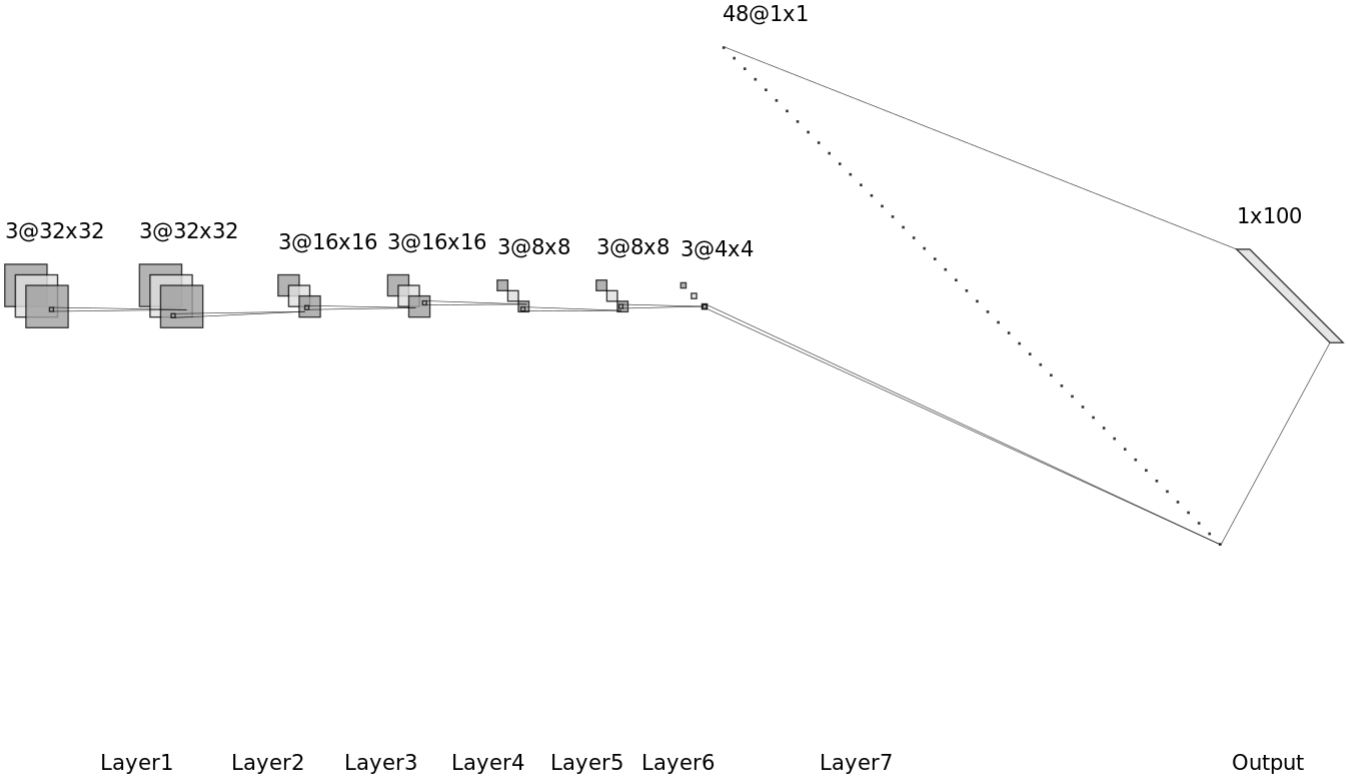
Our Optimizer:

-Adam

-Learning rate = 0.0001

-Loss = Categorical Entropy

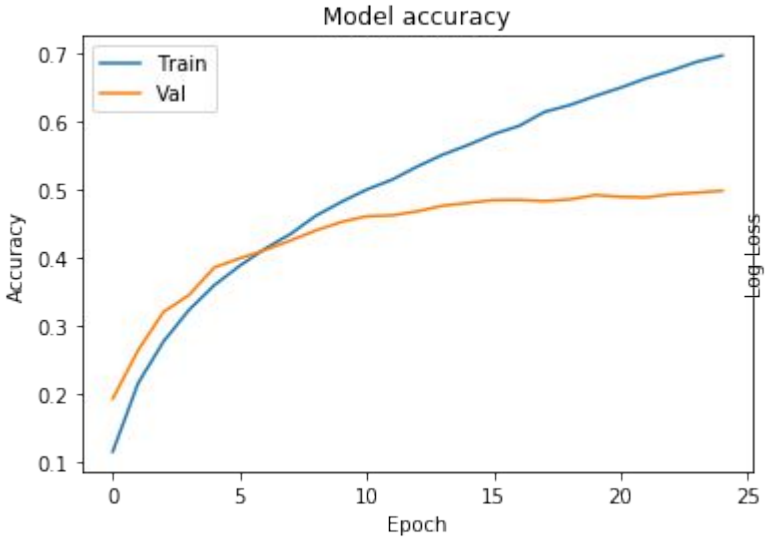
Cifar 100 Model:

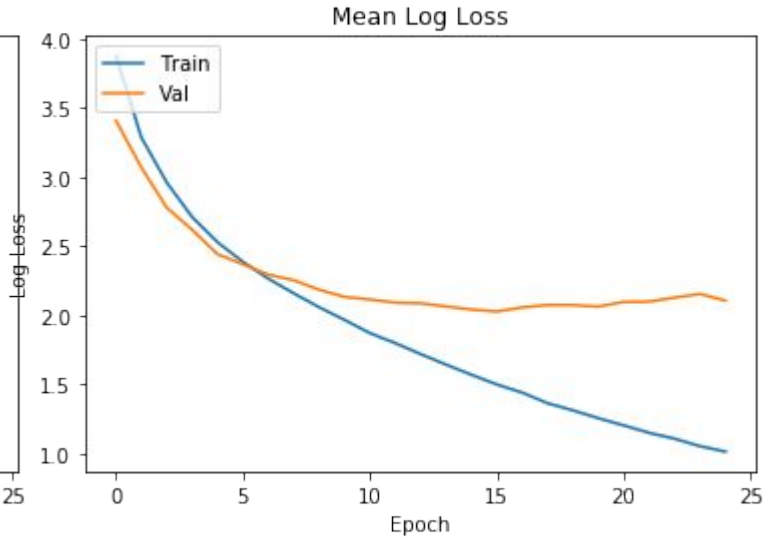


Cifar 100 Results

Test Loss: 2.09308

Test Accuracy: 0.4959





THANKS!

Any questions?

Miguel Pérez

David Burrel

Ignacio Martínez