

### **Deep CNN for Traffic Signs Classification**

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#### Motivation

- Self driving cars
- Application for drivers
- Application for future drivers

#### Dataset - files

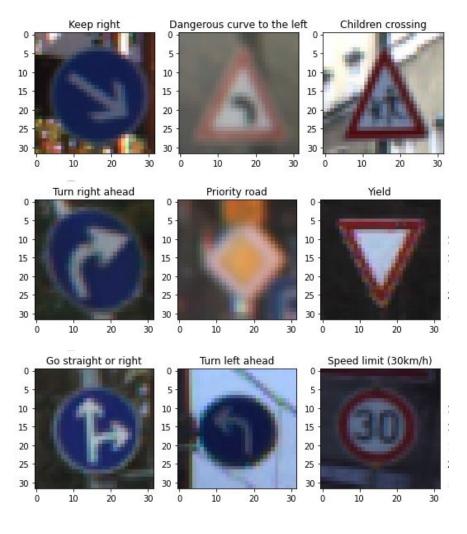
- RGB images
- Gray images
- Train
- Valid
- Test

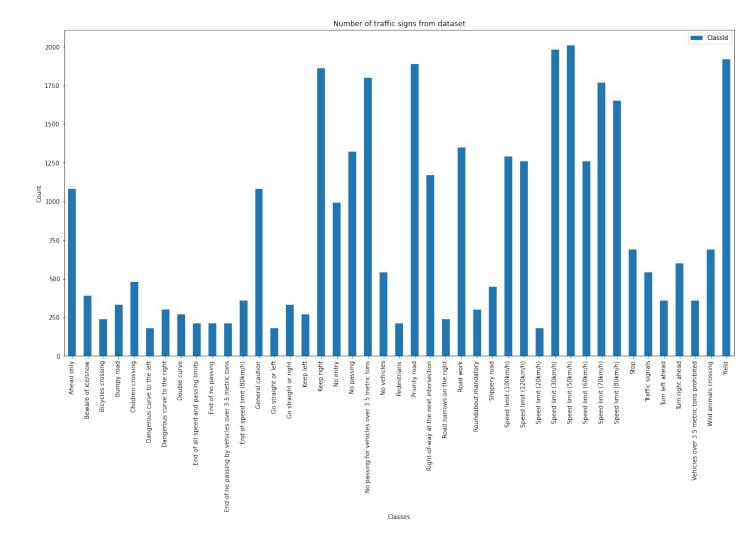
## Dataset - train, valid, test

The dataset is split into training, test and validation sets, with the following characteristics:

- Images are 32 (width) x 32 (height) x 3 (RGB color channels)
- Training set is composed of 34799 images
- Validation set is composed of 4410 images
- Test set is composed of 12630 images
- There are 43 classes (e.g. Speed Limit 20km/h, No entry, Bumpy road, etc.)

### Dataset - images

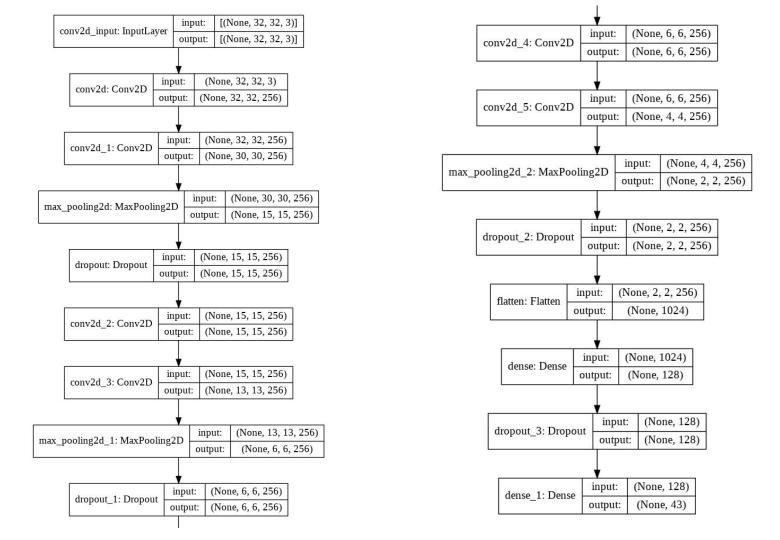


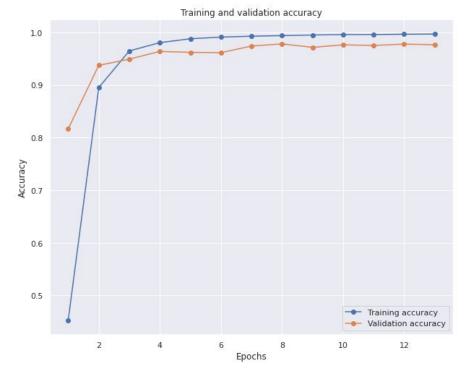


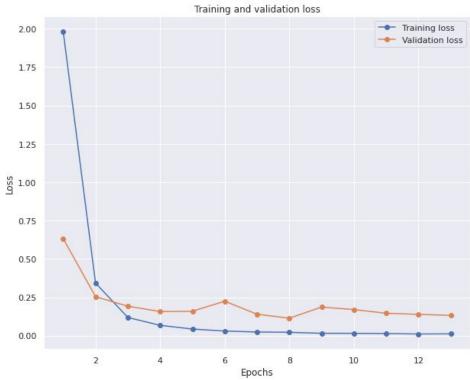
### Model architecture

#### Model:

- 6 Convolutional layers using ReLu activation function
- Kernel size 3x3
- 3 MaxPool layers 2x2
- 4 Dropouts
- Flatten with 128 neurons
- Final layer with 43 results using SoftMax activation function



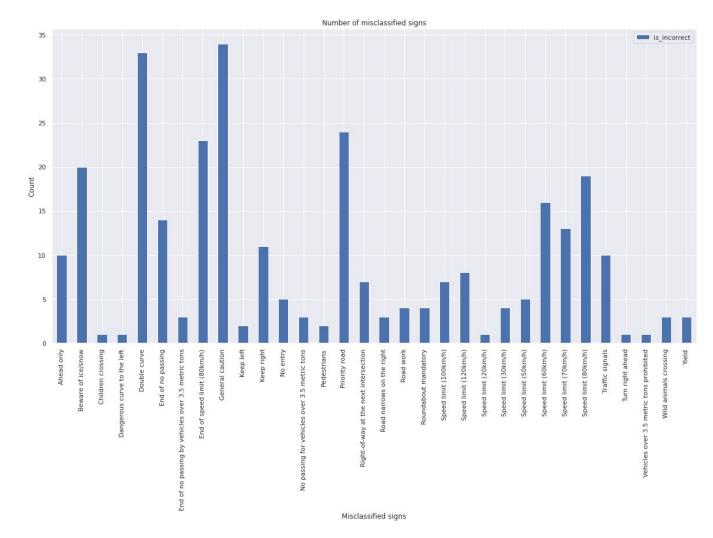




#### Model results

Model	Results
Train (34799 images)	97,65%
RGB (86989 images)	97,3%
Grayscale (86989 images)	96%
5 samples (9660 images)	97,73%
Transfer Learning (EfficientNet-B2.)	19.46%

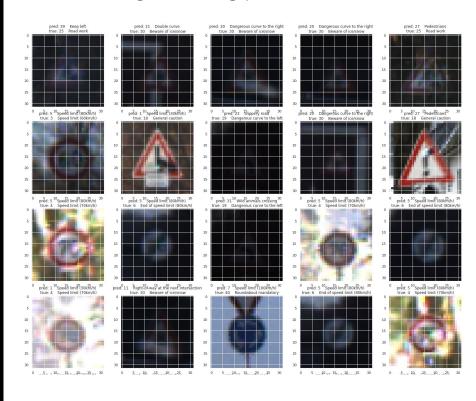
Confusion Matrix	Roundabour mandatory Roundabour mandatory Roundabour mandatory Rep jeft Go straight or right Go straight or right Ahead only Turn left shead Turn right ahead Wild almast crossing Go liders crossing Children crossing Children crossing Traffic signals Board work Road narrows on the right Slippery road Dangerous curve to the fire right General caution No entire Teneral caution No entire Vehicles over 3.5 metric tons prohibited No vehicles over 3.5 metric tons Tongerous curve to the left Stopp Privity road Right-of-way at the next intersection No passing for vehicles over 3.5 metric tons Stopp Speed limit (100km/h) Speed limit (100km/h) Speed limit (50km/h)	End of no passing by vehicles over 3.5 metric tons
Speed limit (20km/h)	) 60 <u>0</u> 0000000000000000000000000000000000	0
Speed limit (30km/h) Speed limit (50km/h)		0
Speed limit (50km/h)		0
Speed limit (70km/h)		0
Speed limit (80km/h)		0
End of speed limit (80km/h)		2
Speed limit (100km/h)		0
Speed limit (120km/h) No passing		0
No passing for vehicles over 3.5 metric tons		0
Right-of-way at the next intersection		0
Priority road	d 000000000000000000000000000000000000	0
Yield		0
Stop		0
No vehicles Vehicles over 3.5 metric tons prohibited		0
No entry		0
General caution		0
Dangerous curve to the left		0
Dangerous curve to the right		0
Double curve		0
Bumpy road Slippery road		0
Road narrows on the right		0
Road work		0
Traffic signals		0
Pedestrians		0
Children crossing		0
Bicycles crossing		0
Beware of ice/snow Wild animals crossing		0
End of all speed and passing limits		0
Turn right ahead		0
Turn left ahead		0
Ahead only		0
Go straight or right		0
Go straight or left		0
Keep right Keep left		0
Roundabout mandatory		0
End of no passing		0
End of no passing by vehicles over 3.5 metric tons		



# Misclassified images

Number of wrong predictions: 296

Percentage if wrong predictions: 2.34 %





**Questions?**