



# Klasyfikacja znaków drogowych

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# 1. Specyfikacja danych

# German Traffic Sign Dataset

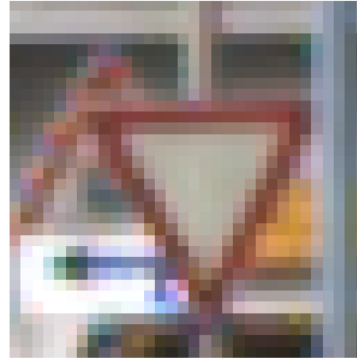
[kaggle.com/datasets/harbhajansingh21/german-traffic-sign-dataset](https://kaggle.com/datasets/harbhajansingh21/german-traffic-sign-dataset)

- 43 unikalnych rodzajów znaków
- 34799 zdjęć do trenowania
- 4410 zdjęć do walidacji
- 12630 zdjęć do testowania
- każde zdjęcie ma 32x32 px

Speed limit (30km/h)



Yield



Ahead only



No passing



Keep right



Traffic signals



Keep right

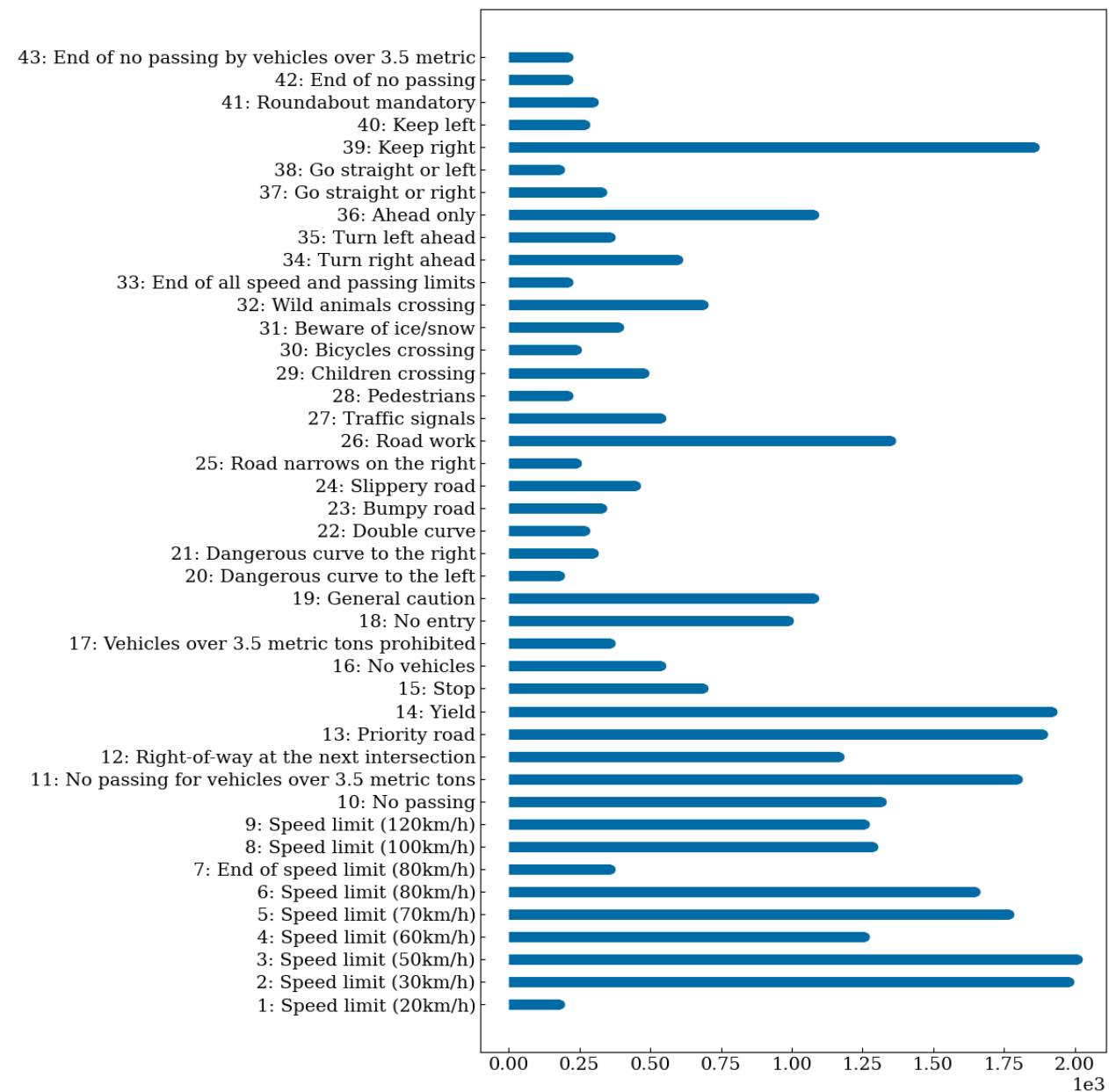


Priority road



Speed limit (50km/h)





Dane były  
*niezbalansowane*

```
from torch.utils.data import WeightedRandomSampler

samples_weights = 1 / counts

WeightedRandomSampler(
    weights=samples_weights,
    num_samples=len(samples_weights),
)
```

## 2. Model: CNN

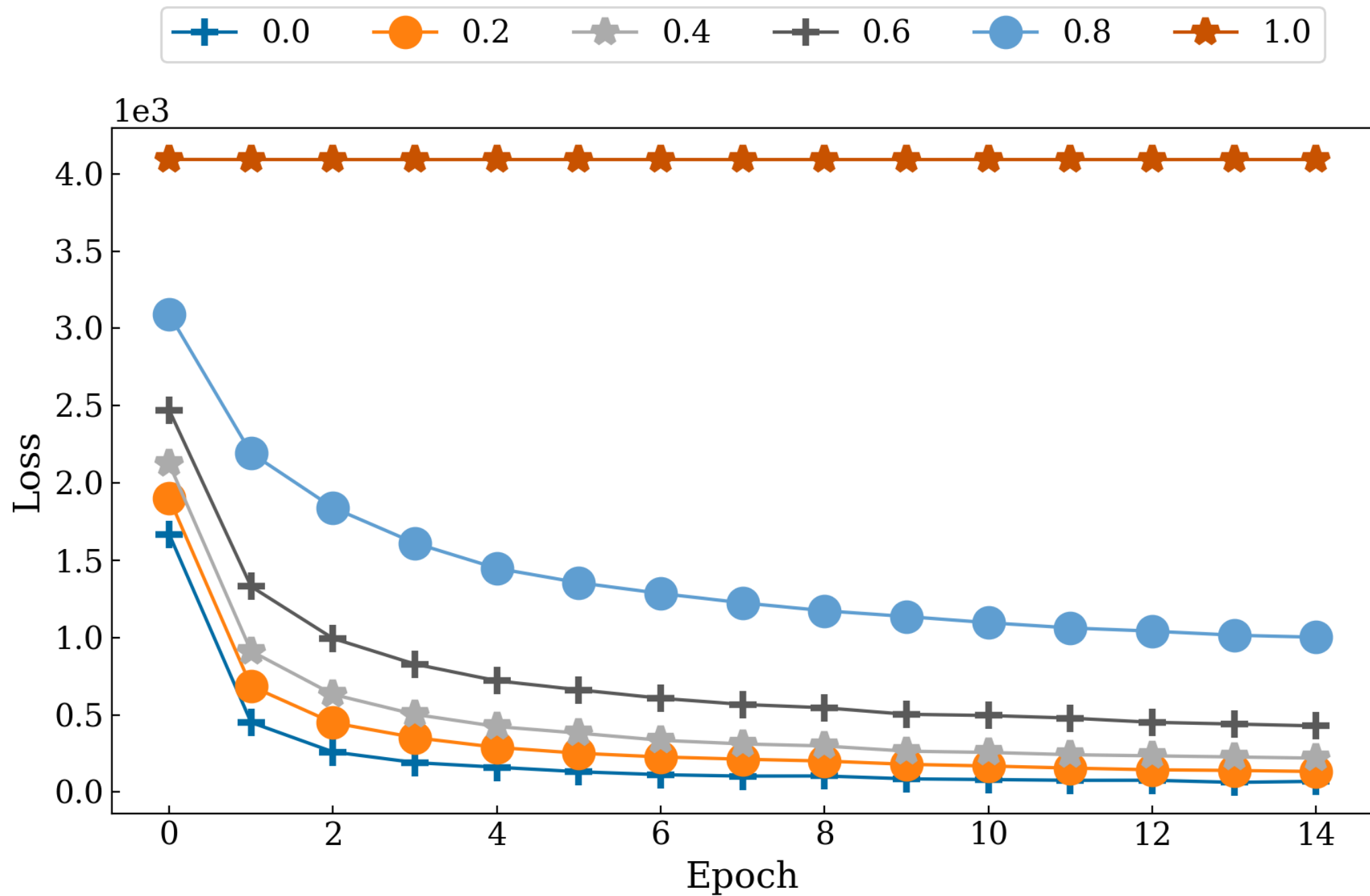
```
# ConvDownBlock:
nn.Conv2d(...) -> nn.BatchNorm2d(...) -> nn.ReLU(...) -> nn.MaxPool2d(...)

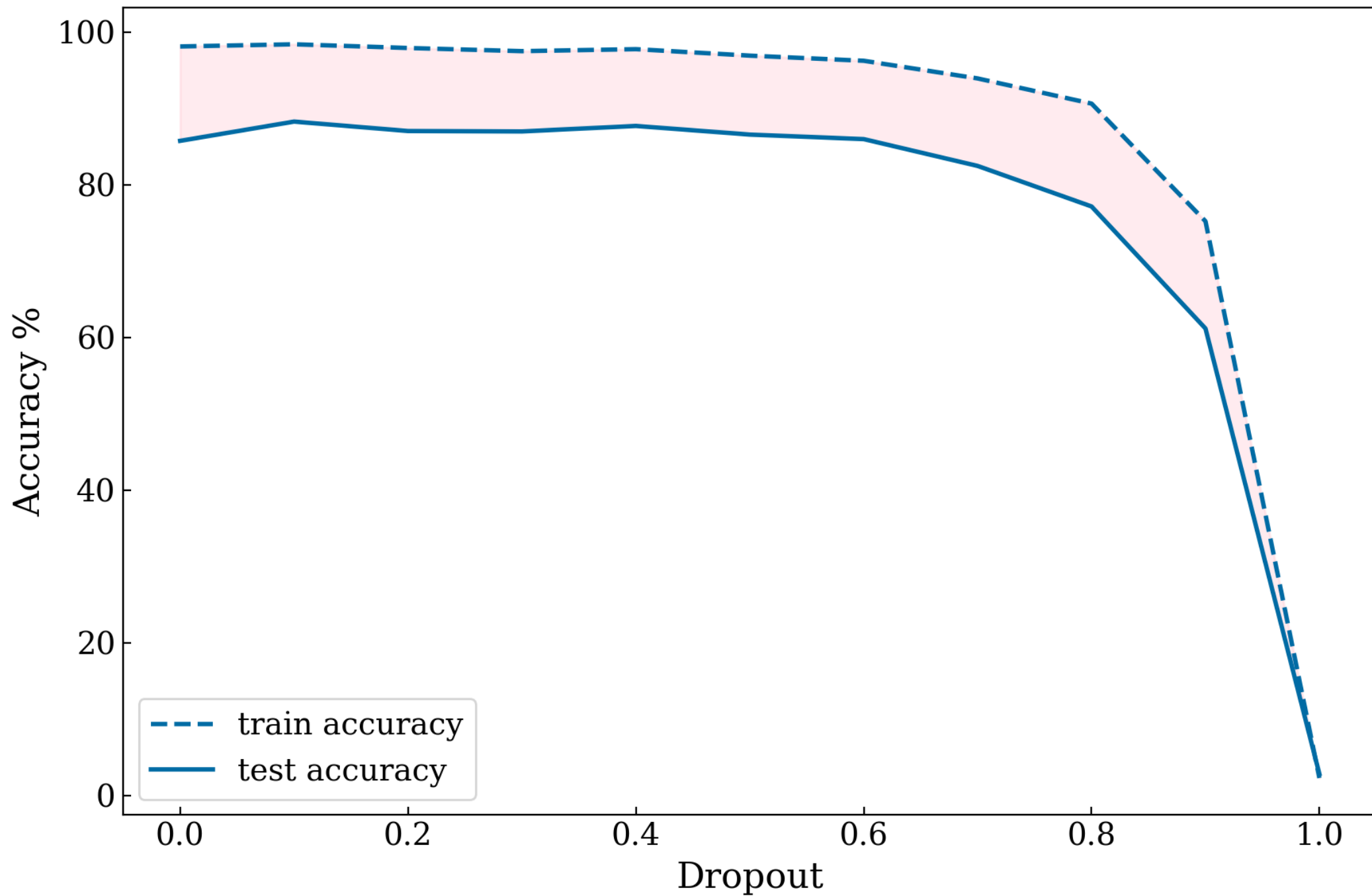
# CNN
model = nn.Sequential(
    # (*, 3, 32, 32) -> (*, 8, 16, 16)
    ConvDownBlock(3, 8, 2, 1),
    # (*, 8, 16, 16) -> (*, 16, 8, 8)
    ConvDownBlock(8, 16, 2, 1),
    # (*, 16, 8, 8) -> (*, 32, 4, 4)
    ConvDownBlock(16, 32, 2, 1),
    #
    nn.Flatten(),
    nn.Dropout(dropout),
    #
    nn.Linear(512, 128),
    nn.ReLU(),
    nn.Linear(128, len(number_of_classes)),
)
```

# 3. Wyniki

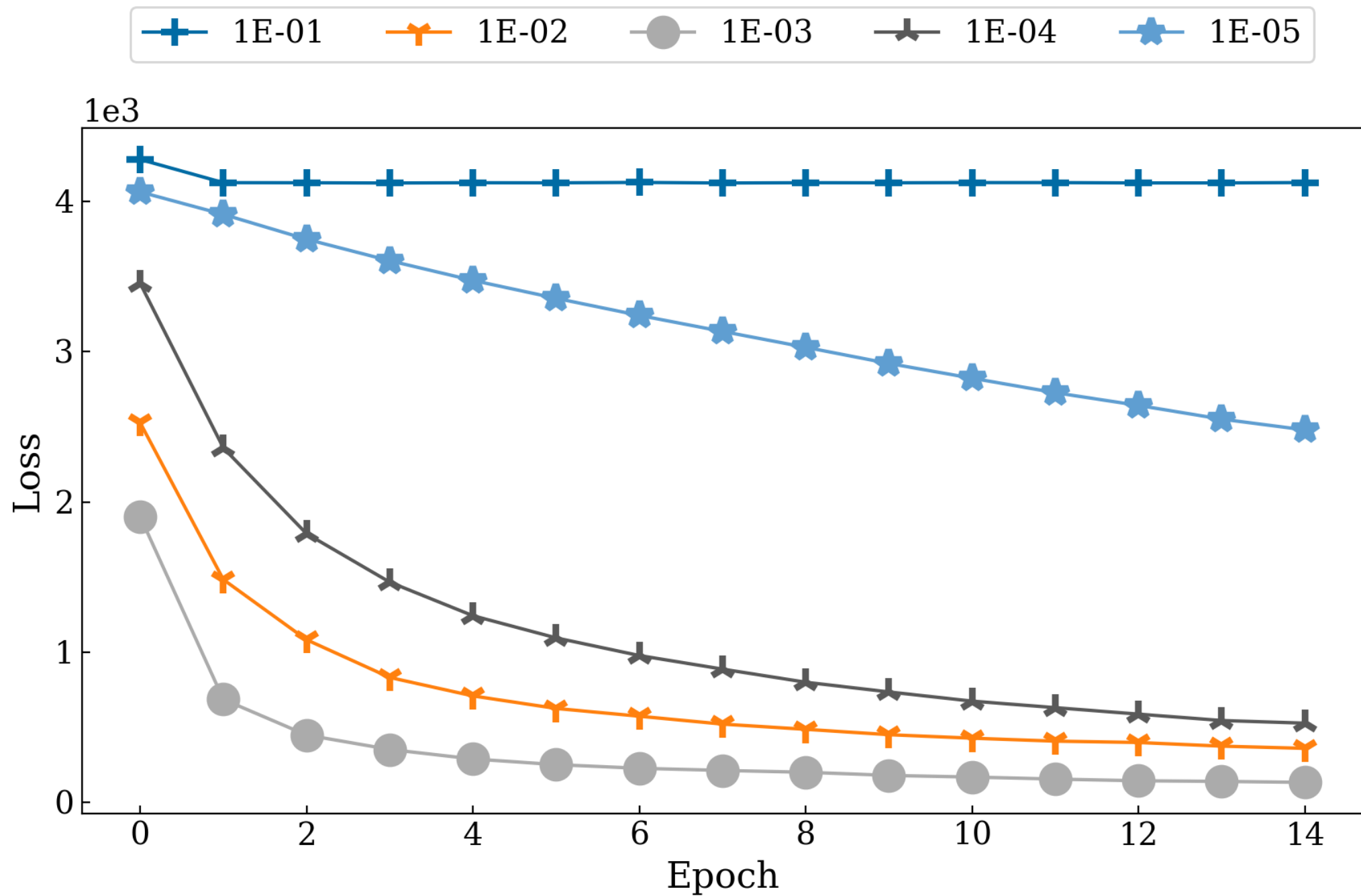


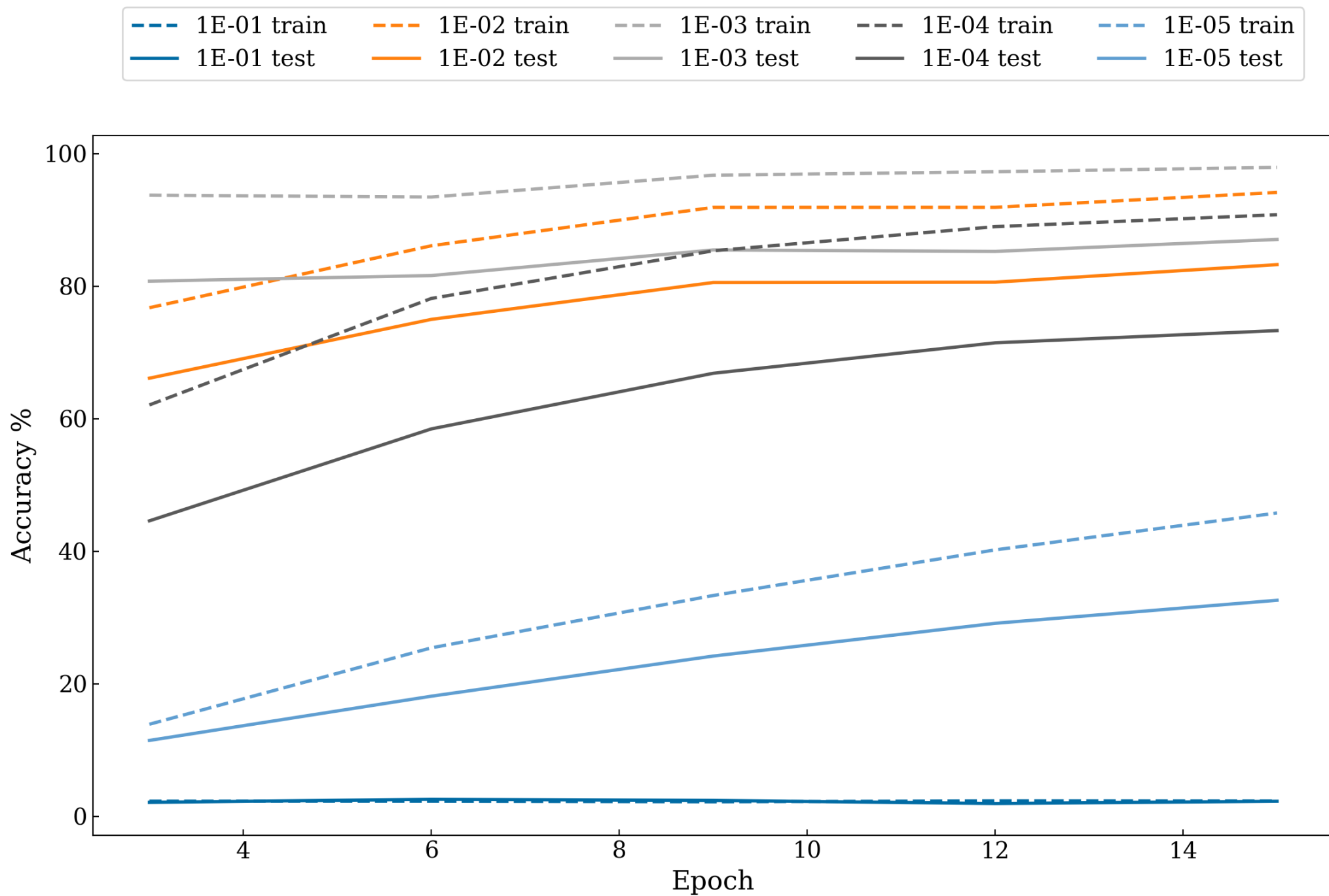
## 3.1. Wpływ dropout





## 3.2. Wpływ learning rate

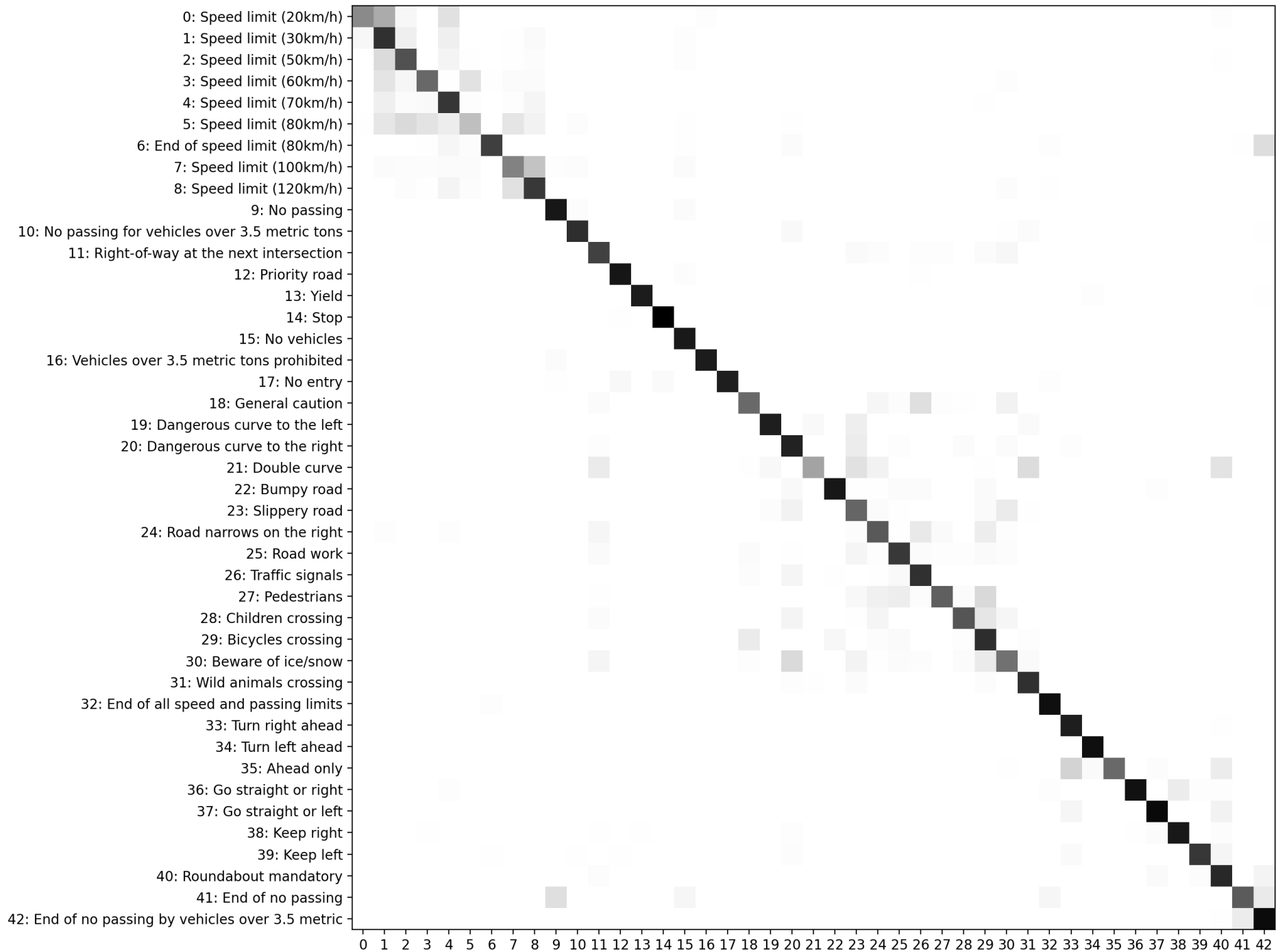




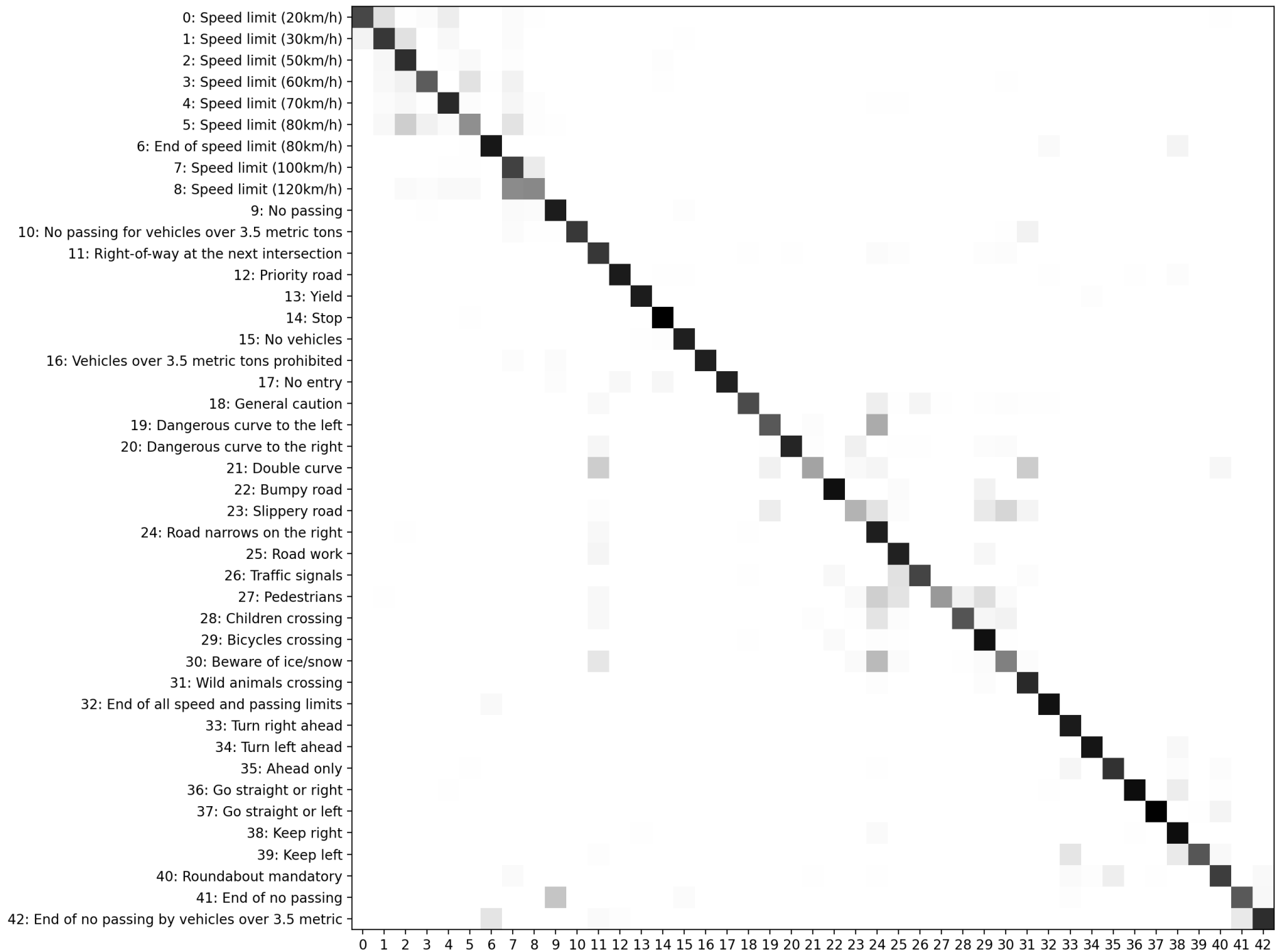
## 3.2. Confusion matrix

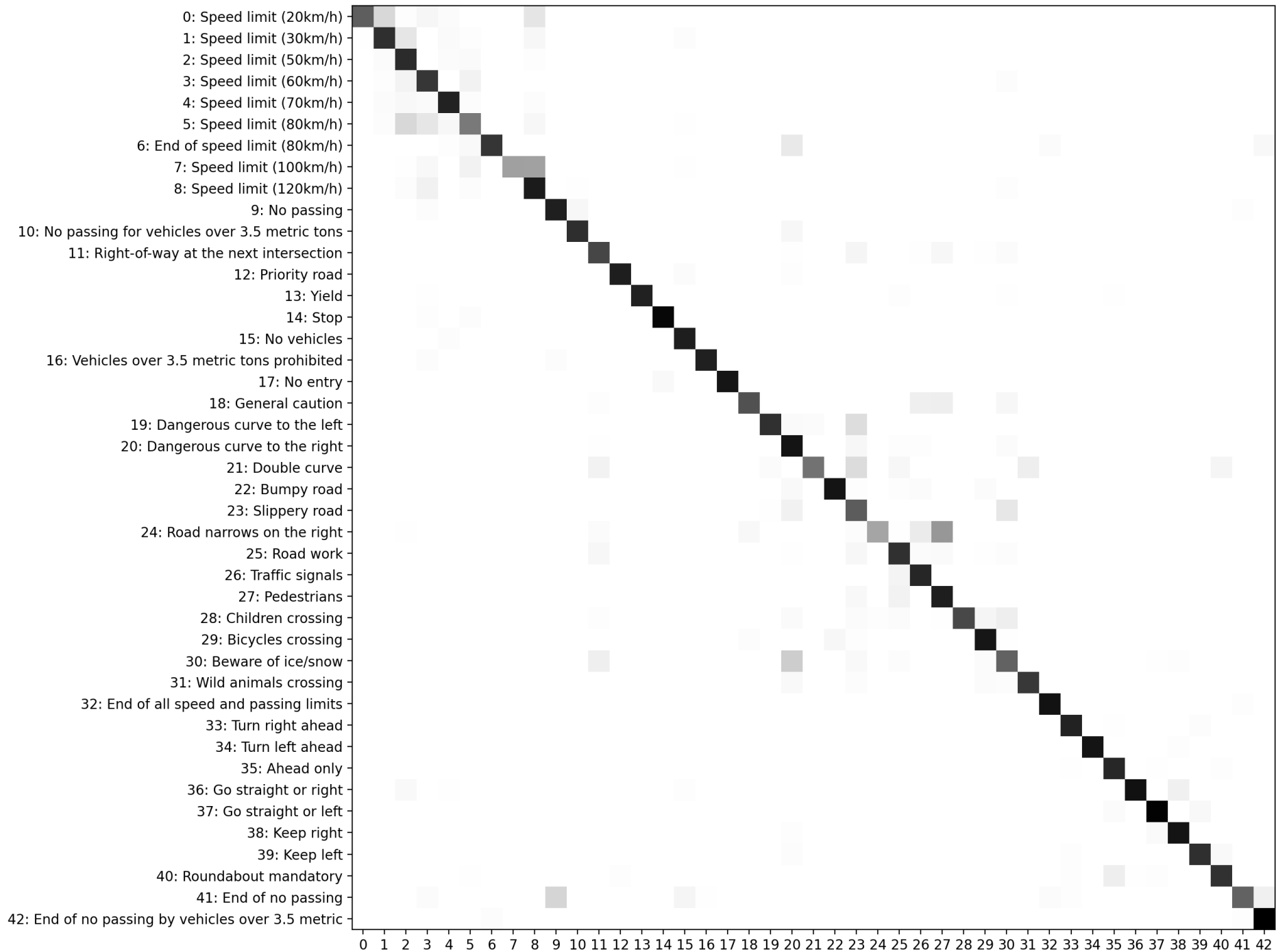
LR = 1e-03

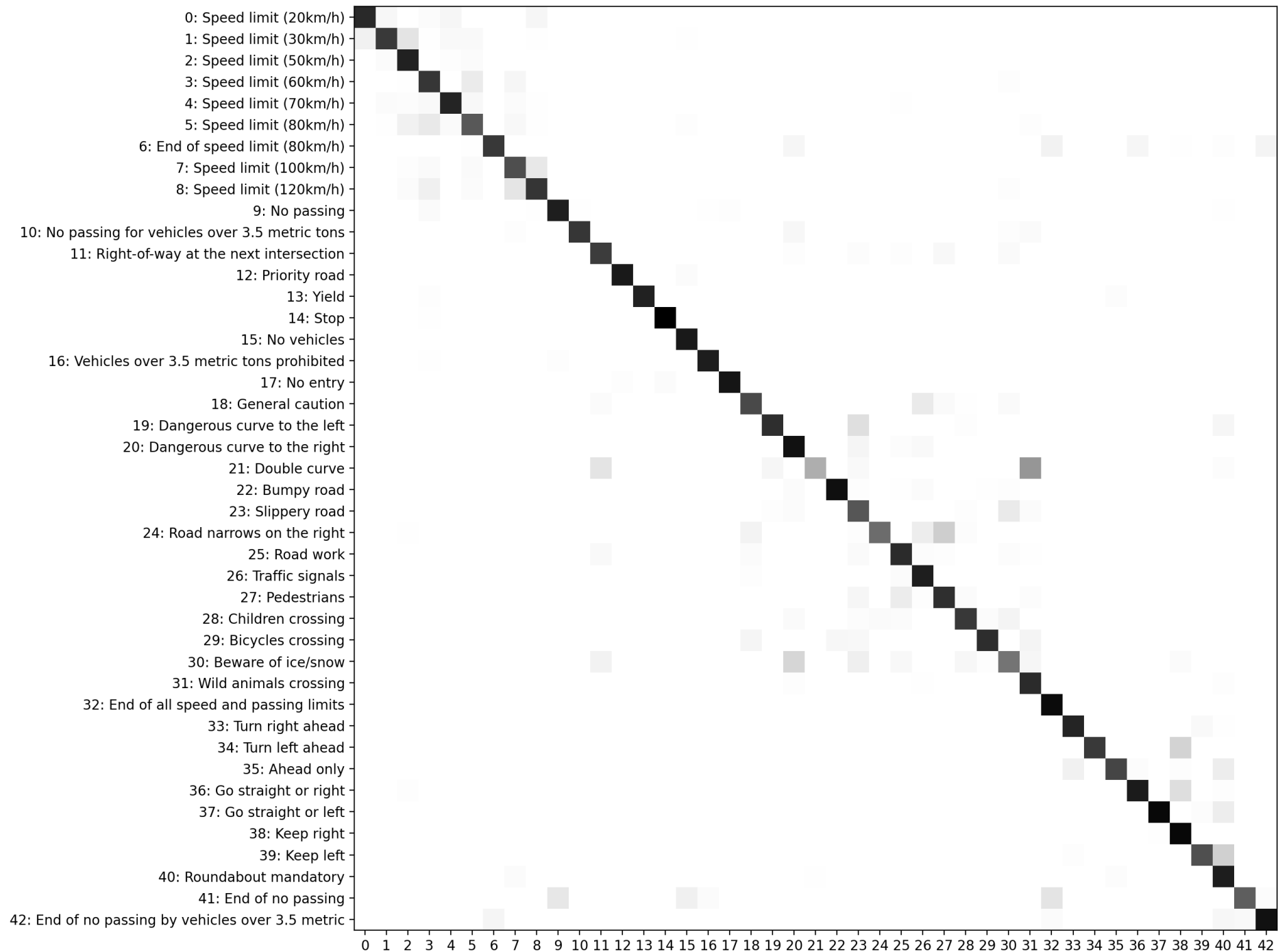
dropout = 0.2

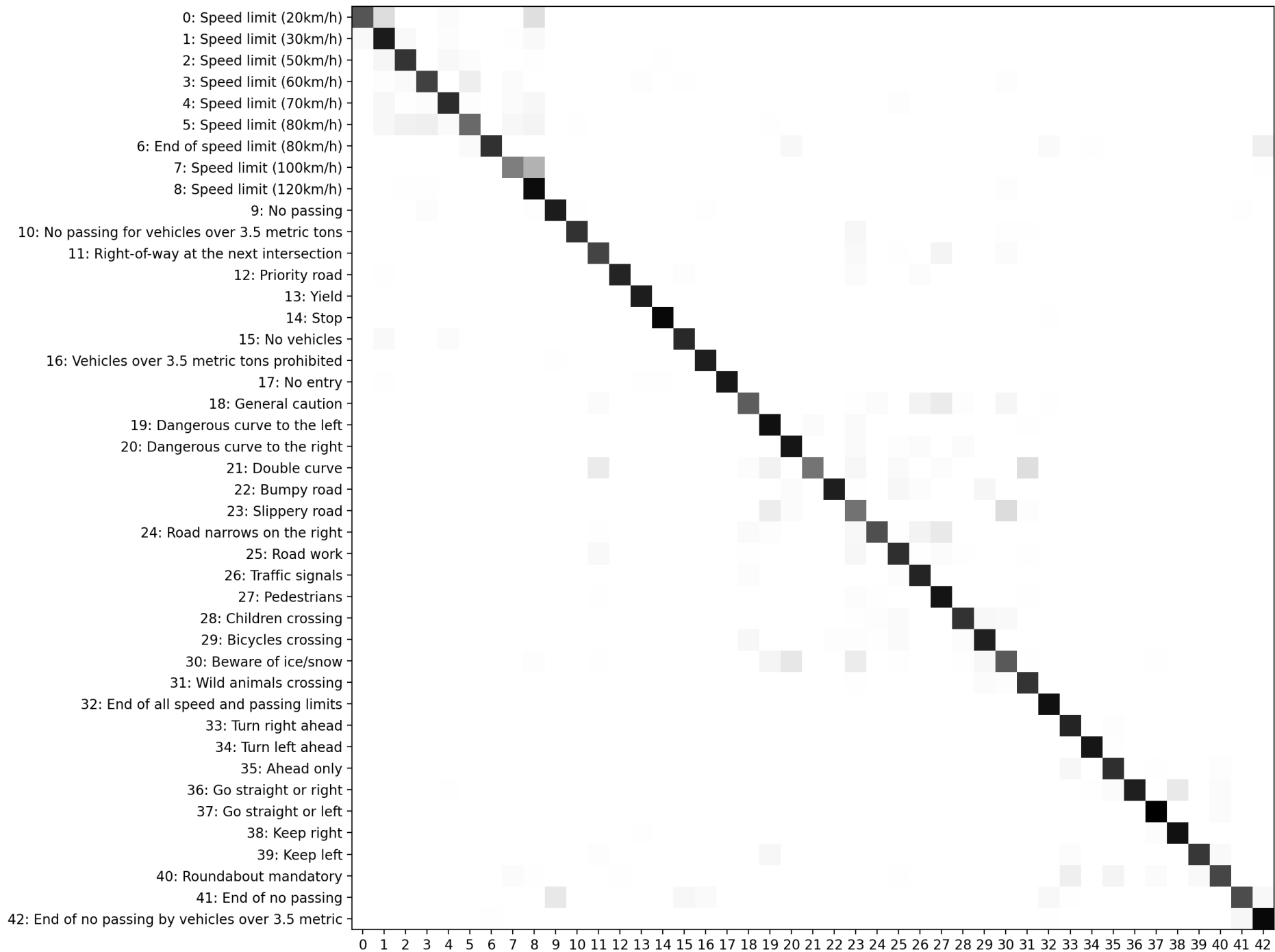








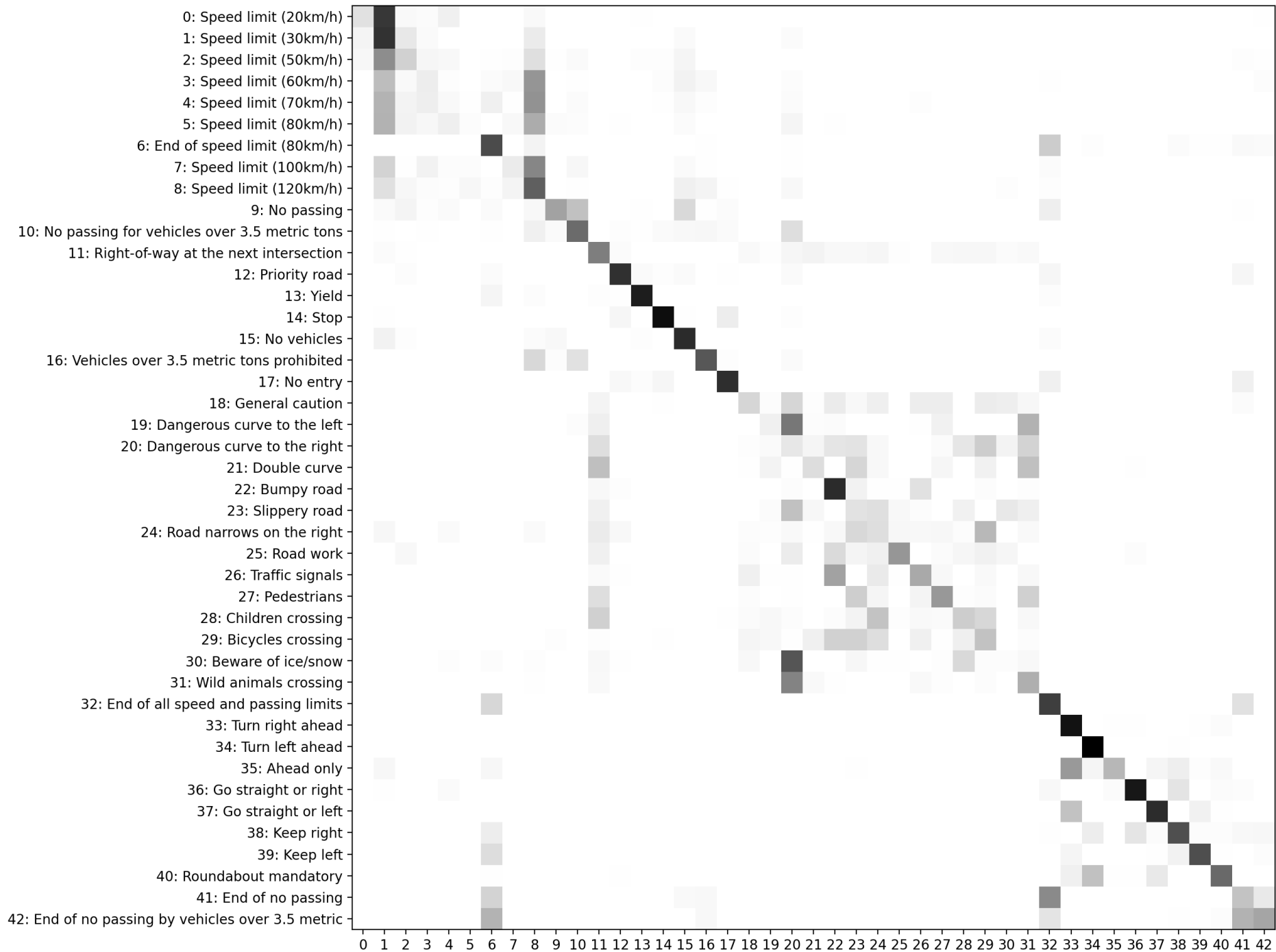


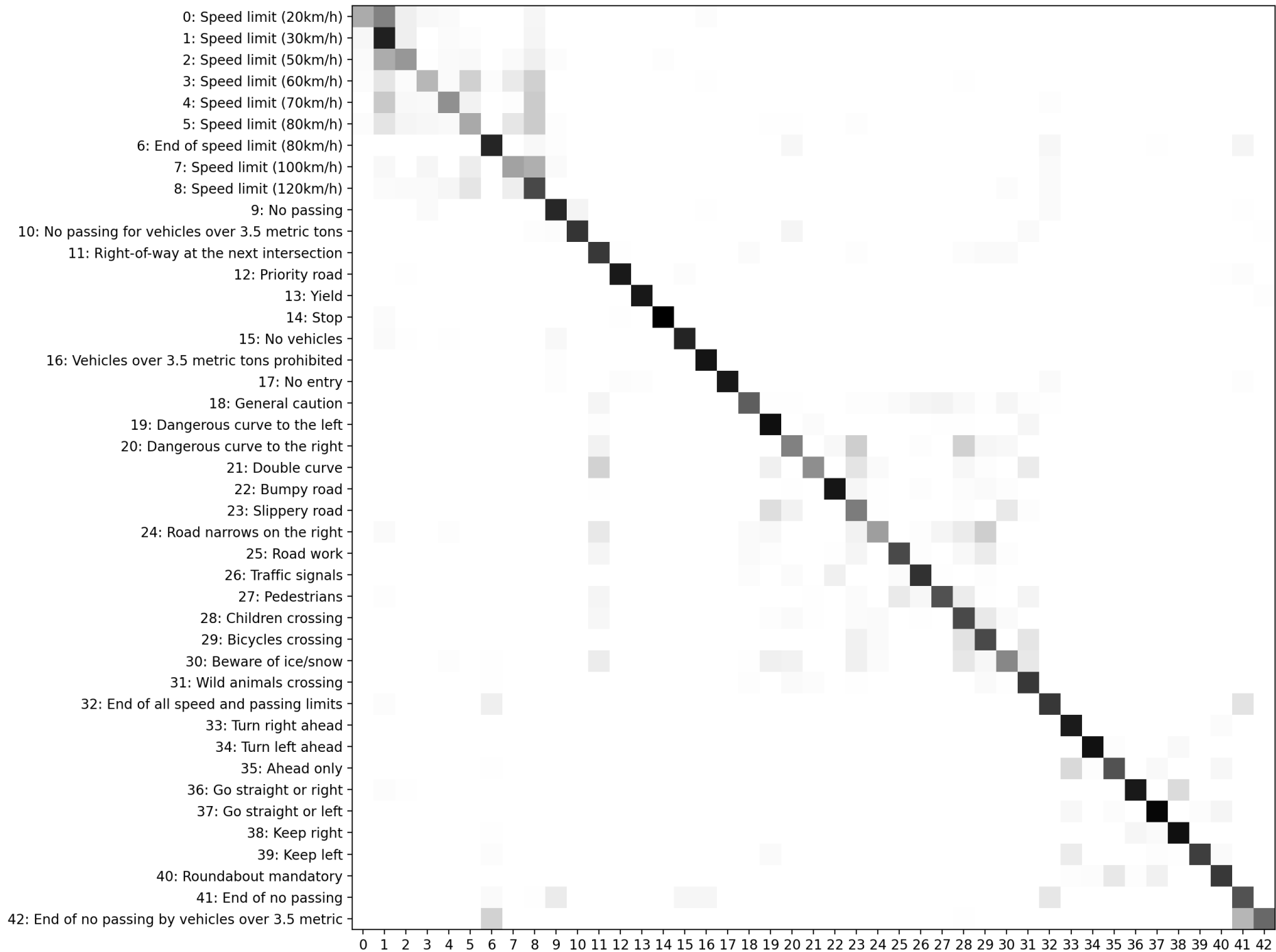


## 3.4. Confusion matrix

LR = 1e-04

dropout = 0.2





**Dziękuję za uwagę**