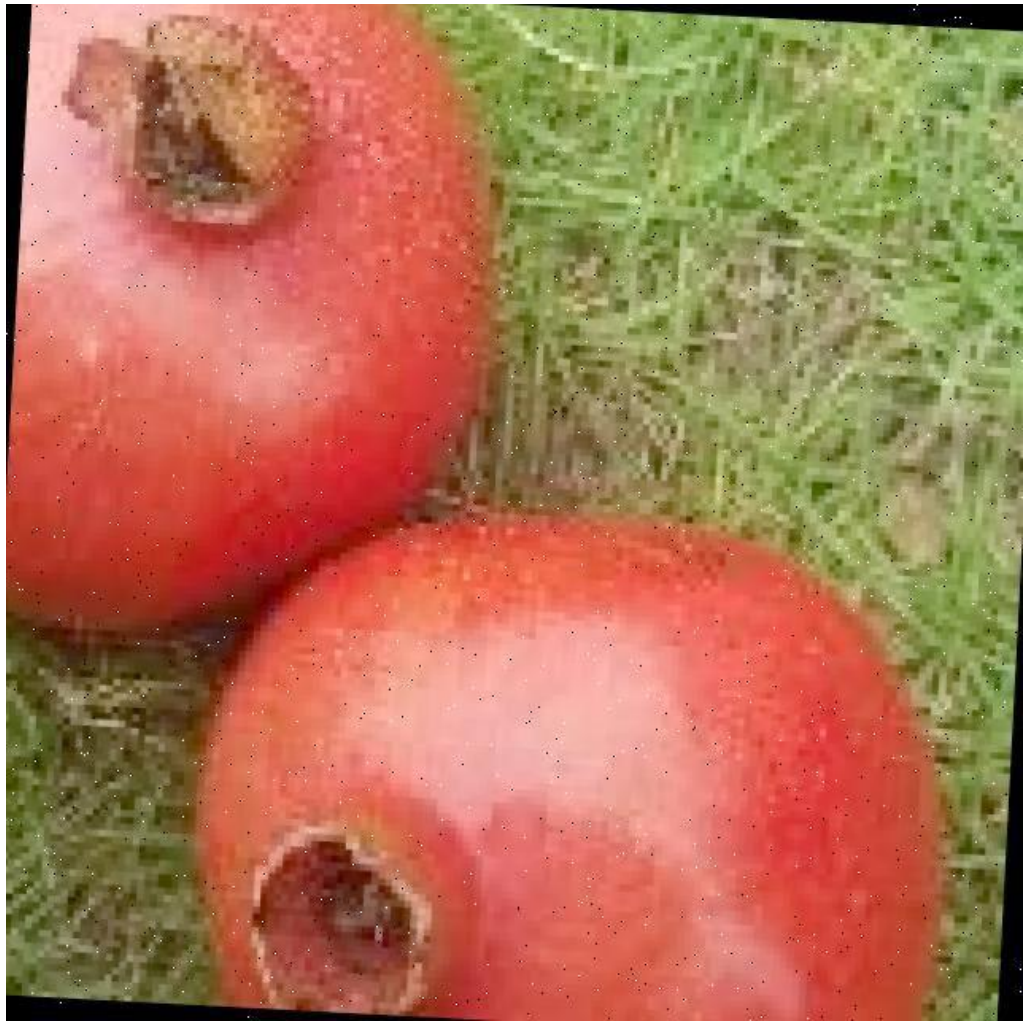
KI Gruppenprojekt

Erster Datensatz

- Fruit Quality Dataset
- CNN Ansatz

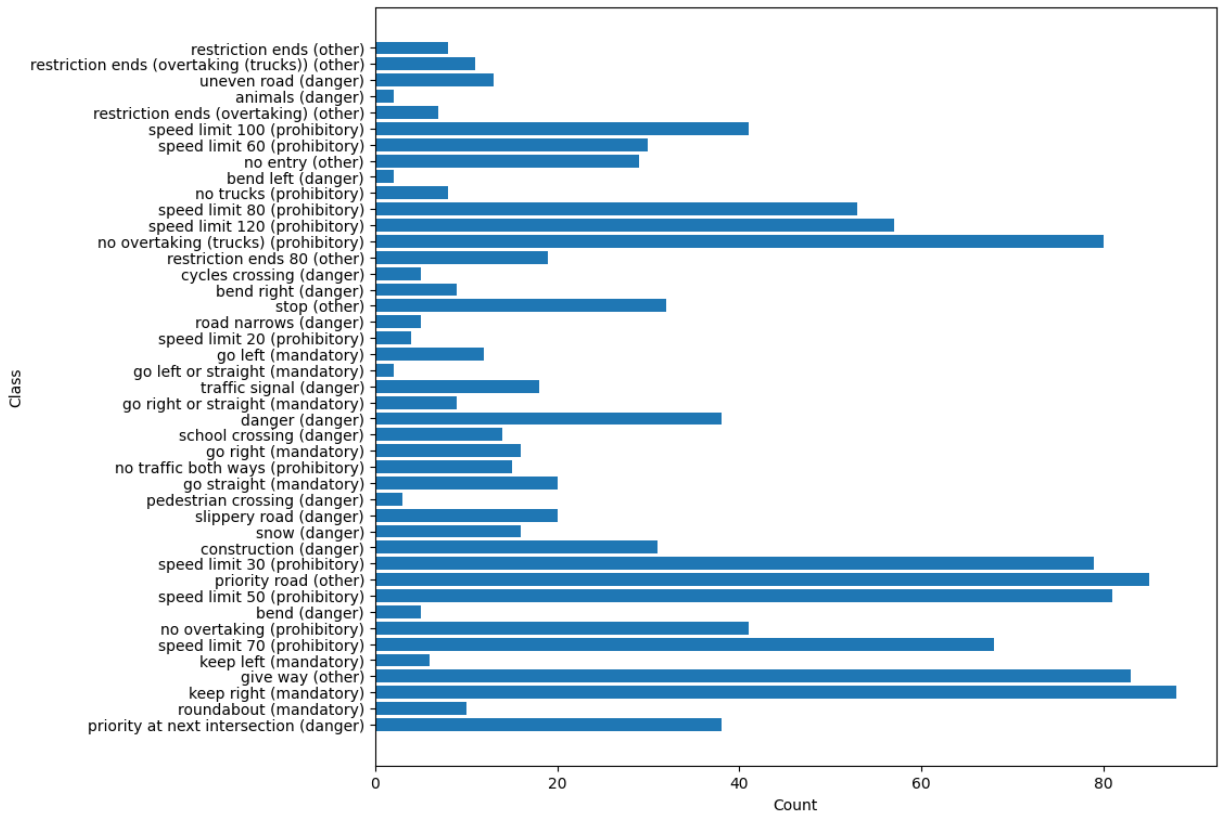
- Fehlerhafte Labels

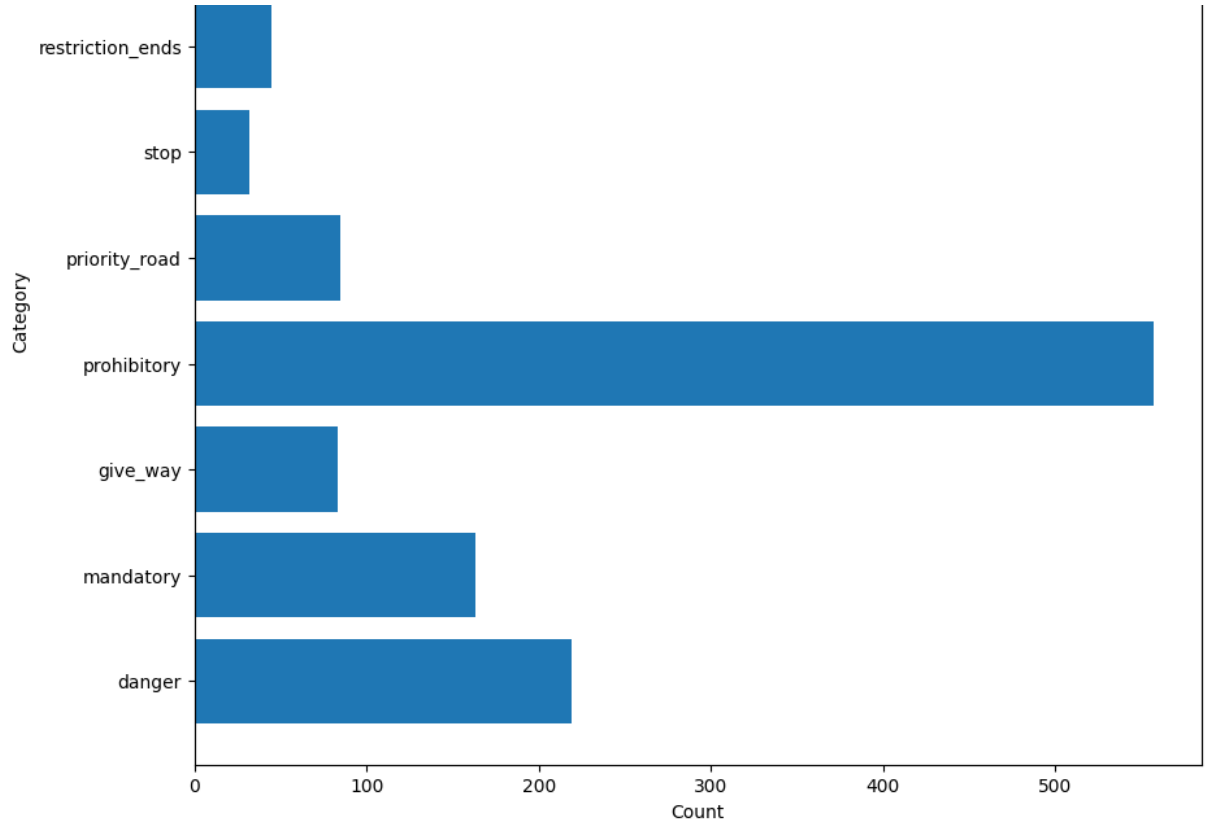


Neuer Datensatz + Ziel

- German Traffic Sign Detection Benchmark Datensatz

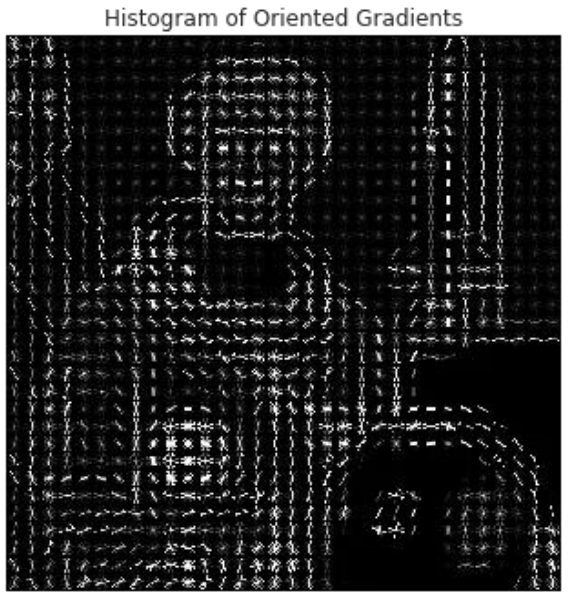
Data Distribution





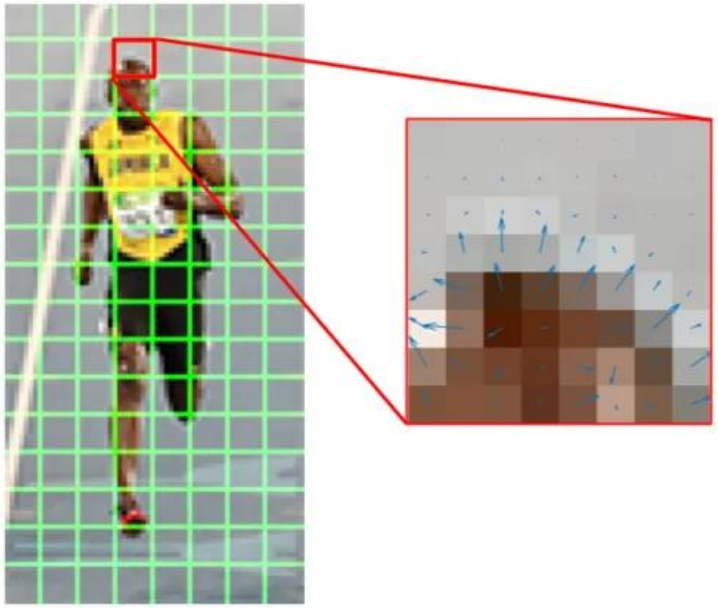
HOG-SVM Lokalisator

- Histogram of Oriented Gradients
- Sliding Window Object Detector
- Support Vector Machine (SVM)
- Kernel zu Vektor pro Pixel über Histogram und Normalisierung zu langem Vektorarray



https://iq.opengenus.org/object-detection-with-histogram-of-oriented-gradients-hog/

HOG



2	3	4	4	3	4	2	2
5	11	17	13	7	9	3	4
11	21	23	27	22	17	4	6
23	99	165	135	85	32	26	2
91	155	133	136	144	152	57	28
98	196	76	38	26	60	170	51
165	60	60	27	77	85	43	136
71	13	34	23	108	27	48	110

Gradient Magnitude

80	36	5	10	0	64	90	73
37	9	9	179	78	27	169	166
87	136	173	39	102	163	152	176
76	13	1	168	159	22	125	143
120	70	14	150	145	144	145	143
58	86	119	98	100	101	133	113
30	65	157	75	78	165	145	124
11	170	91	4	110	17	133	110

Gradient Direction

https://learnopencv.com/histogram-of-oriented-gradients/

-1	0	1

-1
0
1

https://learnopencv.com/histogram-of-oriented-gradients/

$$g = \sqrt{g_x^2 + g_y^2}$$

$$\theta = \arctan \frac{g_y}{g_x}$$

https://learnopencv.com/histogram-of-oriented-gradients/

CNN Lokalisator

- Bounding-Box-Regression
- ResNet-50 (Feature-Extractor)
- Region Proposal Network (RPN)

CNN Recognition

- Mehrere Convolutional Layers (Conv2D)
- ReLUAktivierung
- Kernel-Regularisierung zur Merkmalsextraktion
- Batch-Normalisierung
- Max-Pooling-Schichten

Ergebnisse

HOG+SVM

CNN

HOG-SVM

- mandatory
- keep right - 0.87

- no_entry
- no entry - 0.98

- prohibitory
- keep right - 0.87

CNN

- keep right - 0.97

- no entry - 0.99

- speed limit 70 - 0.99

- speed limit 70 - 0.99