Görüntü Segmentasyonu

İrem Kömürcü

Hello Everyone!

İrem Kömürcü

Computer Vision Engineer

www.iremkomurcu.com

iremkomurcu

irem-komurcu

iremkomurcubm

Google Developer Expert on Machine Learning

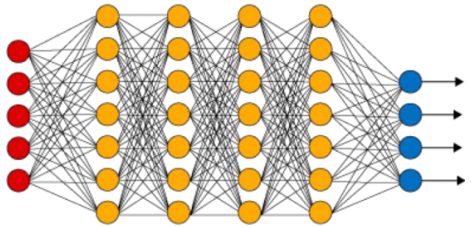
Data Scientist @Deloitte

TensorFlow Turkey - Core Member

GDG & WTM İstanbul - Organizer

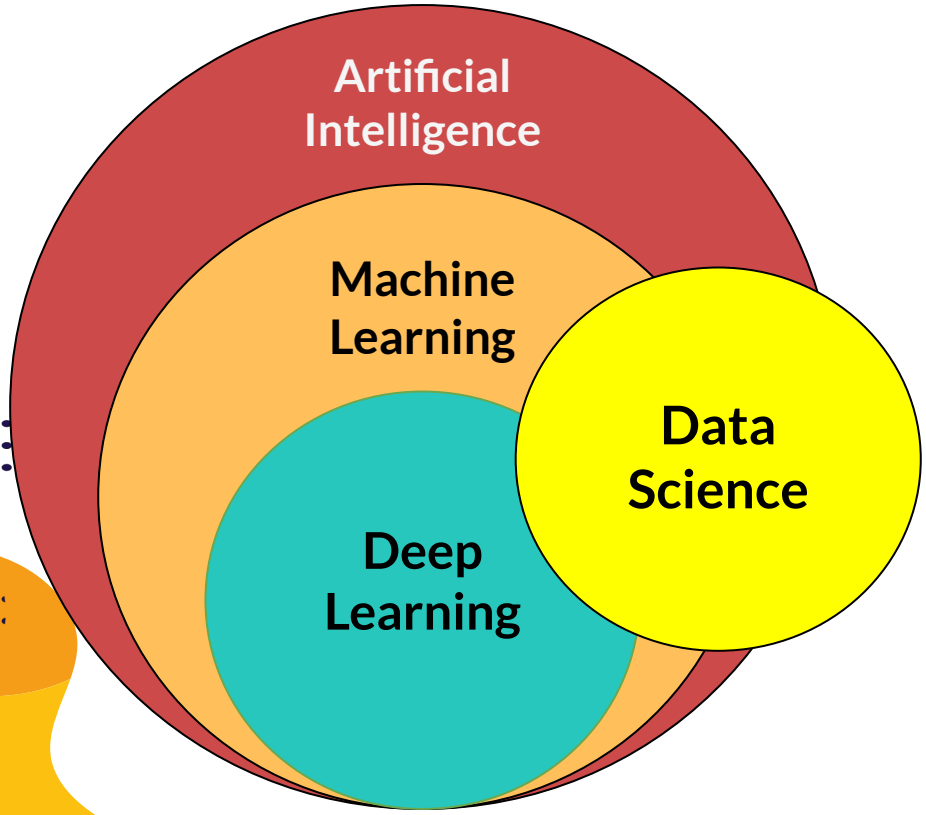
Artificial Intelligence

Machine Learning

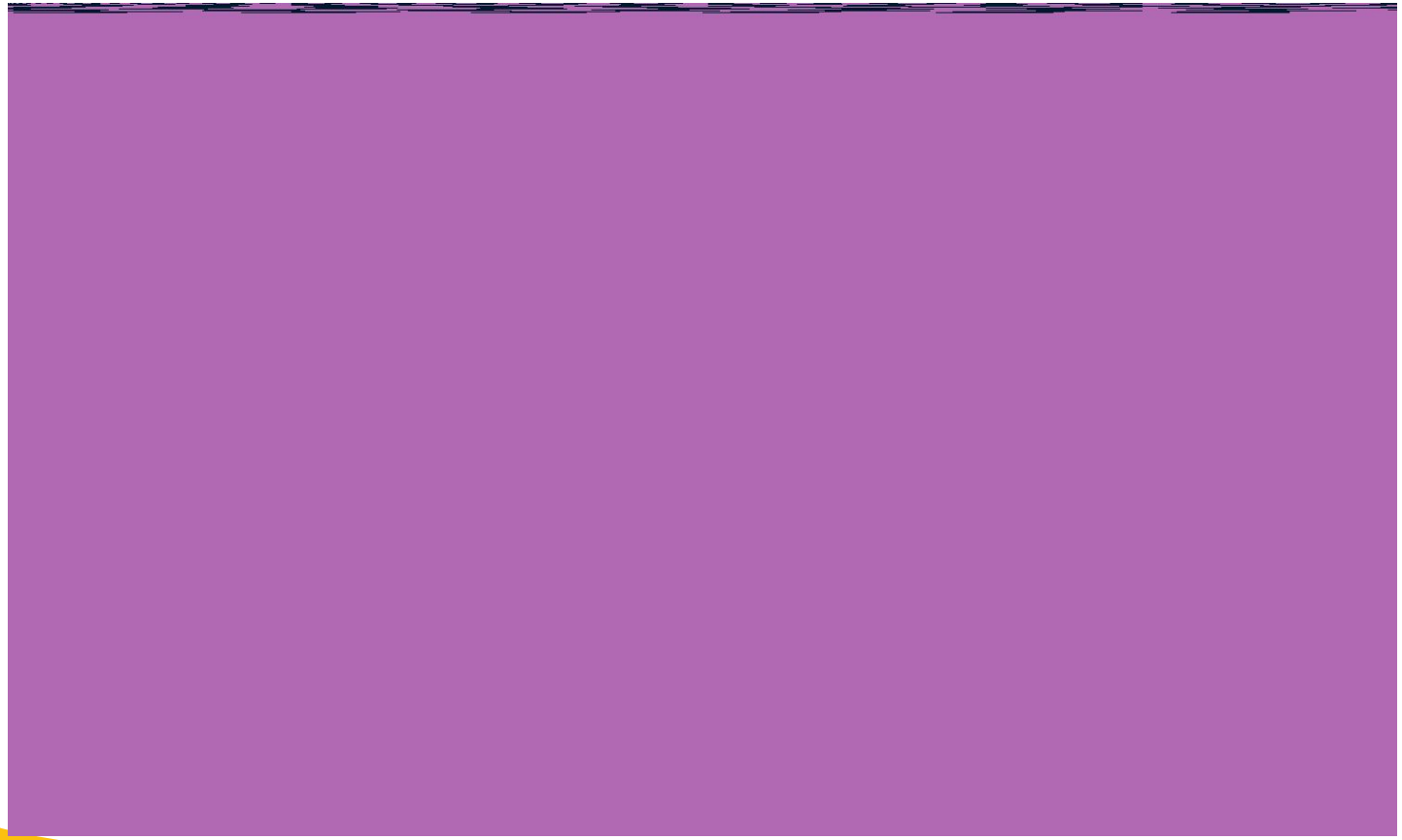


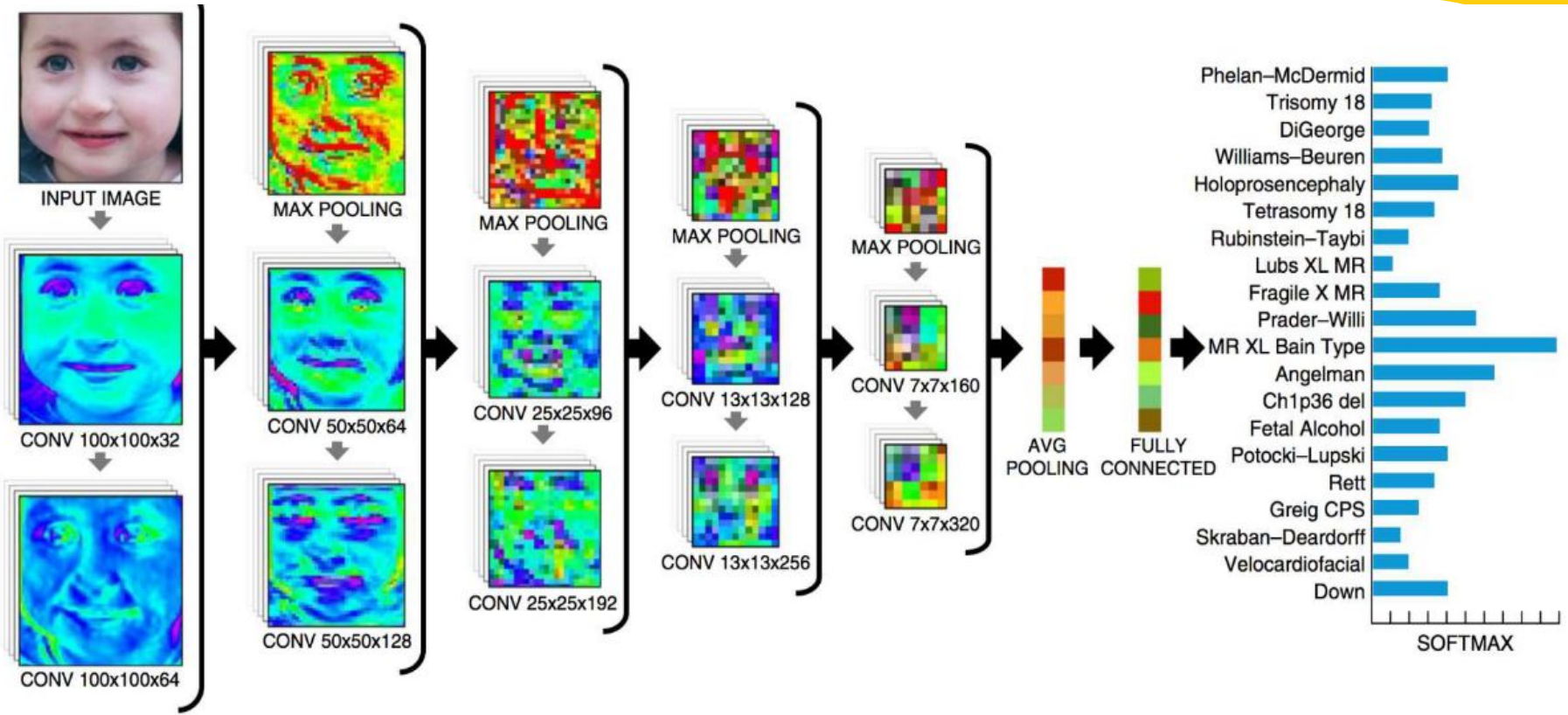
Deep Learning

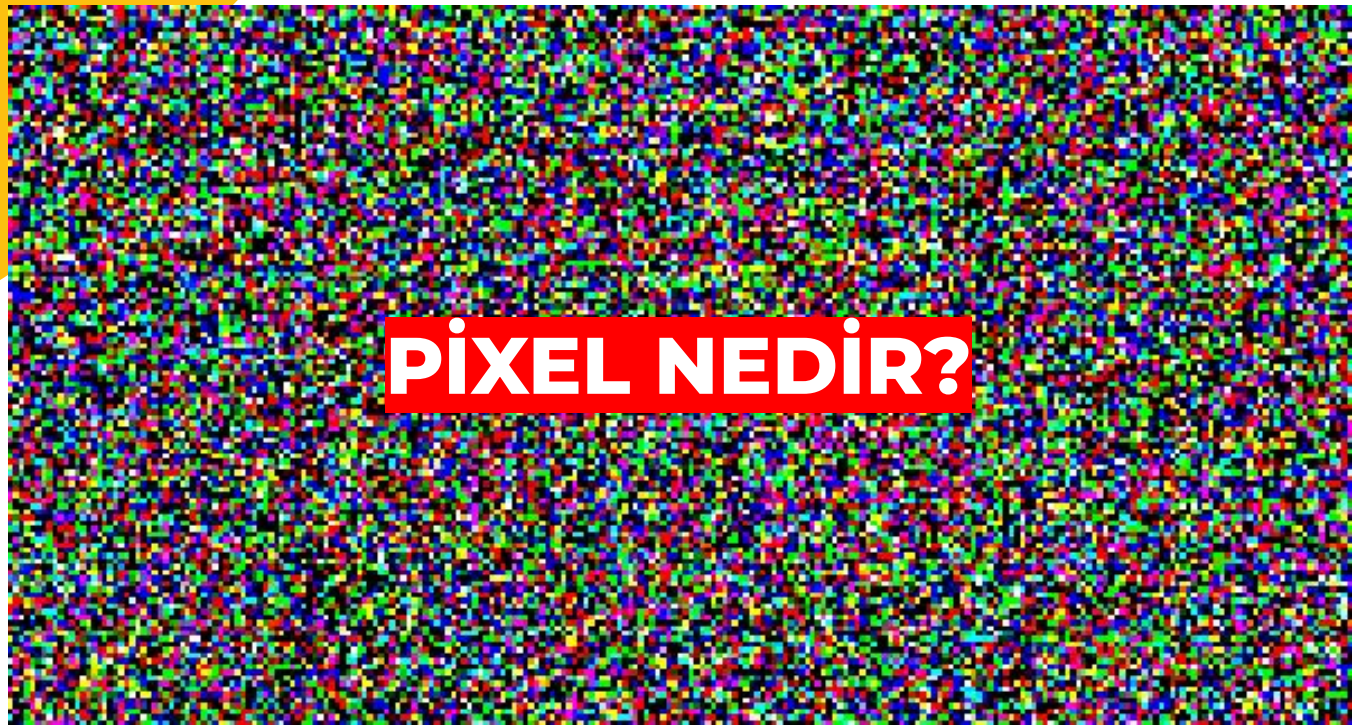
1950 1970 1980 1990 2010



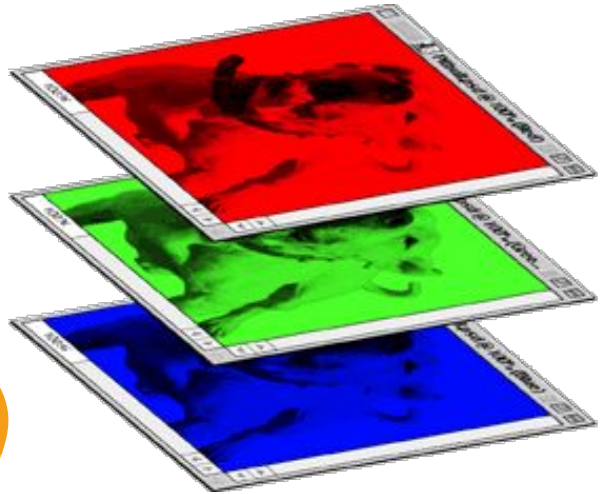
- Artificial Intelligence
- Machine Learning
- Deep Learning
- Data Science
- Big Data
- Mats & Statistic
- Computer Vision
- Natural Language Processing
- Reinforcement Learning
- Image Processing

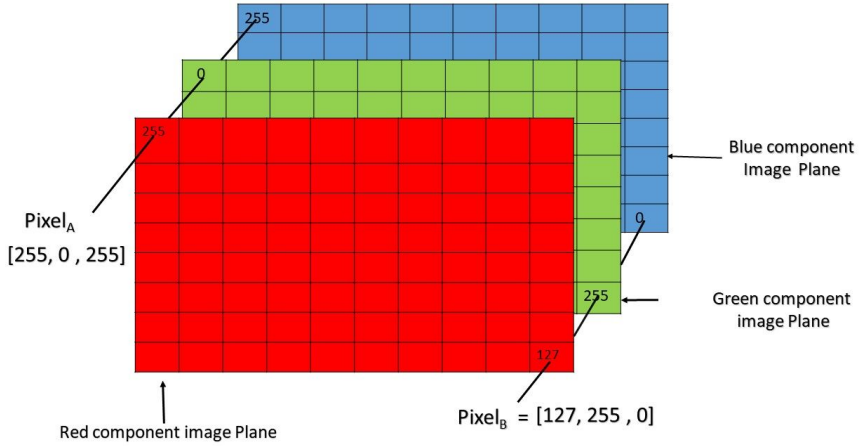



INPUT IMAGE
CONV 100x100x32
CONV 100x100x64
MAX POOLING
CONV 50x50x64
CONV 50x50x128
MAX POOLING
CONV 25x25x96
CONV 25x25x192
MAX POOLING
CONV 13x13x128
CONV 13x13x256
MAX POOLING
CONV 7x7x160
CONV 7x7x320
AVG POOLING
FULLY CONNECTED
Phelan–McDermid
Trisomy 18
DiGeorge
Williams–Beuren
Holoprosencephaly
Tetrasomy 18
Rubinstein–Taybi
Lubs XL MR
Fragile X MR
Prader–Willi
MR XL Bain Type
Angelman
Ch1p36 del
Fetal Alcohol
Potocki–Lupski
Rett
Greig CPS
Skraban–Deardorff
Velocardiofacial
Down
SOFTMAX

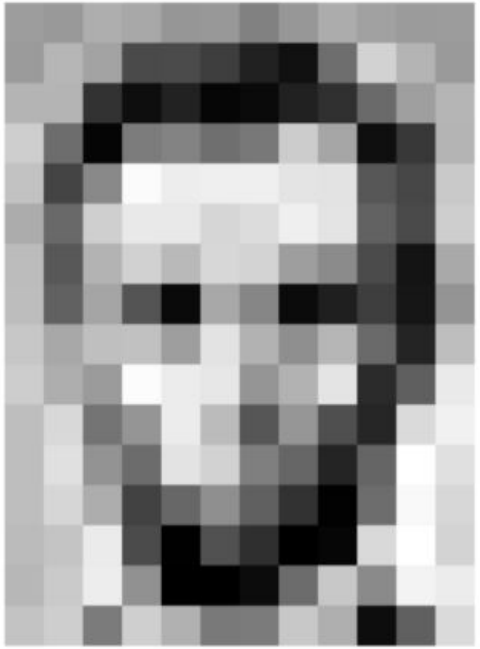

PİXEL NEDİR?

Pixel ve Renk Kanalları





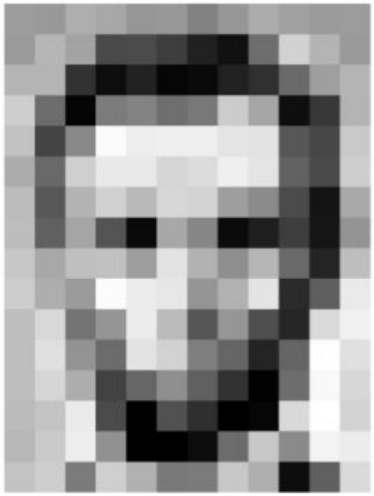
Pixel of an RGB image are formed from the corresponding pixel of the three component images



157	153	174	168	150	152	129	151	172	161	155	156
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	106	159	181
206	109	5	124	131	111	120	204	166	15	56	180
194	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	75	20	169
189	97	165	84	10	168	134	11	31	62	22	148
199	168	191	193	158	227	178	143	182	106	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	86	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	96	50	2	109	249	215
187	196	235	75	1	81	47	0	6	217	255	211
183	202	237	145	0	0	12	108	200	138	243	236
196	206	123	207	177	121	123	200	175	13	96	218

What the computer sees

157	153	174	168	150	152	129	151	172	161	155	156
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	106	159	181
206	109	5	124	131	111	120	204	166	15	56	180
194	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	75	20	169
189	97	165	84	10	168	134	11	31	62	22	148
199	168	191	193	158	227	178	143	182	106	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	86	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	96	50	2	109	249	215
187	196	235	75	1	81	47	0	6	217	255	211
183	202	237	145	0	0	12	108	200	138	243	236
196	206	123	207	177	121	123	200	175	13	96	218



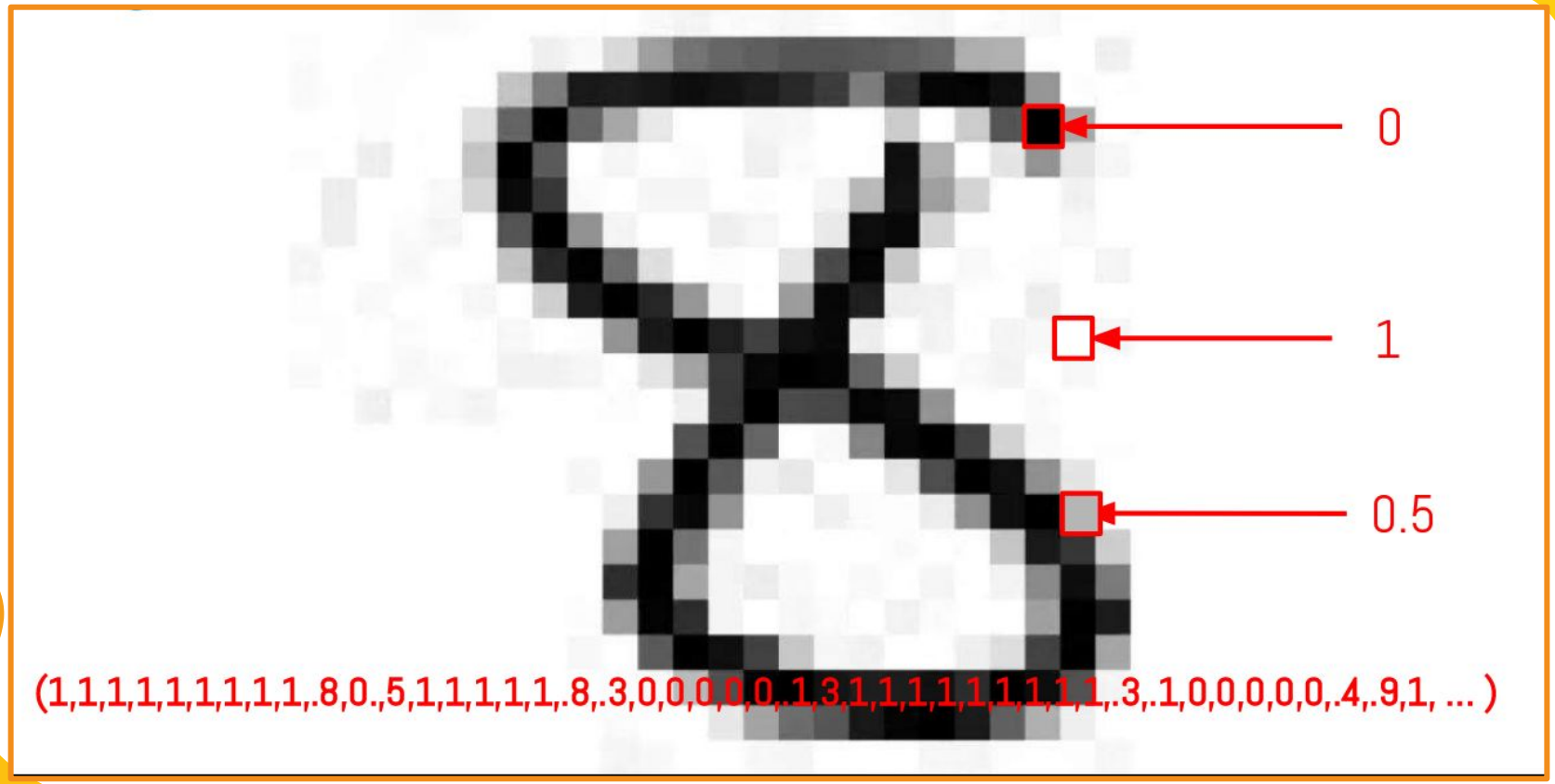
Input Image

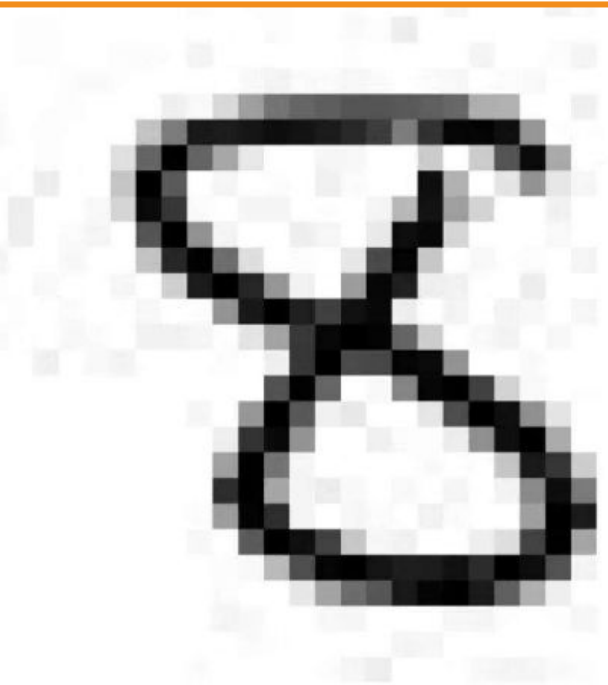
157	153	174	168	150	152	129	151	172	161	155	156
155	182	163	74	75	62	33	17	110	210	180	154
180	180	50	14	34	6	10	33	48	106	159	181
206	109	5	124	131	111	120	204	166	15	56	180
194	68	137	251	237	239	239	228	227	87	71	201
172	105	207	233	233	214	220	239	228	98	74	206
188	88	179	209	185	215	211	158	139	75	20	169
189	97	165	84	10	168	134	11	31	62	22	148
199	168	191	193	158	227	178	143	182	106	36	190
205	174	155	252	236	231	149	178	228	43	95	234
190	216	116	149	236	187	86	150	79	38	218	241
190	224	147	108	227	210	127	102	36	101	255	224
190	214	173	66	103	143	96	50	2	109	249	215
187	196	235	75	1	81	47	0	6	217	255	211
183	202	237	145	0	0	12	108	200	138	243	236
195	206	123	207	177	121	123	200	175	13	96	218

Pixel Representation

classification

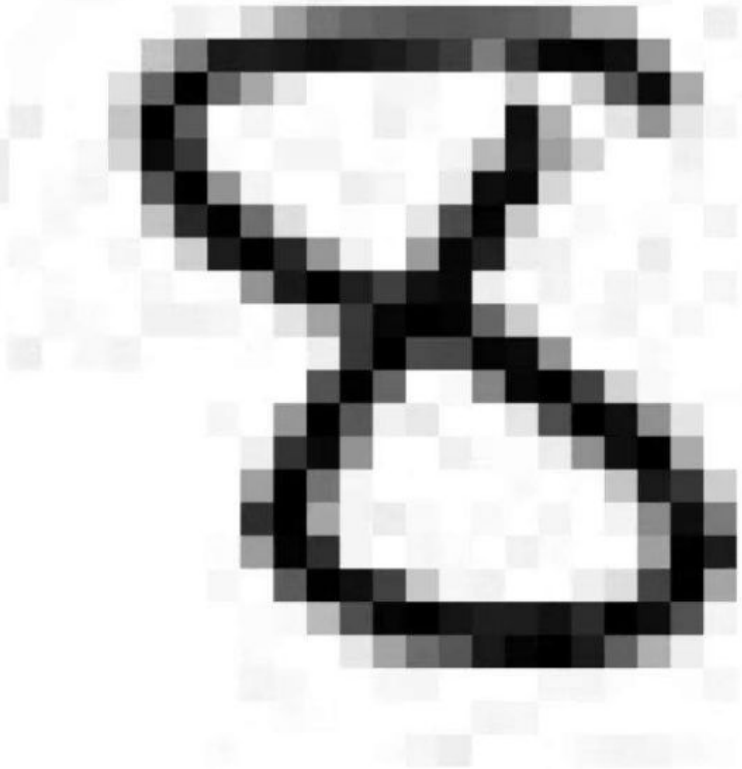
Lincoln	0.8
Washington	0.1
Jefferson	0.05
Obama	0.05

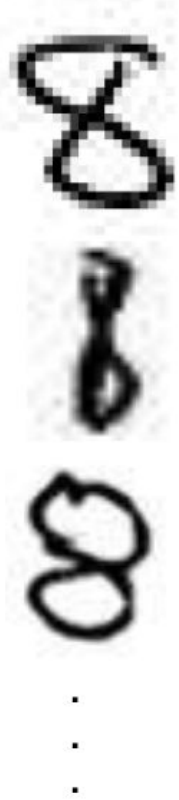

0
1
0.5
(1,1,1,1,1,1,1,1,1,.8,0.,5,1,1,1,1,1,.8,.3,0,0,0,0,0,0,.1,3,1,1,1,1,1,1,1,1,.3,.1,0,0,0,0,0,.4,.9,1, ...)



(1,1,1,1,1,1,1,1,1,.8,0.,5,1,1,1,...)

784 pixels → 784 dimensions





(1,1,1,1,1,1,1,1,1,.8,0.,5,1,1,1,...)

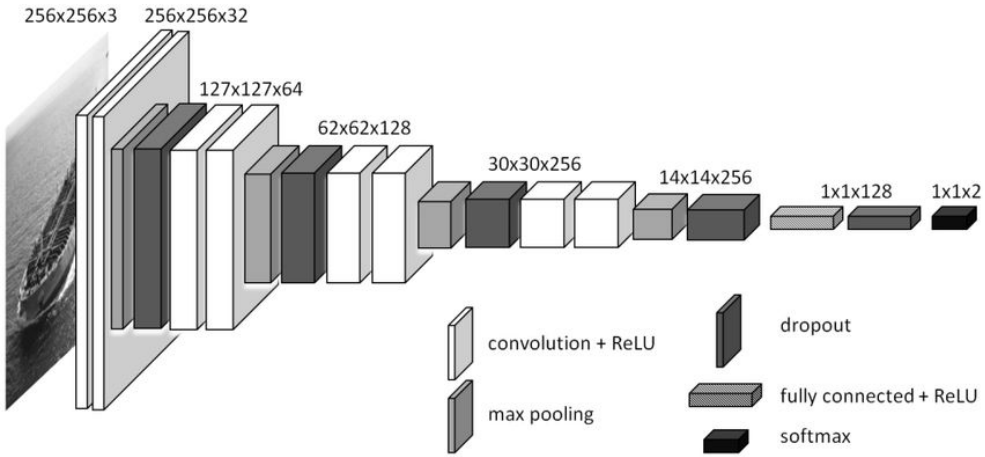
784 pixels ⟶ 784 dimensions

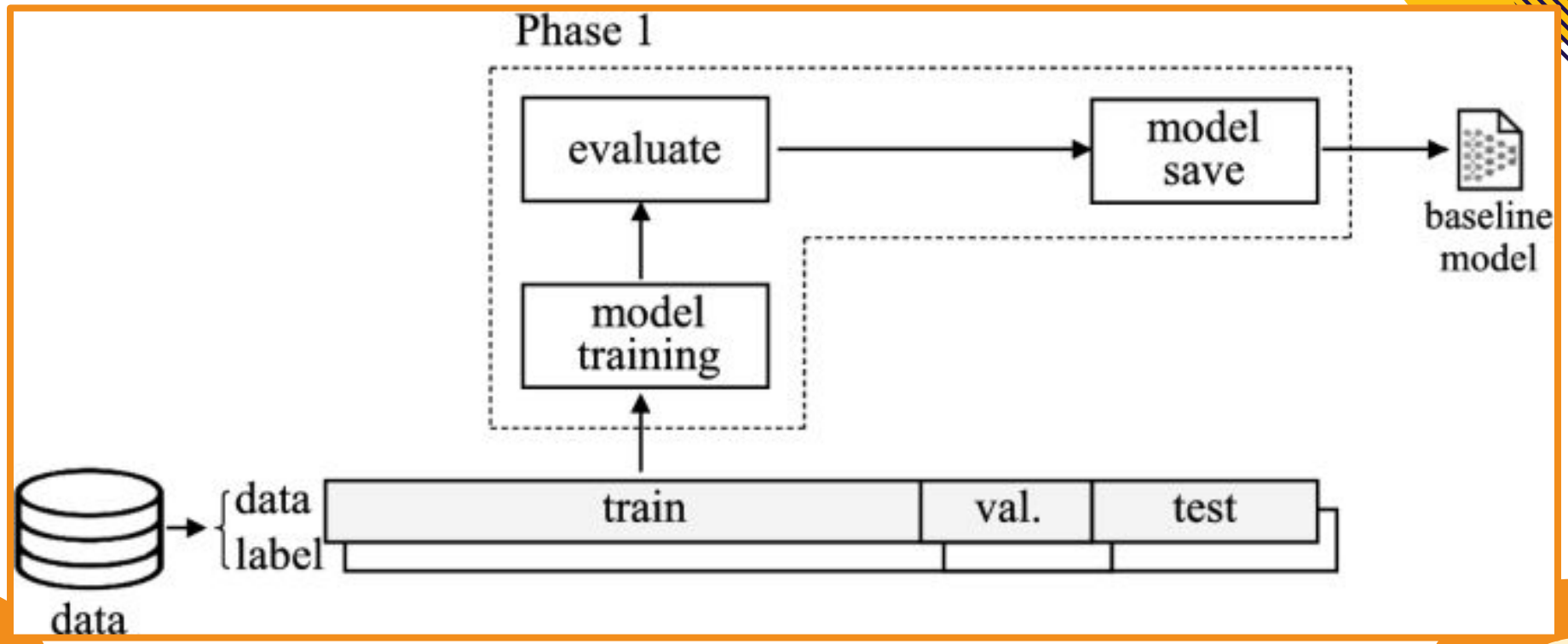
(1,1,1,1,1,1,1,1,1,.6,.7,0.,4,1,1,1,...)

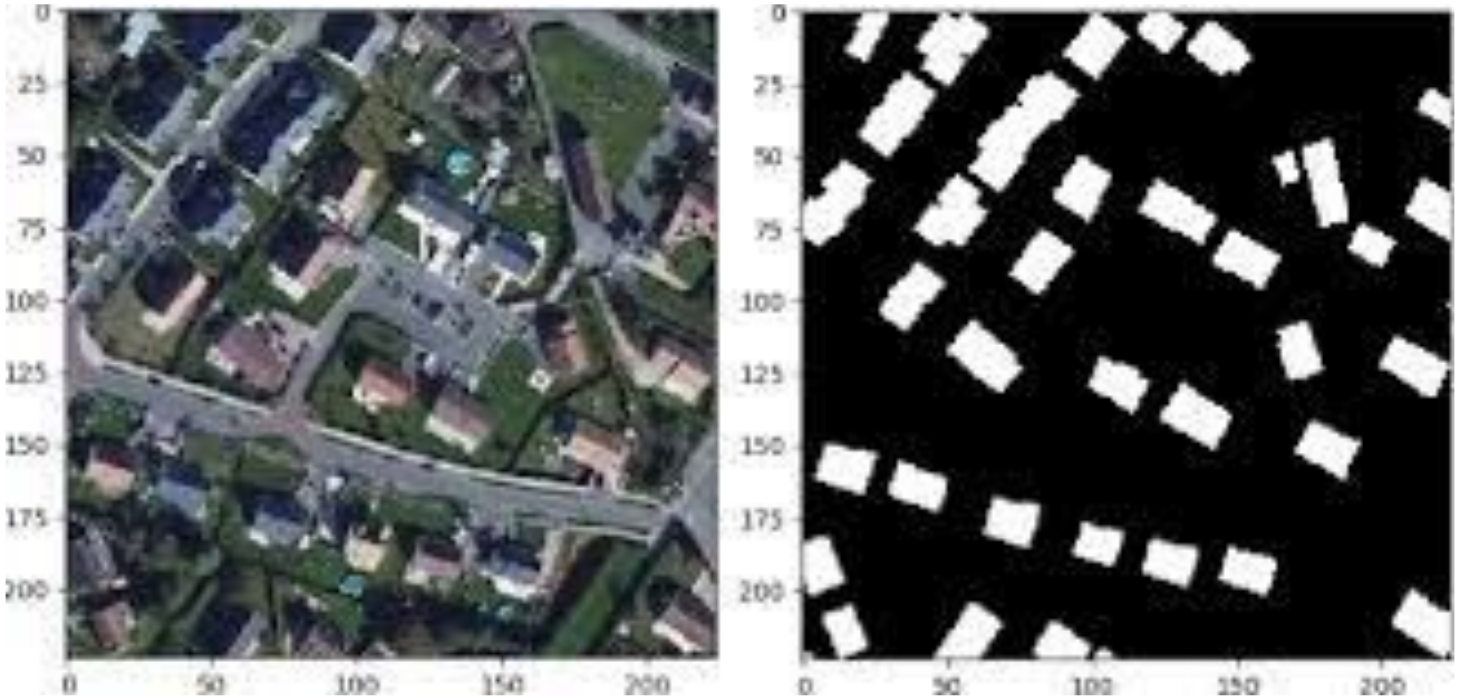
(1,1,1,1,1,1,1,1,1,.4,.5,0.,3,.2,1,1,...)

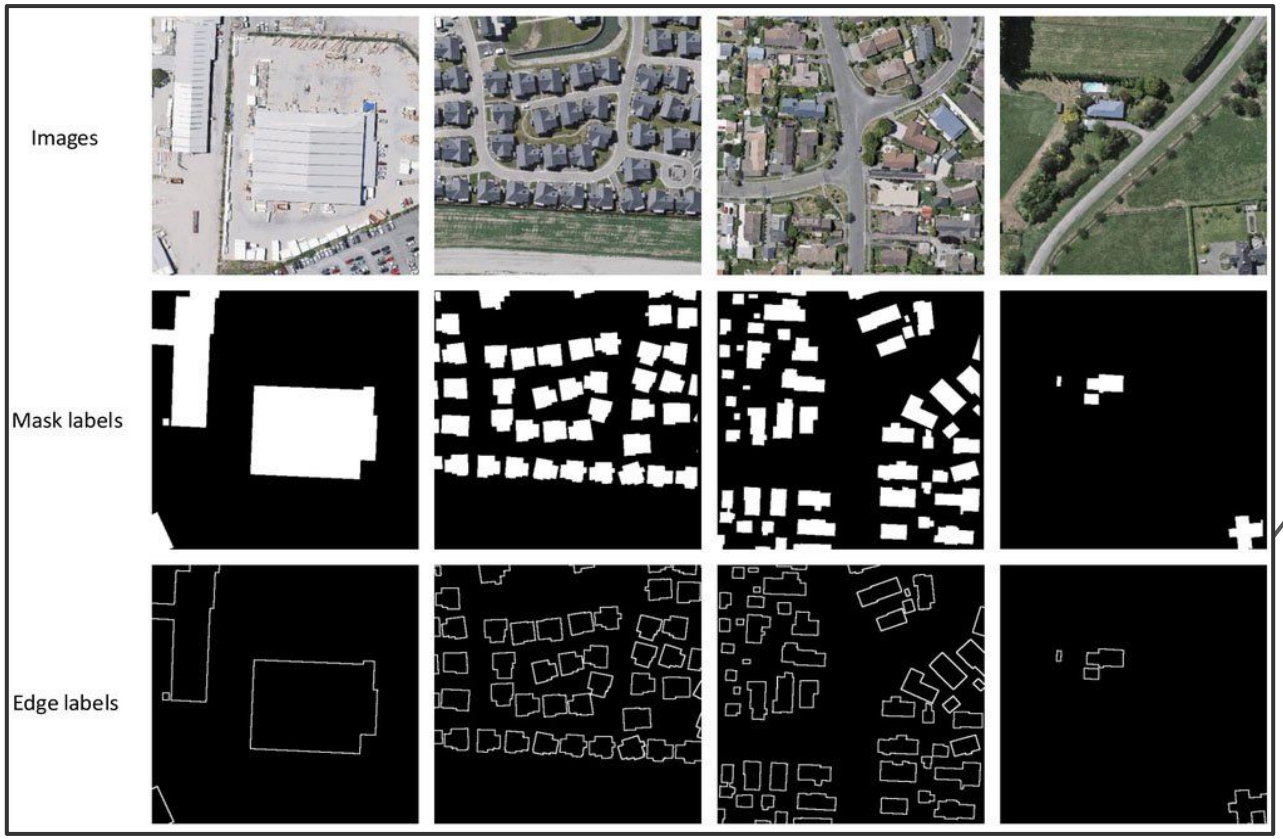
Derin Öğrenme - Ağlar

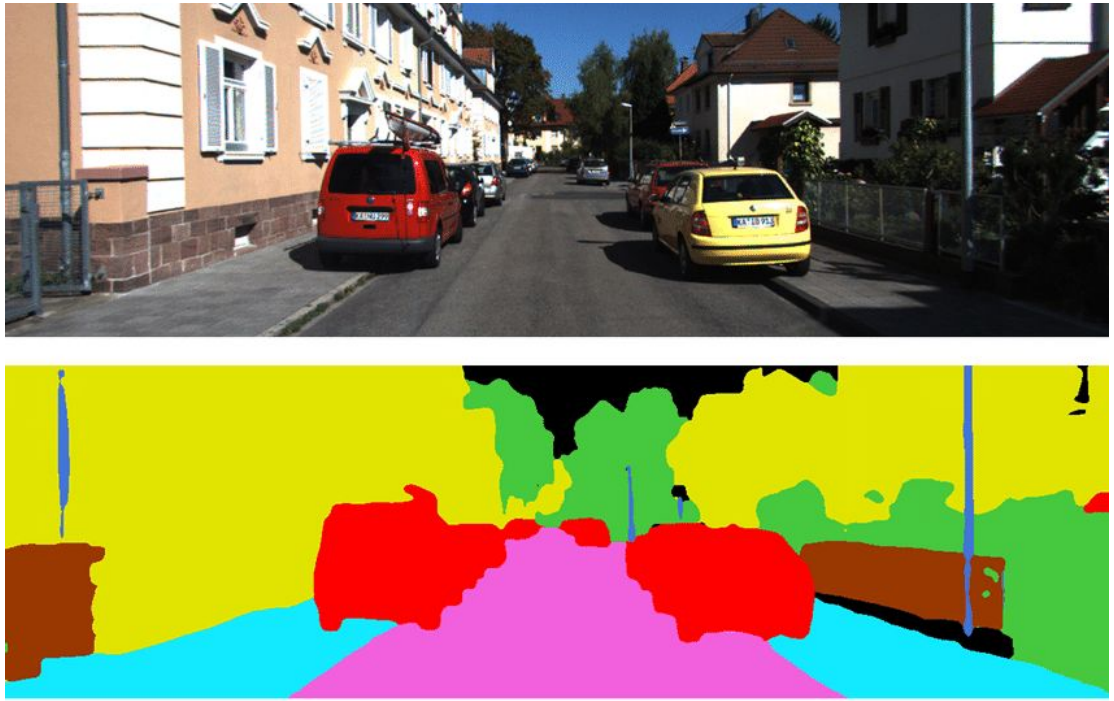
- Convolutional Neural Networks (CNNs)
- Long Short Term Memory Networks (LSTMs)
- Recurrent Neural Networks (RNNs)
- Generative Adversarial Networks (GANs)
- Radial Basis Function Networks (RBFNs)
- Multilayer Perceptrons (MLPs)
- Self Organizing Maps (SOMs)
- Deep Belief Networks (DBNs)
- Restricted Boltzmann Machines(RBMs)

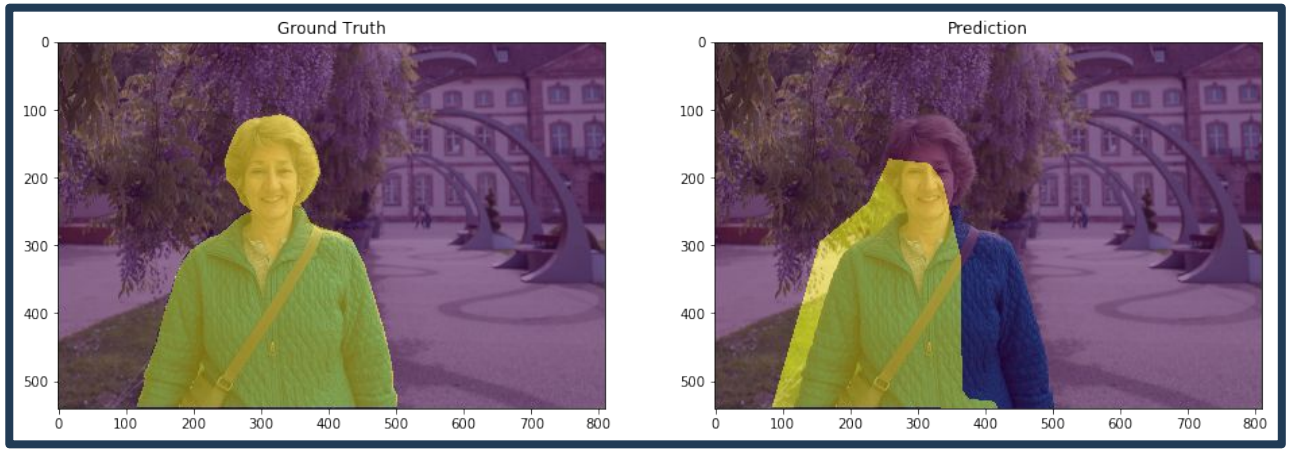


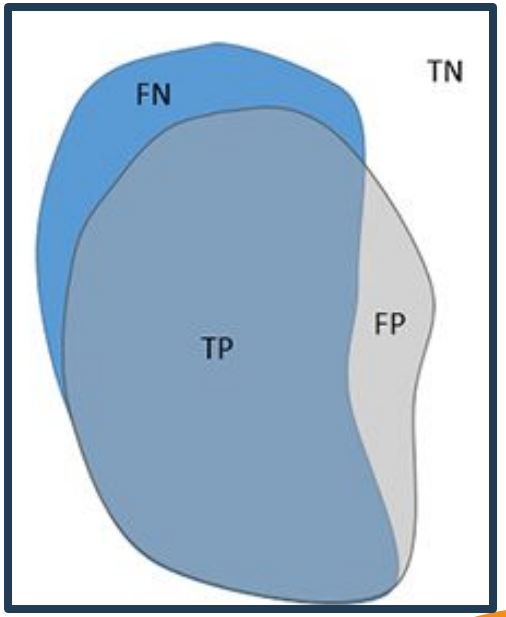

Phase 1
evaluate
model save
baseline model
model training
data
label
train
val.
test
data

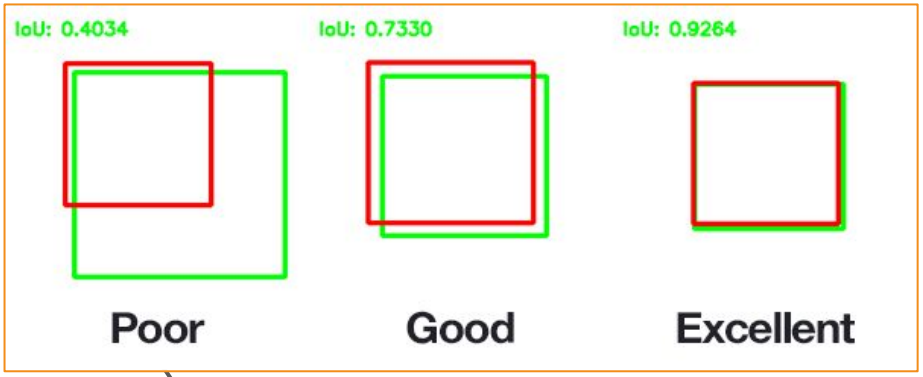

0
25
50
75
100
125
150
175
200
0
50
100
150
200
0
25
50
75
100
125
150
175
200
0
50
100
150
200

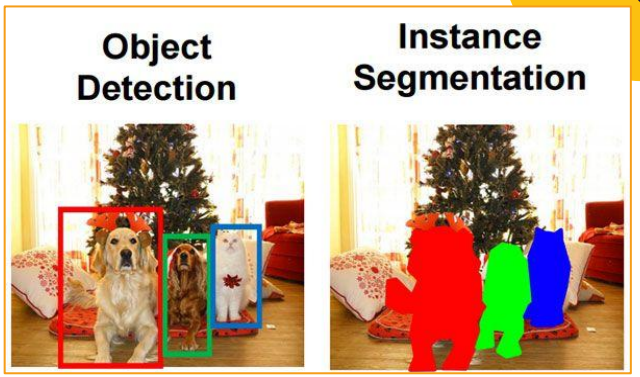

Images
Mask labels
Edge labels

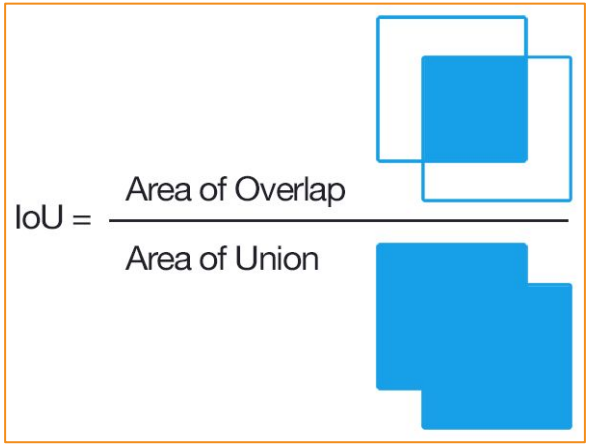

Road
Sidewalk
Building
Fence
Pole
Vegetation
Vehicle
Unlabel


Ground Truth
Prediction
0
100
200
300
400
500
600
700
800


FN
TN
TP
FP


IoU: 0.4034
IoU: 0.7330
IoU: 0.9264
Poor
Good
Excellent


Object Detection
Instance Segmentation


IoU =
Area of Overlap
Area of Union

Data Augmentation

Original	Flip	Rotation	Random crop
			
- Image without any modification	- Flipped with respect to an axis for which the meaning of the image is preserved	- Rotation with a slight angle - Simulates incorrect horizon calibration	- Random focus on one part of the image - Several random crops can be done in a row

Color shift	Noise addition	Information loss	Contrast change
			
- Nuances of RGB is slightly changed - Captures noise that can occur with light exposure	- Addition of noise - More tolerance to quality variation of inputs	- Parts of image ignored - Mimics potential loss of parts of image	- Luminosity changes - Controls difference in exposition due to time of day

https://github.com/qubvel/segmentation_models