0.1 Feature extraction

0.1.1 Pooling kernel: 4×4

Step 1

	model	λ	best epoch	train AUC (%)	validation AUC (%)
1	ResNet101	2^{-5}	19	93.5	92.9
2	ResNet152	2^{-10}	92	95.3	92.8
3	ResNet34	2^{-5}	25	93.3	92.2
4	ResNet50	2^{-5}	24	93.4	92.1
5	ResNet152	2^{-5}	28	93.7	92.0
6	ResNet34	2^{-10}	68	93.4	91.8
7	ResNet152	2^{0}	9	91.4	91.4
8	ResNet18	2^{-5}	34	92.9	91.4
9	ResNet50	2^{-10}	93	94.0	91.0
10	ResNet18	2^{-10}	53	92.7	90.9
11	ResNet101	2^{-10}	98	93.4	90.8
12	ResNet50	2^{0}	27	90.5	90.4
13	ResNet18	2^{0}	21	90.5	90.0
14	ResNet34	2^{0}	16	89.7	89.8
15	ResNet101	2^{0}	15	89.7	89.4
16	ResNet152	2^{5}	15	79.3	79.2
17	ResNet18	2^{5}	11	73.7	72.8
18	ResNet101	2^{5}	10	72.3	72.6
19	ResNet34	2^{5}	24	70.4	70.5
20	ResNet50	2^{5}	12	69.5	69.9
21	ResNet34	2^{10}	11	60.1	60.2
22	ResNet101	2^{10}	15	58.1	57.8
23	ResNet50	2^{10}	6	53.8	53.4
24	ResNet18	2^{10}	10	51.5	51.4
25	ResNet152	2^{10}	19	46.2	46.1

Step 2

	model	λ	best epoch	train AUC (%)	validation AUC (%)
1	ResNet101	2^{-6}	38	94.0	93.3
2	ResNet101	2^{-7}	39	94.5	93.0
3	ResNet101	2^{-4}	9	92.4	92.6
4	ResNet101	2^{-3}	13	91.9	92.0

Step 3

	model	λ	best epoch	train AUC (%)	validation AUC (%)
1	ResNet101	0.01602	22	94.1	**93.6**
2	ResNet101	0.01133	27	93.9	93.5
3	ResNet101	0.01016	31	94.4	93.4
4	ResNet101	0.01836	33	93.6	93.3
5	ResNet101	0.02187	34	93.9	93.3
6	ResNet101	0.01367	21	94.0	93.2
7	ResNet101	0.0125	27	94.2	93.2
8	ResNet101	0.02773	11	93.2	93.1
9	ResNet101	0.01719	39	93.9	93.1
10	ResNet101	0.01953	22	93.9	93.1
11	ResNet101	0.008984	19	94.2	93.1
12	ResNet101	0.03008	19	93.3	93.0
13	ResNet101	0.02422	27	93.9	93.0
14	ResNet101	0.02891	33	93.6	93.0
15	ResNet101	0.0207	21	93.5	92.9
16	ResNet101	0.02305	20	93.6	92.9
17	ResNet101	0.02539	11	93.1	92.8
18	ResNet101	0.01484	10	93.6	92.8
19	ResNet101	0.01521	27	93.1	92.8
19	ResNet101	0.02656	27	93.1	92.7

0.1.2 Pooling kernel: 2×2

Step 1

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet34	2^{-5}	68	95.9	93.4
2	ResNet152	2^{0}	34	94.0	93.2
3	ResNet34	2^{0}	31	94.1	93.1
4	ResNet101	2^{0}	17	94.0	93.1
5	ResNet152	2^{-5}	31	96.4	92.9
6	ResNet18	2^{0}	17	93.4	92.8
7	ResNet18	2^{-5}	92	95.0	92.2
8	ResNet50	2^{-5}	69	96.0	91.7
9	ResNet50	2^{0}	9	92.5	91.4
10	ResNet101	2^{-5}	23	94.7	90.9
11	ResNet152	2^{5}	25	90.6	90.4
12	ResNet18	2^{-10}	776	94.8	89.7
13	ResNet34	2^{-10}	714	95.5	89.6
14	ResNet101	2^{5}	18	89.2	89.4
15	ResNet34	2^{5}	22	88.6	88.4
16	ResNet101	2^{-10}	49	93.6	87.4
17	ResNet50	2^{5}	26	86.9	86.9
18	ResNet152	2^{-10}	121	94.0	86.9
19	ResNet18	2^{5}	14	87.1	86.3
20	ResNet50	2^{-10}	154	86.5	82.5
21	ResNet34	2^{10}	3	66.3	66.4
22	ResNet152	2^{10}	20	65.2	64.3
23	ResNet101	2^{10}	10	60.5	60.1
24	ResNet50	2^{10}	15	55.9	55.9
25	ResNet18	2^{10}	7	49.1	48.9

Step 2

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet34	2^{-2}	27	94.8	**93.8**
2	ResNet34	2^{-3}	23	95.2	93.6
3	ResNet34	2^{-4}	44	95.5	93.3
4	ResNet34	2^{-1}	22	94.2	93.0
5	ResNet34	2^{-6}	93	95.7	92.4
6	ResNet34	2^{-7}	180	96.0	92.2

Step 3

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet34	0.3618	16	94.7	93.7
2	ResNet34	0.2434	18	94.7	93.6
3	ResNet34	0.1842	26	94.9	93.6
4	ResNet34	0.1321	23	95.2	93.6
5	ResNet34	0.1447	40	95.0	93.6
6	ResNet34	0.4211	24	94.5	93.6
7	ResNet34	0.1645	26	95.3	93.4
8	ResNet34	0.3026	23	94.7	93.4
9	ResNet34	0.4605	21	94.4	93.4
10	ResNet34	0.2039	22	95.2	93.4
11	ResNet34	0.4013	22	94.4	93.4
12	ResNet34	0.2632	18	94.8	93.4
13	ResNet34	0.2237	18	95.0	93.3
14	ResNet34	0.2829	29	94.6	93.3
15	ResNet34	0.4408	37	94.7	93.3
16	ResNet34	0.3816	15	94.3	93.2
17	ResNet34	0.3421	50	94.3	93.1
18	ResNet34	0.3224	23	94.7	93.1
19	ResNet34	0.4978	22	94.2	93.0
20	ResNet34	0.4803	20	94.2	92.9

0.1.3 No Pooling

Step 1

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet101	2^0	18	94.9	**93.8**
2	ResNet34	2^0	29	94.3	93.2
3	ResNet18	2^0	21	94.5	93.1
4	ResNet152	2^0	40	94.3	93.1
5	ResNet34	2^{-5}	88	97.3	92.8
6	ResNet50	2^0	22	94.4	92.0
7	ResNet18	2^{-5}	90	96.4	91.9
8	ResNet152	2^5	11	90.5	90.6
9	ResNet152	2^{-10}	68	96.7	90.5
10	ResNet101	2^5	15	90.2	90.4
11	ResNet152	2^{-5}	25	95.5	90.1
12	ResNet18	2^5	23	90.3	89.9
13	ResNet34	2^{-10}	192	95.6	89.8
14	ResNet34	2^5	26	89.8	89.6
15	ResNet50	2^5	10	89.7	89.3
16	ResNet18	2^{-10}	151	94.3	86.8
17	ResNet50	2^{-5}	37	93.4	86.5
18	ResNet101	2^{-10}	79	93.0	85.8
19	ResNet101	2^{-5}	28	92.7	85.1
20	ResNet50	2^{-10}	156	84.6	78.6
21	ResNet34	2^{10}	13	69.9	70.0
22	ResNet18	2^{10}	14	70.4	69.9
23	ResNet101	2^{10}	10	66.8	66.6
24	ResNet50	2^{10}	19	62.4	62.6
25	ResNet152	2^{10}	10	61.7	61.2

Step 2

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet101	2^1	25	94.5	93.7
2	ResNet101	2^{-1}	23	95.3	93.3
3	ResNet101	2^2	22	93.5	93.1
4	ResNet101	2^{-2}	43	87.9	86.9

Step 3

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet101	1.132	25	94.9	**93.8**
2	ResNet101	0.7368	36	94.6	93.7
3	ResNet101	0.5789	20	95.5	93.7
4	ResNet101	1.968	25	94.5	93.7
5	ResNet101	1.289	21	94.3	93.6
6	ResNet101	1.526	25	94.4	93.6
7	ResNet101	1.053	22	94.9	93.6
8	ResNet101	1.842	20	94.1	93.6
9	ResNet101	1.763	21	94.6	93.5
10	ResNet101	1.447	20	94.2	93.5
11	ResNet101	1.605	18	94.6	93.4
12	ResNet101	1.211	23	94.7	93.3
13	ResNet101	0.5481	23	95.3	93.3
14	ResNet101	1.684	36	94.4	93.2
15	ResNet101	1.921	25	94.1	93.1
16	ResNet101	0.6579	27	94.6	93.1
17	ResNet101	0.9737	41	94.8	93.1
18	ResNet101	1.368	14	93.0	92.1
19	ResNet101	0.8158	9	93.0	91.7
20	ResNet101	0.8947	30	83.6	82.8

0.2 Fine tuning

0.2.1 Layers conv5_x

Step 1

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet50	2^{-5}	12	97.0	94.9
2	ResNet50	2^{-10}	11	99.7	94.8
3	ResNet152	2^{-5}	17	98.1	94.6
4	ResNet34	2^{-10}	8	97.5	93.6
5	ResNet34	2^{-5}	14	95.8	93.3
6	ResNet101	2^{-5}	15	96.9	93.2
7	ResNet152	2^{0}	1	92.0	92.3
8	ResNet50	2^{0}	1	92.4	91.7
9	ResNet18	2^{-5}	8	92.4	91.2
10	ResNet18	2^{3}	4	90.3	90.4
11	ResNet18	2^{-10}	7	93.5	90.2
12	ResNet34	2^{3}	2	89.2	88.6
13	ResNet101	2^{0}	7	87.3	87.7
14	ResNet18	2^{0}	3	87.3	87.2
15	ResNet101	2^{3}	1	87.3	86.8
16	ResNet152	2^{-10}	2	90.0	86.4
17	ResNet34	2^{0}	4	86.8	86.4
18	ResNet152	2^{3}	1	84.2	84.8
19	ResNet50	2^{3}	1	82.9	83.4
20	ResNet101	2^{-10}	1	75.8	77.5

Step 2

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet50	2^{-7}	11	98.5	94.5
2	ResNet50	2^{-6}	11	98.4	94.2
3	ResNet50	2^{-4}	4	95.4	93.1
4	ResNet50	2^{-3}	1	92.2	91.5

Step 3

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet50	0.02009	10	97.0	**95.0**
2	ResNet50	0.02232	19	97.4	94.8
3	ResNet50	0.01786	11	97.2	94.0
4	ResNet50	0.03795	21	97.1	93.9
5	ResNet50	0.02455	13	97.6	93.8
6	ResNet50	0.03348	21	97.4	93.6
7	ResNet50	0.02902	25	97.8	93.6
8	ResNet50	0.04018	3	94.3	93.5
9	ResNet50	0.02679	20	98.3	93.4
10	ResNet50	0.03571	3	95.5	93.3
11	ResNet50	0.0558	1	93.5	93.0
12	ResNet50	0.04911	3	94.9	92.8
13	ResNet50	0.04688	1	92.4	92.6
14	ResNet50	0.06027	1	92.4	91.5
15	ResNet50	0.03125	12	96.0	91.5
16	ResNet50	0.04241	2	92.7	91.4
17	ResNet50	0.05357	2	92.2	91.0
18	ResNet50	0.04464	2	90.7	90.2
19	ResNet50	0.05134	1	87.6	86.6
20	ResNet50	0.05804	1	78.1	79.0

0.2.2   Layers conv4_x - conv5_x

Step 1

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet18	2^{-10}	11	99.3	**95.2**
2	ResNet34	2^{-10}	12	99.3	**95.2**
3	ResNet152	2^{-10}	5	97.0	94.7
4	ResNet101	2^{-10}	4	97.8	94.7
5	ResNet101	2^{-5}	20	96.8	94.4
6	ResNet50	2^{-10}	10	99.4	93.7
7	ResNet34	2^{-5}	22	96.5	93.5
8	ResNet50	2^{-5}	15	96.5	93.5
9	ResNet34	2^{3}	3	92.4	91.9
10	ResNet152	2^{-5}	2	93.0	91.2
11	ResNet18	2^{0}	4	91.8	90.7
12	ResNet18	2^{-5}	6	91.6	89.6
13	ResNet152	2^{0}	1	89.9	88.3
14	ResNet50	2^{0}	1	87.4	85.8
15	ResNet34	2^{0}	2	85.8	85.2
16	ResNet18	2^{3}	2	84.1	85.1
17	ResNet101	2^{0}	1	76.8	76.0
18	ResNet152	2^{3}	1	75.0	75.8
19	ResNet50	2^{3}	1	71.2	71.5
20	ResNet101	2^{3}	1	59.8	58.4

Step 2

	model	λ	best epoch	train AUC (%)	validation AUC (%)
1	ResNet18	2^{-9}	8	97.7	93.4
2	ResNet18	2^{-11}	10	99.3	93.2
3	ResNet18	2^{-12}	8	97.6	90.6
4	ResNet18	2^{-8}	5	90.8	89.4

Step 3

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet18	0.000279	1	95.7	94.5
2	ResNet18	0.0004534	12	99.6	94.3
3	ResNet18	0.0007324	17	99.6	94.2
4	ResNet18	0.0004185	16	99.8	94.1
5	ResNet18	0.0005929	15	99.0	94.1
6	ResNet18	0.0009417	10	99.1	93.9
7	ResNet18	0.0008719	13	99.1	93.7
8	ResNet18	0.0005232	14	99.6	93.4
9	ResNet18	0.0007673	9	98.6	93.3
10	ResNet18	0.0004883	10	99.3	93.2
11	ResNet18	0.0006278	12	99.1	93.0
12	ResNet18	0.0008371	9	98.5	92.9
13	ResNet18	0.0006627	6	96.3	92.6
14	ResNet18	0.0008022	4	92.5	88.4
15	ResNet18	0.0003836	5	90.9	87.6
16	ResNet18	0.0006975	5	89.6	86.8
17	ResNet18	0.0003488	2	87.0	86.0
18	ResNet18	0.0009068	4	85.6	85.5
19	ResNet18	0.000558	4	89.6	84.7
20	ResNet18	0.0003139	5	85.2	81.5

0.2.3 Layers conv3_x - conv5_x

Step 1

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet50	2^{-10}	6	97.4	95.4
2	ResNet101	2^{-10}	8	97.5	95.1
3	ResNet152	2^{-10}	10	98.5	95.1
4	ResNet18	2^{-10}	9	98.2	94.8
5	ResNet152	2^{-5}	38	96.7	94.7
6	ResNet101	2^{-5}	33	96.3	94.3
7	ResNet34	2^{-10}	11	98.9	93.8
8	ResNet50	2^{-5}	22	95.5	93.7
9	ResNet34	2^{-5}	23	96.1	92.5
10	ResNet101	2^{0}	2	91.1	91.1
11	ResNet18	2^{3}	2	87.1	86.7
12	ResNet18	2^{0}	3	87.5	86.1
13	ResNet152	2^{0}	1	82.9	82.9
14	ResNet50	2^{0}	2	81.7	79.2
15	ResNet152	2^{3}	1	75.5	76.7
16	ResNet50	2^{3}	1	75.4	75.6
17	ResNet34	2^{3}	1	72.1	73.2
18	ResNet34	2^{0}	1	70.9	72.0
19	ResNet18	2^{-5}	5	74.8	69.9
20	ResNet101	2^{3}	1	58.0	56.0

Step 2

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet50	2^{-8}	17	98.4	95.8
2	ResNet50	2^{-7}	15	98.5	95.5
3	ResNet50	2^{-9}	16	98.8	95.4
4	ResNet50	2^{-12}	2	96.1	94.9
5	ResNet50	2^{-11}	5	95.9	93.4

Step 3

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet50	0.00558	20	98.3	**96.5**
2	ResNet50	0.005022	15	97.8	**96.5**
3	ResNet50	0.004185	11	98.2	**96.5**
4	ResNet50	0.002232	16	99.0	96.3
5	ResNet50	0.006696	15	98.0	96.1
6	ResNet50	0.003906	17	98.5	96.1
7	ResNet50	0.006417	13	97.7	96.0
8	ResNet50	0.002511	14	98.4	96.0
9	ResNet50	0.004464	12	97.8	96.0
10	ResNet50	0.00279	16	98.5	95.8
11	ResNet50	0.006975	14	97.8	95.7
12	ResNet50	0.007254	18	98.1	95.7
13	ResNet50	0.003627	16	98.5	95.7
14	ResNet50	0.003069	20	98.5	95.4
15	ResNet50	0.005301	8	97.3	95.4
16	ResNet50	0.003348	20	98.6	95.4
17	ResNet50	0.007533	15	97.4	95.3
18	ResNet50	0.004743	19	98.5	95.3
19	ResNet50	0.006138	19	97.6	95.1
20	ResNet50	0.005859	17	97.8	95.0

All layers

Step 1

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet50	2^{-10}	29	98.5	97.0
2	ResNet152	2^{-10}	28	98.4	96.6
3	ResNet101	2^{-10}	17	97.8	96.5
4	ResNet34	2^{-10}	9	97.5	96.3
5	ResNet18	2^{-10}	24	98.9	96.1
6	ResNet101	2^{-5}	27	96.8	95.8
7	ResNet50	2^{-5}	41	95.5	94.6
8	ResNet34	2^{-5}	28	95.5	94.4
9	ResNet152	2^{-5}	41	95.2	94.2
10	ResNet18	2^{-5}	53	95.2	93.4
11	ResNet18	2^{0}	3	81.3	81.0
12	ResNet101	2^{0}	1	81.5	80.3
13	ResNet34	2^{0}	1	73.3	74.3
14	ResNet50	2^{0}	1	72.0	72.0
15	ResNet152	2^{0}	1	31.5	31.3

Step 2

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet50	2^{-11}	13	98.5	97.2
2	ResNet50	2^{-9}	28	98.3	96.4
3	ResNet50	2^{-12}	10	98.2	96.4
4	ResNet50	2^{-8}	31	97.6	96.4

Step 3

	model	λ	melhor epoca	train AUC (%)	validation AUC (%)
1	ResNet50	0.0007673	25	98.6	**97.3**
2	ResNet50	0.0005929	9	97.9	**97.3**
3	ResNet50	0.0003488	13	98.4	**97.3**
4	ResNet50	0.0004185	10	98.2	97.2
5	ResNet50	0.000279	24	99.0	97.1
6	ResNet50	0.0008022	18	98.3	97.0
7	ResNet50	0.0006278	30	98.8	96.8
8	ResNet50	0.0003139	9	97.3	96.8
9	ResNet50	0.0009068	31	97.9	96.8
10	ResNet50	0.0005232	13	97.9	96.6
11	ResNet50	0.0008371	23	98.5	96.5
12	ResNet50	0.0004883	15	98.5	96.5
13	ResNet50	0.0008719	26	98.6	96.5
14	ResNet50	0.0004534	23	98.5	96.4
15	ResNet50	0.0007324	10	97.3	96.4
16	ResNet50	0.0009417	18	98.0	96.4
17	ResNet50	0.0006975	24	98.1	96.4
18	ResNet50	0.0006627	10	97.7	96.3
19	ResNet50	0.0003836	18	97.9	96.1
20	ResNet50	0.000558	16	98.2	96.0