Deep Learning

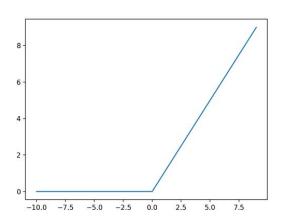


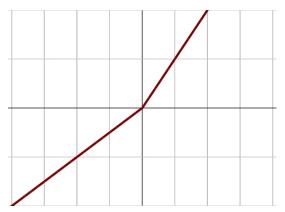
UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

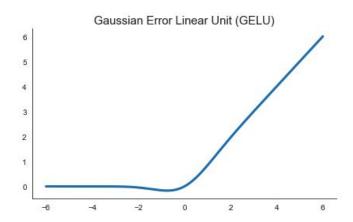
Facultat d'Informàtica de Barcelona



ReLu vs PReLu vs GeLu







4096

1024

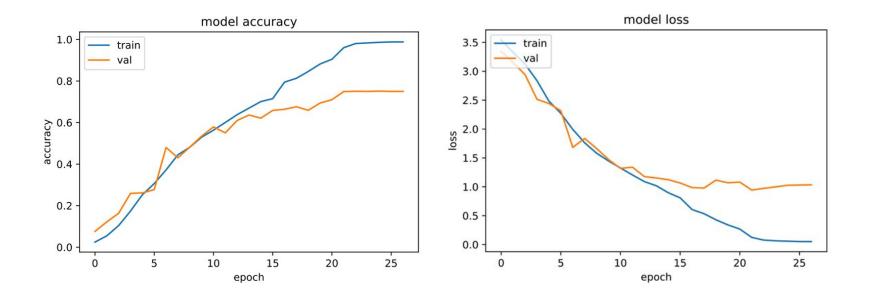
29

Activation Function: ReLu

Frozen layers: 10

Drop out: No

Accuracy in test: 73%



4096

1024

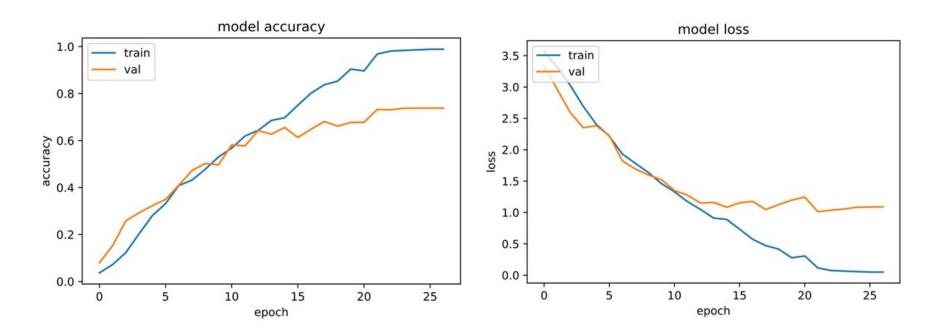
29

Activation Function: PReLu

Frozen layers: 10

Drop out: No

Accuracy in test: 74%



4096

1024

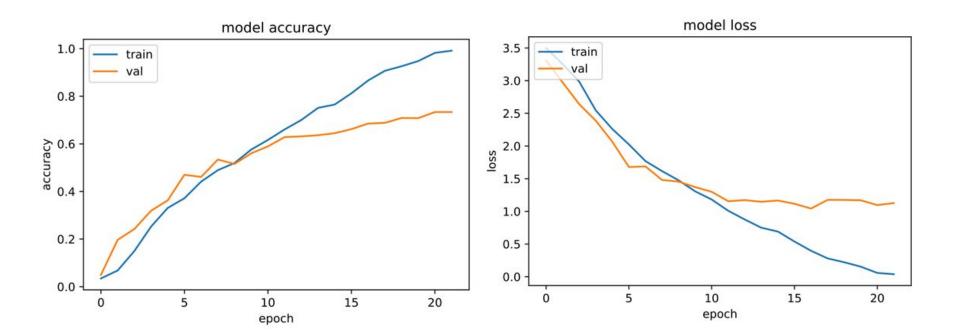
29

Activation Function: GeLu

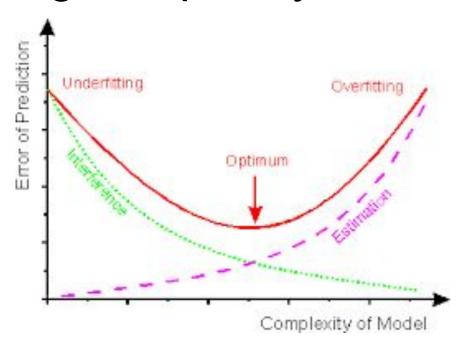
Frozen layers: 10

Drop out: No

Accuracy test: 67%



Reducing complexity of the model



2048

512

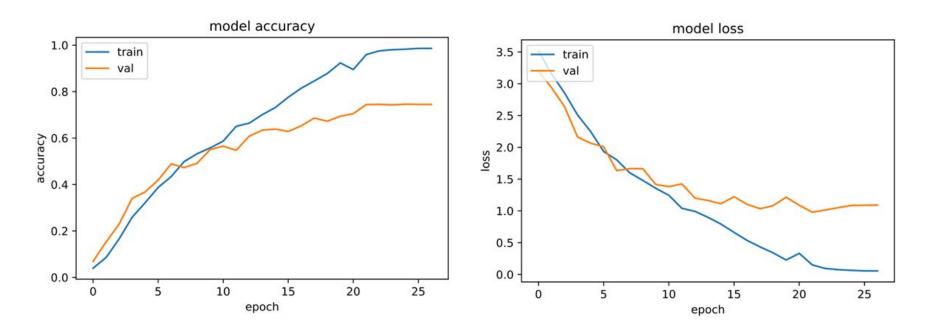
29

Activation Function: PReLu

Frozen layers: 10

Drop out: No

Accuracy test: 72%



1024

256

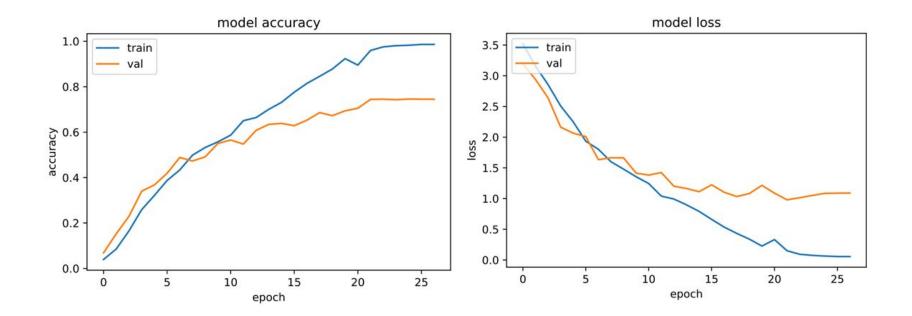
29

Activation Function: PReLu

Frozen layers: 10

Drop out: No

Accuracy test: 72%



512

128

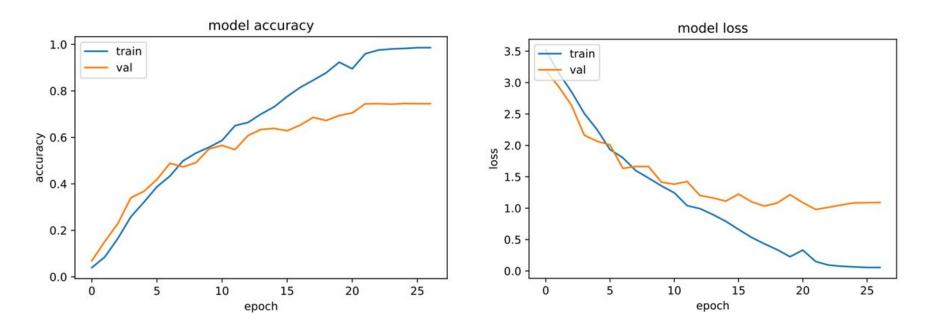
29

Activation Function: PReLu

Frozen layers: 10

Drop out: No

Accuracy test: 72%



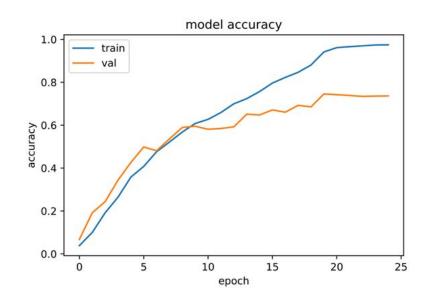
29

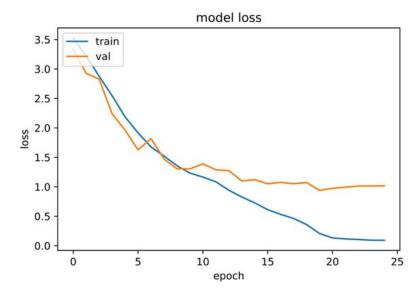
Activation Function: PReLu

Frozen layers: 10

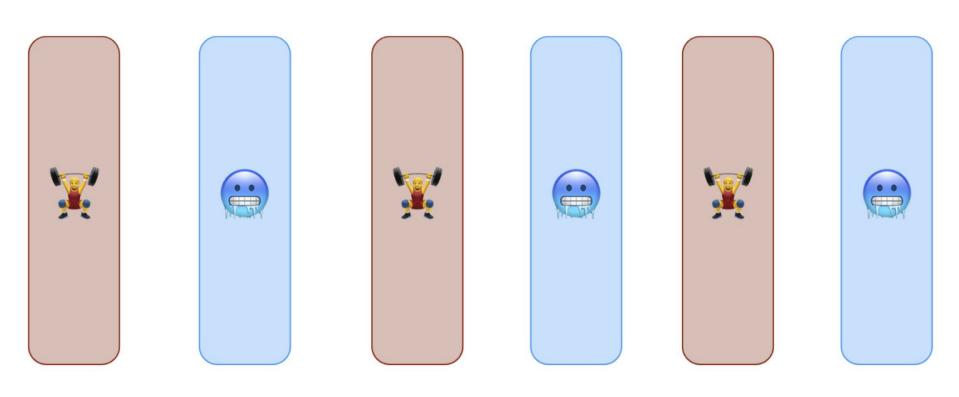
Drop out: No

Accuracy test: 73%





Changing the Frozen layers



4096

1024

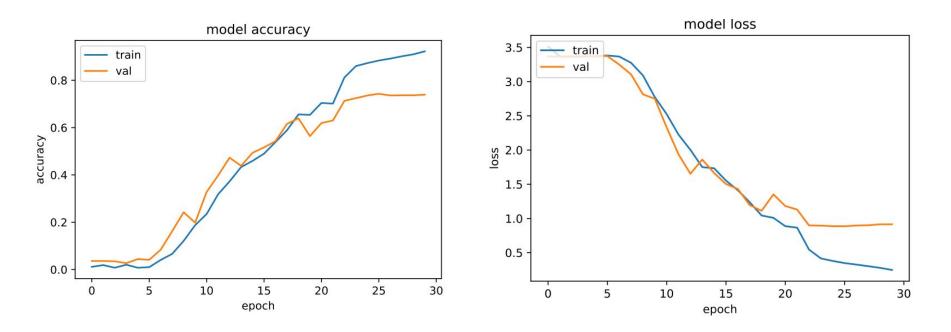
29

Activation Function: PReLu

Frozen layers: 6

Drop out: No

Accuracy in test: 72%



4096

1024

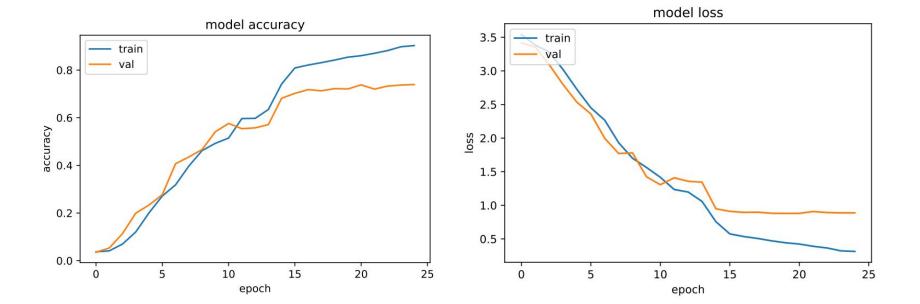
29

Activation Function: PReLu

Frozen layers: 8

Drop out: No

Accuracy in test: 72%



4096

1024

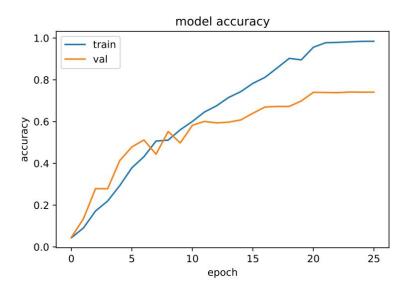
29

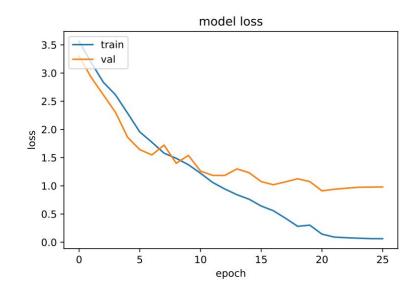
Activation Function: PReLu

Frozen layers: 12

Drop out: No

Accuracy in test: 74%





Feature Extraction

All layers Batch Size 16

3 0.82 0.88 0.85 31 4 0.76 0.77 0.76 70 5 0.77 0.71 0.74 70 6 0.85 0.80 0.83 70 7 0.82 0.77 0.79 70 8 0.86 0.89 0.87 70 9 0.73 0.94 0.82 18 10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58		precision	recall	f1-score	support
1 0.79 0.72 0.75 70 2 0.81 0.76 0.78 70 3 0.82 0.88 0.85 31 4 0.76 0.77 0.76 70 5 0.77 0.71 0.74 70 6 0.85 0.80 0.83 70 7 0.82 0.77 0.79 70 8 0.86 0.89 0.87 70 9 0.73 0.94 0.82 18 10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58	•	0.06	0.07	0.07	700
2 0.81 0.76 0.78 70 3 0.82 0.88 0.85 31 4 0.76 0.77 0.76 70 5 0.77 0.71 0.74 70 6 0.85 0.80 0.83 70 7 0.82 0.77 0.79 70 8 0.86 0.89 0.87 70 9 0.73 0.94 0.82 18 10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58					
3 0.82 0.88 0.85 31 4 0.76 0.77 0.76 70 5 0.77 0.71 0.74 70 6 0.85 0.80 0.83 70 7 0.82 0.77 0.79 70 8 0.86 0.89 0.87 70 9 0.73 0.94 0.82 18 10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58					
4 0.76 0.77 0.76 76 5 0.77 0.71 0.74 76 6 0.85 0.80 0.83 76 7 0.82 0.77 0.79 76 8 0.86 0.89 0.87 76 9 0.73 0.94 0.82 18 10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58					700
5 0.77 0.71 0.74 76 6 0.85 0.80 0.83 76 7 0.82 0.77 0.79 76 8 0.86 0.89 0.87 76 9 0.73 0.94 0.82 18 10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58					
6 0.85 0.80 0.83 76 7 0.82 0.77 0.79 76 8 0.86 0.89 0.87 76 9 0.73 0.94 0.82 18 10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58					700
7 0.82 0.77 0.79 70 8 0.86 0.89 0.87 70 9 0.73 0.94 0.82 18 10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58					700
8 0.86 0.89 0.87 76 9 0.73 0.94 0.82 18 10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58					700
9 0.73 0.94 0.82 18 10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58	100				700
10 0.96 0.98 0.97 32 11 0.95 0.97 0.96 58					700
11 0.95 0.97 0.96 58	100				188
	10	0.96	0.98	0.97	328
12 0 67 0 05 0 75 26	11	0.95	0.97	0.96	584
12 0.0/ 0.85 0.75 26	12	0.67	0.85	0.75	265
13 0.74 0.69 0.72 57	13	0.74	0.69	0.72	572
14 0.78 0.74 0.76 70	14	0.78	0.74	0.76	700
15 0.86 0.75 0.80 70	15	0.86	0.75	0.80	700
16 0.54 0.77 0.63 25	16	0.54	0.77	0.63	257
17 0.81 0.76 0.78 70	17	0.81	0.76	0.78	700
18 0.78 0.88 0.82 28	18	0.78	0.88	0.82	286
19 0.56 0.64 0.60 37	19	0.56	0.64	0.60	375
20 0.85 0.91 0.88 70	20	0.85	0.91	0.88	700
21 0.28 0.72 0.41 9	21	0.28	0.72	0.41	95
22 0.83 0.78 0.80 70	22	0.83	0.78	0.80	700
23 0.69 0.94 0.79 13	23	0.69	0.94	0.79	133
24 0.78 0.71 0.74 70	24	0.78	0.71	0.74	700
25 0.70 0.83 0.76 36	25	0.70	0.83	0.76	361
26 0.93 0.92 0.92 70	26	0.93	0.92	0.92	700
	27				700
					700

accur	racy			0.81	15657	
macro	avg	0.78	0.81	0.79	15657	
weighted	avg	0.82	0.81	0.81	15657	

All layers Batch Size 32

	precision	recall	f1-score	support
0	0.96	0.97	0.97	700
1	0.79	0.72	0.75	700
2	0.81	0.76	0.78	700
3	0.82	0.88	0.85	313
4	0.76	0.77	0.76	700
5	0.77	0.71	0.74	700
6	0.85	0.80	0.83	700
7	0.82	0.77	0.79	700
8	0.85	0.89	0.87	700
9	0.73	0.94	0.82	188
10	0.96	0.98	0.97	328
11	0.95	0.97	0.96	584
12	0.67	0.84	0.75	265
13	0.75	0.69	0.72	572
14	0.78	0.74	0.76	700
15	0.86	0.74	0.80	700
16	0.54	0.77	0.63	257
17	0.81	0.76	0.78	700
18	0.78	0.88	0.82	286
19	0.55	0.65	0.60	375
20	0.85	0.91	0.88	700
21	0.29	0.72	0.41	95
22	0.83	0.78	0.80	700
23	0.68	0.93	0.79	133
24	0.78	0.71	0.74	700
25	0.70	0.83	0.76	361
26	0.93	0.92	0.92	700
27	0.91	0.89	0.90	700
28	0.88	0.70	0.78	700

accura	су			0.81	15657	
macro a	vg	0.78	0.81	0.79	15657	
weighted a	vg	0.82	0.81	0.81	15657	

Eliminating last layer of each bloc

Batch Size 16

precision	recall	f1-score	support	
0	0.96	0.97	0.97	700
1	0.75	0.69	0.72	700
2	0.79	0.73	0.76	700
3	0.80	0.85	0.83	313
4	0.72	0.73	0.73	700
5	0.73	0.68	0.71	700
6	0.82	0.78	0.80	700
7	0.78	0.75	0.77	700
8	0.85	0.87	0.86	700
9	0.73	0.91	0.81	188
10	0.95	0.98	0.96	328
11	0.95	0.96	0.96	584
12	0.66	0.79	0.72	265
13	0.70	0.67	0.69	572
14	0.76	0.72	0.74	700
15	0.83	0.73	0.78	700
16	0.51	0.71	0.59	257
17	0.81	0.73	0.77	700
18	0.74	0.87	0.80	286
19	0.52	0.64	0.58	375
20	0.85	0.89	0.87	700
21	0.28	0.71	0.40	95
22	0.79	0.75	0.77	700
23	0.63	0.93	0.75	133
24	0.76	0.67	0.72	700
25	0.66	0.79	0.72	361
26	0.91	0.90	0.91	700
27	0.90	0.87	0.88	700
28	0.86	0.67	0.75	700

accuracy			0.78	15657
macro avg	0.76	0.79	0.77	15657
weighted avg	0.79	0.78	0.79	15657

Batch Size 32

precision	recall	f1-score	support	
0	0.96	0.97	0.97	700
1	0.75	0.69	0.72	700
2	0.79	0.73	0.76	700
3	0.80	0.85	0.83	313
4	0.72	0.73	0.73	700
5	0.73	0.68	0.71	700
6	0.82	0.78	0.80	700
7	0.78	0.75	0.77	700
8	0.85	0.87	0.86	700
9	0.73	0.91	0.81	188
10	0.95	0.98	0.96	328
11	0.95	0.96	0.96	584
12	0.67	0.79	0.72	265
13	0.70	0.67	0.69	572
14	0.76	0.72	0.74	700
15	0.83	0.73	0.78	700
16	0.51	0.72	0.60	257
17	0.81	0.73	0.77	700
18	0.74	0.87	0.80	286
19	0.52	0.65	0.58	375
20	0.85	0.89	0.87	700
21	0.28	0.71	0.40	95
22	0.78	0.75	0.77	700
23	0.63	0.93	0.75	133
24	0.76	0.68	0.72	700
25	0.66	0.79	0.72	361
26	0.91	0.90	0.91	700
27	0.90	0.87	0.88	700
28	0.86	0.67	0.75	700

accuracy			0.78	15657
macro avg	0.76	0.79	0.77	15657
weighted avg	0.79	0.78	0.79	15657

Eliminating fc layers

Batch Size 16

prec:	ision	recall	f1-sc	ore	supp	ort
0	0.95	0.	97	0.9	96	700
1	0.73		67	0.7		700
2	0.77		74	0.7	75	700
3	0.78		83	0.8		313
4	0.71	0.	73	0.7	12	700
5	0.73	0.	66	0.7	10	700
6	0.83	0.	81	0.8	32	700
7	0.79	0.	72	0.7	16	700
8	0.83	0.	86	0.8	35	700
9	0.69	0.	93	0.7	19	188
10	0.93	0.	99	0.9	96	328
11	0.93	0.	96	0.9	95	584
12	0.63	0.	80	0.7	71	265
13	0.68	0.	64	0.6	6	572
14	0.75	0.	69	0.7	72	700
15	0.83	0.	71	0.7	76	700
16	0.52	0.	73	0.6	51	257
17	0.81	0.	71	0.7	76	700
18	0.77	0.	88	0.8	32	286
19	0.47	0.	62	0.5	4	375
20	0.87	0.	87	0.8	37	700
21	0.25	0.	62	0.3	36	95
22	0.76	0.	74	0.7	75	700
23	0.66	0.	91	0.7	16	133
24	0.74	0.	67	0.7	1	700
25	0.65	0.	81	0.7	12	361
26	0.93	0.	90	0.9	12	700
27	0.89	0.	87	0.8	38	700
28	0.84	0.	65	0.7	73	700

accuracy			0.77	15657
macro avg	0.75	0.78	0.76	15657
weighted avg	0.79	0.77	0.78	15657

Batch Size 32

	precision	recall	f1-score	support
0	0.95	0.97	0.96	700
1	0.73	0.67	0.70	700
2	0.77	0.74	0.75	700
3	0.78	0.83	0.81	313
4	0.71	0.73	0.72	700
5	0.73	0.66	0.70	700
6	0.83	0.81	0.82	700
7	0.79	0.72	0.76	700
8	0.83	0.86	0.85	700
9	0.69	0.93	0.79	188
10	0.93	0.99	0.96	328
11	0.93	0.96	0.95	584
12	0.63	0.79	0.70	265
13	0.68	0.64	0.66	572
14	0.75	0.68	0.72	700
15	0.83	0.71	0.76	700
16	0.52	0.73	0.61	257
17	0.81	0.71	0.76	700
18	0.77	0.88	0.82	286
19	0.47	0.62	0.53	375
20	0.87	0.87	0.87	700
21	0.25	0.62	0.36	95
22	0.76	0.74	0.75	700
23	0.66	0.91	0.77	133
24	0.74	0.68	0.71	700
25	0.65	0.81	0.72	361
26	0.93	0.90	0.92	700
27	0.89	0.87	0.88	700
28	0.84	0.65	0.73	700

accuracy			0.77	15657
macro avg	0.75	0.78	0.76	15657
weighted avg	0.79	0.77	0.78	15657