

## Test result

We tested 4 types of trash (aluminium, plastic, paper and others) with 3 different threshold (60%, 70% and 80%) and captured operation time. Percentage of threshold means the minimum percentage of the model's confidence in order to classify the desired type of trash. i.e. the model with the 65% of confidence in 'paper' will be able to classify paper with the 60% of threshold but unable to perform this task at 70% and 80% threshold.

### 1. Aluminium

60% threshold			70% threshold			80% threshold		
Type	confidence	Time (sec)	Type	confidence	Time (sec)	Type	confidence	Time (sec)
Can			Can			Can		
1	0.85	5.84	1	0.99	5.12	1	0.92	5.4
2	0.68	4.88	2	0.91 (plastic)	2.1	2	0.88	4.44
3	0.9	5.88	3	0.73	5.25	3	0.98	5.26
4	0.97	5.69	4	0.99	5.7	4	0.95	4.4
5	0.98	4.32	5	0.74	4.72	5	0.99	5.17
6	0.91	6.08	6	0.78 (plastic)	2.11	6	0.88	4.57
7	0.72 (paper)	5.49	7	0.93 (paper)	5.11	7	0.96	4.98
8	0.90 (paper)	4.58	8	0.79	6.16	8	0.95	5.31
9	0.94	5.15	9	0.99	5.5	9	0.94	6.09
10	0.91	5.29	10	0.83 (paper)	5.11	10	0.8	4.37
avg	0.8925	5.37875		0.871666667	5.4083333		0.925	4.999

Result: performed good in 80% threshold with some minor error in the other threshold. The average time was about 5 second per operation. The overall accuracy was 80%.

### 2. Plastic

60% threshold			70% threshold			80% threshold		
PlasticBottle	confidence	Time (sec)	PlasticBottle	confidence	Time (sec)	PlasticBottle	confidence	Time (sec)
1	0.67	4.73	1	0.76	5.43	1	No	No
2	0.61	5.18	2	0.73	7.39	2	0.95	2.96
3	0.7	4.06	3	0.82	5.28	3	0.85	4.6
4	0.8	3.67	4	0.79	4.26	4	0.89	5.05
5	0.86	4.39	5	0.93	5.31	5	0.81	8.59
6	0.64	4.01	6	0.79	4.79	6	0.91	4.66
7	0.91	4.65	7	0.82 (can)	7.99	7	0.93	6.23
8	0.7	5.17	8	0.88	3.61	8	0.84	4.45
9	0.75	2.95	9	0.91	1.71	9	No	No
10	0.72	3.21	10	0.71	6.65	10	No	No
avg	0.736	4.202		0.813333333	4.9366667		0.882857143	5.22

Result: performed good only in 60% threshold. There were some error in 70% threshold and some missing detection in the last threshold. The overall accuracy was 86.67% and the overall operation time per cycle was 5.22 second.

### 3. Paper

60% threshold			70% threshold			80% threshold		
PaperCup	confidence	Time (sec)	PaperCup	confidence	Time (sec)	PaperCup	confidence	Time (sec)
1	0.98	6.73	1	0.82	7.28	1	0.99	5.7
2	0.98	6.02	2	0.98	6.09	2	0.97	6.62
3	0.84	6.13	3	0.97	5.11	3	0.93	5.98
4	0.61	4.72	4	0.72	5.45	4	0.98	6.88
5	0.99	6.41	5	0.99	6.2	5	0.99	6.09
6	0.97	6.2	6	0.98	6.03	6	0.99	5.84
7	0.98	6.42	7	0.9	5.84	7	0.89	6.09
8	0.99	6.49	8	0.93	5.97	8	0.83	6.28
9	0.94	6.48	9	0.84	5.8	9	0.99	5.76
10	0.92	5.68	10	0.99	6.36	10	0.99	5.7
avg	0.92	6.128		0.912	6.013		0.955	6.094

Result: no error at all (100% accuracy) and the average time per operation was 6.09 second.

### 4. Others

60% threshold			70% threshold			80% threshold		
Others	confidence	Time (sec)	Others	confidence	Time (sec)	Others	confidence	Time (sec)
1	0.88	2.63	1	0.99 (paper)	3.74	1	No	No
2	0.81	3.22	2	0.71	5.04	2	No	No
3	0.68 (paper)	4.66	3	0.83	3.43	3	0.94	1.71
4	0.69 (plastic)	2.81	4	0.80 (paper)	3.73	4	No	No
5	0.92	2.76	5	No	No	5	0.87	2.43
6	0.97 (plastic)	2.57	6	0.76	3.28	6	No	No
7	0.85 (paper)	4.2	7	0.99 (paper)	5.5	7	No	No
8	0.95	3.35	8	No	No	8	0.97	2.5
9	0.96	3.73	9	0.98 (paper)	3.35	9	0.85	4.99
10	0.86	3.48	10	No	No	10	0.82	5.51
avg	0.896666667	3.195		0.766666667	3.9166667		0.89	3.428

Result: there were many errors in every threshold. Missing detection occurred in 70% and 80% threshold. The average accuracy was 46.67% and the average time per operation was 3.43 second

Overall, aluminium performed good at more than 80% threshold where as plastic performed better at lower threshold (lower than 70%). Paper performed good in all situation where as Others could be better when performed in low threshold (lower than 60% threshold). The overall accuracy of the model was 89% accuracy with the average time per operation in 5 second.