

Misclassification and Visibility analysis in Foggy Weather

Done under the esteemed guidance

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Abstract

This is report on “Misclassification” and “Visibility” performed during the summer internship by student of Indian Institute of Engineering Science and Technology, Shibpur under the supervision of our Professor Dr. Anuj Kishor Budhkar.

We have used MATLAB and media player to determine the visibility in the given video file. In Winters the visibility on the roads decreases due to which many accidents and mis happenings may take place. Through this study we can provide some ways to deal with it.

We have used Media player to do the misclassification work and noted the datas in the excel file. In automatic vehicle detection, several vehicles were detected in wrong vehicle class. These misclassifications were corrected manually by noting down the misclassified vehicle IDs and correcting vehicle classes in output trajectory file.

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Misclassification table from video

- 1.1. **Objective:-** To manually correct the misclassified vehicle IDs and correcting vehicle classes in output trajectory file.
- 1.2. **Requirements:-** Media Player and MS Excel.
- 1.3. **Procedure:-**
 1. We download the given files. I was a given video named Serampore Foggy 1_x264.
 2. We open these videos using media player.
 3. We play these videos in slow motion by decreasing the playback speed.
 4. Vehicles are detected automatically and one unique ID is assigned to it.
 5. We have to observe the vehicles carefully and make an Excel sheet with columns named Original ID, Original Type, New ID, and New Type.
 6. We assign the New ID as 0 to the stationary object and human.
 7. If there are more than one Ids on any vehicle we consider the last original ID as the new ID.



1.4. Data and Result:-

	A	B	C	D	E
1	original veh id	original vehicle type	new id	new vehicle type	
2	27	car	417	truck	
3	34	person	0	0	
4	57	car	66	motorbike	
5	64	motorbike	66	motorbike	
6	73	car	80	truck	
7	79	bus	80	truck	
8	80	car	80	truck	
9	86	bus	83	car	
10	97	bus	88	bus	
11	101	car	101	truck	
12	130	person	0	0	
13	147	truck	152	truck	
14	152	bus	152	truck	
15	158	car	158	motorbike	
16	168	person	0	0	
17	186	car	186	auto	
18	194	car	186	auto	
19	202	car	206	car	
20	215	person	215	motorbike	
21	227	person	227	motorbike	
22	222	motorbike	222	person	
23	243	train	243	bus	
24	244	car	246	car	
25	249	car	244	car	
26	274	car	274	auto	
27	280	bus	256	truck	

	A	B	C	D	E	F
26	274	car	274	auto		
27	280	bus	256	truck		
28	256	car	256	truck		
29	305	car	305	truck		
30	336	truck	336	bicycle		
31	346	car	346	motorbike		
32	392	person	392	bicycle		
33	417	car	417	truck		
34	433	car	433	truck		
35	448	train	450	truck		
36	450	bus	450	truck		
37	451	car	451	truck		
38	463	bus	463	truck		
39	463	bus	497	truck		
40	522	bicycle	522	motorbike		
41	521	person	521	motorbike		
42	550	car	552	car		
43	571	truck	571	auto		
44	615	car	615	auto		
45	685	train	685	truck		
46	688	bus	685	truck		
47	715	motorbike	715	tricycle		
48	721	car	721	truck		
49	729	truck	732	truck		
50	725	person	725	bicycle		
51	748	truck	752	truck		
52	767	car	767	truck		

	A	B	C	D	E
235	3751	person	0	0	
236	3744	bus	3742	truck	
237	3759	person	0	0	
238	3770	person	0	0	
239	3772	person	0	0	
240	3801	car	3801	truck	
241	3810	truck	3801	truck	
242	3832	car	3832	truck	
243	3851	bus	3841	truck	
244	3907	person	0	0	
245	3871	person	0	0	
246	3944	person	0	0	
247	3955	person	0	0	
248	3963	person	0	0	
249	3973	person	0	0	
250	3983	person	3983	motorbike	
251	3998	car	4000	car	
252	4011	car	4008	car	
253	4079	person	0	0	
254	4057	person	0	0	
255	4114	person	4114	motorbike	
256	4117	motorbike	4117	person	
257	4143	car	4143	truck	
258	4145	train	4145	truck	
259	4150	car	4150	motorbike	
260	4157	train	4157	truck	
261	4167	bus	4157	truck	

	A	B	C	D	E	F
278	4405	truck	4405	auto		
279	4446	car	4446	auto		
280	4479	truck	4483	bus		
281	4483	truck	4483	bus		
282	4486	person	0	0		
283	4510	bicycle	4499	bicycle		
284	4513	truck	4439	truck		
285	4526	truck	4526	auto		
286	4532	motorbike	4544	motorbike		
287	4537	motorbike	4544	motorbike		
288	4540	motorbike	4540	person		
289	4532	motorbike	4532	bicycle		
290	4550	bicycle	4550	person		
291	4585	truck	4585	car		
292	4594	car	4594	truck		
293	4597	car	4597	truck		
294	4291	truck	4291	person		
295	4604	truck	4604	person		
296	4613	car	4613	truck		
297	4616	car	4613	auto		
298	4645	car	4645	truck		
299	4632	person	0	0		
300	4650	motorbike	4650	person		
301	4674	motorbike	4665	motorbike		
302	4679	person	0	0		
303	4690	person	0	0		
304						

2. Visibility

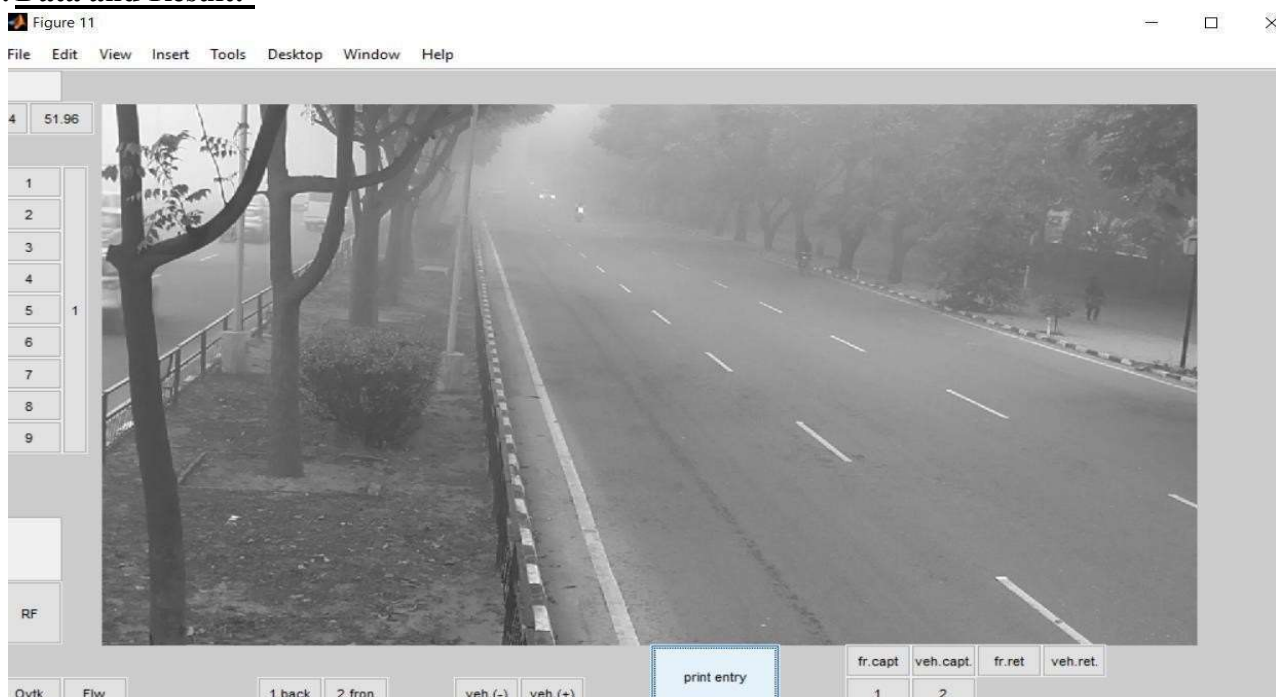
2.1. Objective:- To determine the visibility in the given video. Visibility is the maximum distance up to which a non-reflective black object can be identified against an uniform white background.

2.2. Requirements:- MATLAB, Media Player.

2.3. Procedure:-

1. Download the given video file. I was given the task of finding the visibility of Serampore foggy 1, Dera Bassi 1 and Dera Bassi 2.
2. Open MATLAB.
3. Download and run test_1.m file given. This MATLAB programme is for playing videos.
4. In 345 line, there is a path for video file. You have to give your own video path here in the command line by editing it according to where you had downloaded the video file.
5. Edit the command line and then run the video.
6. Click on load image. It will get the video.
7. Then click on run. Video will start playing.
8. Click pause. A screenshot will appear. Check whether two values are appearing or not. If it is appearing then it is fine but if its not appearing do the above step once again until you see two values.
9. Visibility is the maximum distance up to which a non-reflective black object can be identified against a uniform white background. For this reason we have used a black and white umbrella here.
10. Click on 1. Then first click on black part of the umbrella and then click on the white part of the umbrella. Make sure that black is the blackest part and white is the whitest part on the umbrella where you are clicking.
11. Then print entry.
12. These coordinates will be saved in a text file named Coors.txt.
13. We don't need to click on 1 again and again. Just click on black portion of the umbrella first, then the white portion of the umbrella and then click on print.
14. Make sure that you start doing this procedure when the person with the umbrella is exactly at the front.
15. Keep on doing this procedure till you see the umbrella as much as possible.

2.4. Data and Result:-



Serampore foggy 1								
File	Edit	View						
754.5	545.8	70	739.5	614.8	197	1	36133	1
700.4	438.2	76	739.2	413.8	186	1	36382	1
718.2	398.2	79	687.1	373.8	194	1	36624	1
717.0	333.9	90	692.6	319.5	178	1	36859	1
684.0	289.2	102	669.0	275.7	162	1	37112	1
667.1	259.5	114	651.6	248.5	177	1	37352	1
662.7	239.6	130	648.3	234.0	166	1	37582	1
653.8	224.0	137	646.0	218.5	173	1	37823	1
662.7	217.4	144	654.9	210.7	170	1	38073	1
662.7	210.7	148	656.0	201.9	169	1	38301	1
653.8	204.1	154	648.3	199.6	170	1	38538	1
654.9	196.3	158	648.3	191.9	169	1	38777	1
656.0	193.0	158	660.5	188.5	167	1	39016	1
651.6	190.8	159	648.3	185.2	169	1	39274	1
649.4	188.5	160	646.0	183.0	168	1	39501	1
652.7	183.0	164	658.3	178.6	171	1	39756	1
649.5	182.7	162	649.5	178.2	168	1		1
649.5	185.7	161	658.5	181.2	173	1	45447	1
649.5	187.2	159	657.0	184.2	178	1	45680	1
658.5	191.7	158	666.0	184.2	176	1	45921	1
658.5	199.2	156	666.0	194.7	184	1	46165	1
660.0	203.7	146	669.0	197.7	175	1	46404	1
664.5	211.2	137	675.0	206.7	178	1	46638	1
652.5	220.2	136	669.0	215.7	184	1	46881	1
645.0	229.2	123	657.0	226.2	196	1	47121	1
687.0	262.2	115	672.0	251.7	185	1	47367	1
693.0	289.2	98	715.5	277.2	200	1	47604	1
717.0	343.2	86	747.0	335.7	197	1	47842	1
709.5	469.3	75	757.5	451.3	212	1	48080	1
831.1	658.4	57	771.1	604.3	201	1	48219	1
787.6	632.9	52	858.1	629.9	188	1	53703	1
706.5	386.8	73	745.5	385.3	186	1	53957	1
708.0	343.2	87	739.5	346.2	175	1	54203	1
685.5	286.2	104	709.5	290.7	179	1	54444	1
672.0	265.2	108	693.0	263.7	176	1	54683	1
660.0	245.7	117	679.5	245.7	173	1	54924	1
657.0	229.2	122	673.5	227.7	173	1	55167	1

Serampore foggy 1								
File	Edit	View						
709.5	469.3	75	757.5	451.3	212	1	48080	1
831.1	658.4	57	771.1	604.3	201	1	48219	1
787.6	632.9	52	858.1	629.9	188	1	53703	1
706.5	386.8	73	745.5	385.3	186	1	53957	1
708.0	343.2	87	739.5	346.2	175	1	54203	1
685.5	286.2	104	709.5	290.7	179	1	54444	1
672.0	265.2	108	693.0	263.7	176	1	54683	1
660.0	245.7	117	679.5	245.7	173	1	54924	1
657.0	229.2	122	673.5	227.7	173	1	55167	1
660.0	223.2	122	675.0	221.7	169	1	55403	1
661.5	217.2	131	673.5	214.2	184	1	55649	1
657.0	211.2	138	669.0	209.7	172	1	55890	1
663.0	205.2	146	673.5	205.2	177	1	56120	1
657.0	202.2	149	667.5	199.2	181	1	56365	1
657.0	199.2	150	666.0	197.7	171	1	56600	1
657.0	194.7	154	667.5	193.2	174	1	56840	1
657.0	191.7	153	663.0	191.7	167	1	57080	1
654.0	187.2	157	661.5	187.2	169	1	57322	1
654.0	188.7	157	663.0	185.7	175	1	57558	1
651.0	187.2	153	657.0	182.7	182	1	58043	1
649.5	181.2	158	654.0	181.2	177	1	58294	1
648.0	185.7	154	655.5	181.2	172	1	58517	1
648.0	181.2	161	655.5	178.2	168	1	58764	1
652.5	182.7	159	660.0	179.7	168	1	59000	1
651.0	179.7	158	657.0	175.2	178	1	59239	1
651.0	178.2	162	657.0	176.7	169	1	59488	1
646.5	179.7	157	651.0	175.2	178	1	59715	1
646.5	179.7	158	649.5	176.7	167	1	60387	1
646.5	182.7	160	651.0	178.2	172	1	60619	1
646.5	185.7	155	651.0	181.2	175	1	60872	1
646.5	187.2	151	652.5	182.7	182	1	61098	1
645.0	185.7	147	649.5	181.2	186	1	61340	1
645.0	190.2	144	652.5	185.7	181	1	61591	1
651.0	194.7	136	658.5	188.7	194	1	61942	1
657.0	202.2	136	661.5	193.2	195	1	62185	1
660.0	211.2	131	649.5	205.2	181	1	62428	1
655.5	221.7	123	666.0	214.2	193	1	62661	1
657.0	229.2	113	669.0	221.7	194	1	62907	1
655.5	247.2	108	640.5	236.7	194	1	63145	1
669.0	271.2	97	652.5	260.7	185	1	63389	1

Dera Bassi 1

904.6	676.4	69	979.6	670.4	244	1	2621	1
825.1	415.3	85	880.6	439.3	217	1	2769	1
921.1	647.9	103	897.1	538.3	114	1	2646	1
939.1	574.3	67	1014.1	562.3	245	1	2810	1
826.6	398.8	88	877.6	424.3	214	1	2777	1
759.0	242.7	82	792.1	253.2	235	1	2895	1
733.5	175.2	84	759.0	181.2	255	1	3015	1
717.0	139.2	90	733.5	142.2	248	1	3134	1
703.5	113.7	96	717.0	118.2	232	1	3252	1
699.0	95.6	94	711.0	100.1	246	1	3374	1
697.5	85.1	95	708.0	89.6	220	1	3491	1
697.5	74.6	138	705.0	82.1	214	1	3608	1
694.5	70.1	123	700.5	74.6	214	1	3727	1
694.5	65.6	130	700.5	68.6	241	1	3847	1
690.0	61.1	125	696.0	65.6	182	1	3967	1
690.0	56.6	130	693.0	61.1	209	1	4082	1
687.0	53.6	142	693.0	56.6	237	1	4195	1
690.0	50.6	232	693.0	53.6	228	1	4310	1
685.5	49.1	150	691.5	52.1	159	1	4426	1
685.5	44.6	154	688.5	50.6	117	1	4549	1
685.5	44.6	201	690.0	46.1	242	1	4664	1
684.0	40.1	125	687.0	44.6	215	1	4778	1
687.0	43.1	137	1	4891	1			
684.0	41.6	238	684.0	43.1	221	1	5003	1
684.0	37.1	205	687.0	38.6	154	1	5242	1
690.0	41.6	190	684.0	41.6	152	1	5355	1

Dera Bassi 2

1006.6	556.3	66	922.6	575.8	248	1	10900	1
784.6	184.2	115	760.5	197.7	243	1	11012	1
751.4	140.8	79	732.6	146.4	247	1	11124	1
734.8	109.8	94	714.8	118.7	235	1	11241	1
717.0	92.0	124	709.3	99.8	239	1	11353	1
718.2	82.0	121	706.0	87.6	237	1	11466	1
714.8	70.9	127	707.1	79.8	223	1	11582	1
706.0	66.5	115	700.4	70.9	236	1	11693	1
702.6	62.1	103	697.1	66.5	234	1	11805	1
699.3	55.4	129	694.9	59.9	247	1	11923	1
694.9	56.5	244	697.1	54.3	205	1	12037	1
694.9	49.9	122	692.6	53.2	255	1	12150	1
698.2	49.9	128	694.9	53.2	223	1	12263	1
683.8	46.5	113	688.2	48.8	240	1	12378	1
686.0	44.3	138	687.1	47.6	234	1	12490	1
689.3	42.1	137	687.1	45.4	247	1	12603	1
684.9	41.0	133	687.1	45.4	208	1	12715	1
680.4	41.0	150	687.1	41.0	255	1	12830	1
684.9	39.9	89	689.3	39.9	255	1	12944	1
680.4	32.1	187	682.7	31.0	236	1	13750	1
682.7	32.1	252	679.3	32.1	245	1	13862	1
680.4	33.2	159	679.3	33.2	193	1	13973	1
682.7	34.3	114	682.7	32.1	168	1	14086	1
682.7	33.2	175	678.2	31.0	202	1	14201	1
679.3	33.2	142	682.7	34.3	195	1	15234	1
682.7	32.1	192	679.3	32.1	216	1	15351	1
683.8	29.9	220	680.4	31.0	192	1	15463	1

Coors.txt file

We know that, Visibility is the distance at which contrast threshold of an object reduces to 5% of its original value in fog. Initially brightness of the black and white portions of the object are calculated in clear weather condition and is labelled as A. As the reference object is carried away from the camera, a change in brightness is noted. The difference between the brightness of black and white portions is labelled as B. In foggy conditions due to scattering of light the brightness of white portion decreases and the brightness of black portion increases depending on the intensity of fog. As soon as $A/B = 0.05$, the position of object is recorded and termed as visibility as per basic definition.

3. Conclusion

Through this internship I got to learn how to use MATLAB to find out the visibility and note it. Also got to know the effects of scattering of light on the test object used for determining the visibility. Also got to know the importance of misclassification and correctly providing the new IDs and vehicle types and noting them in the Excel file.