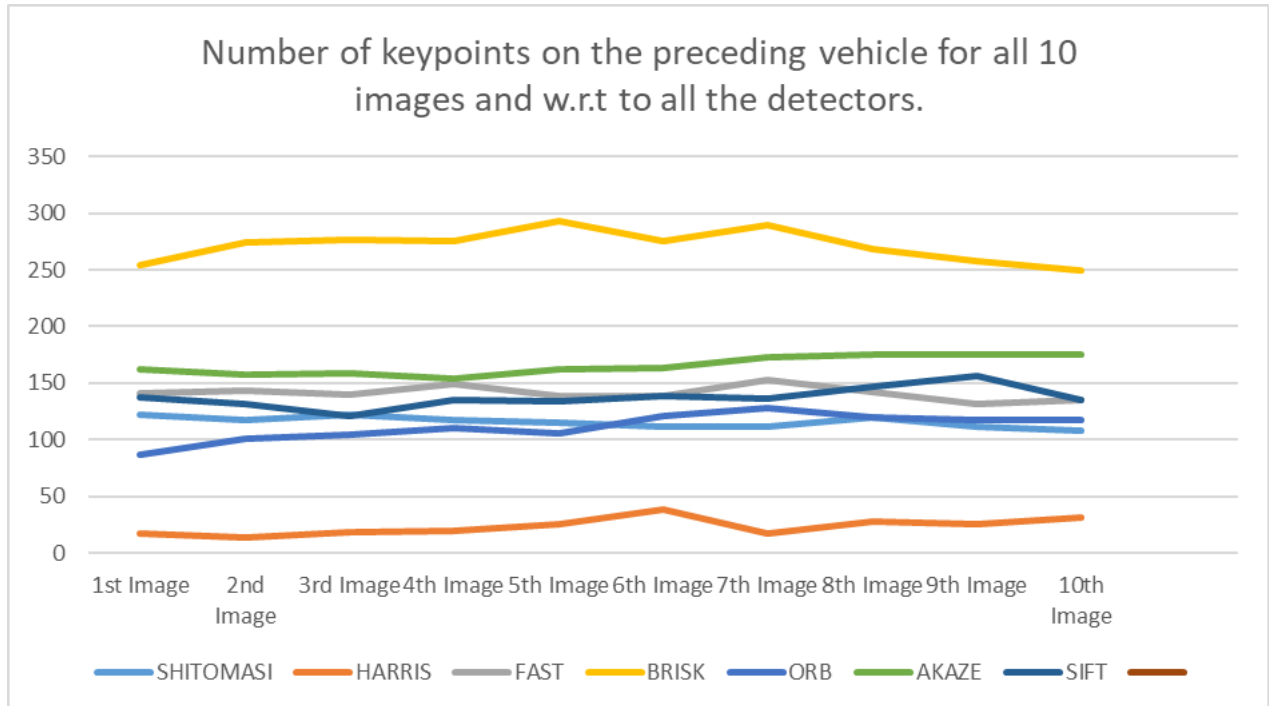


## MP.7 Performance Evaluation 1

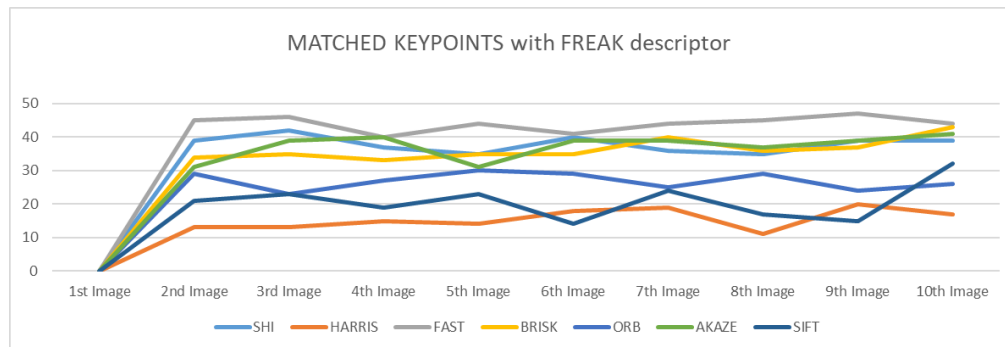
Number of Key points on the preceding vehicle for all 10 images and w.r.t to all the detectors.

	SHITOMASI	HARRIS	FAST	BRISK	ORB	AKAZE	SIFT
1 <sup>st</sup> Image	122	17	141	254	87	162	137
2 <sup>nd</sup> Image	117	14	143	274	101	157	131
3 <sup>rd</sup> Image	122	18	140	276	105	159	121
4 <sup>th</sup> Image	117	20	149	275	110	154	135
5 <sup>th</sup> Image	115	25	139	293	106	162	134
6 <sup>th</sup> Image	112	39	139	275	121	163	139
7 <sup>th</sup> Image	112	17	153	289	128	173	136
8 <sup>th</sup> Image	120	28	142	268	120	175	147
9 <sup>th</sup> Image	111	25	131	258	117	175	156
10 <sup>th</sup> Image	108	31	135	249	117	175	135

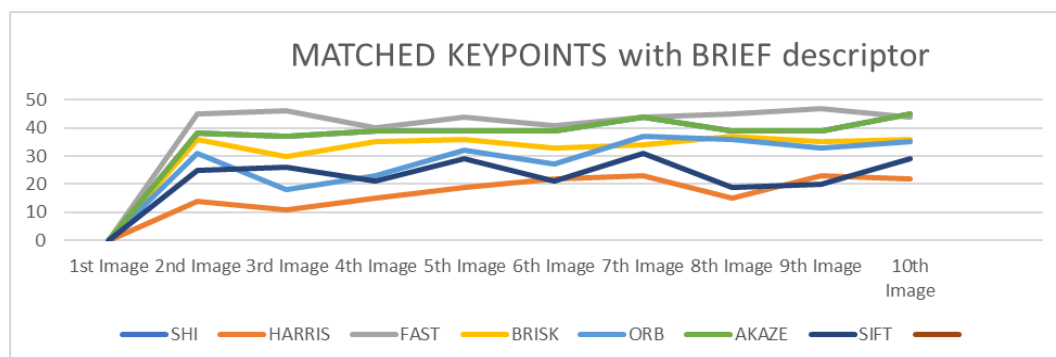


## MP.8 Performance Evaluation 2

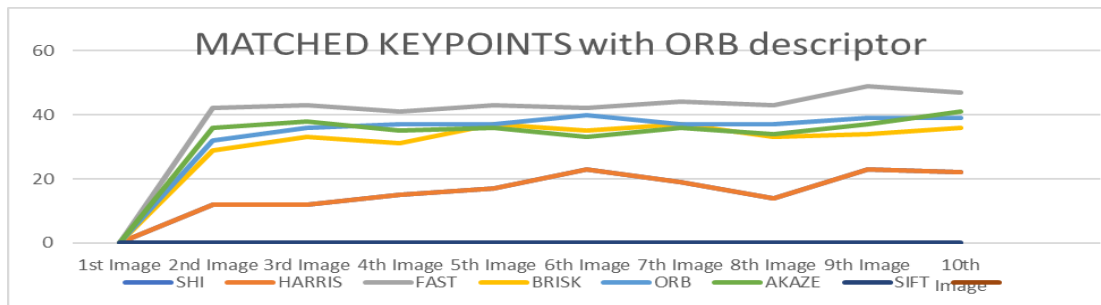
FREAK	SHI	HARRIS	FAST	BRISK	ORB	AKAZE	SIFT
1 <sup>st</sup> Image	0	0	0	0	0	0	0
2 <sup>nd</sup> Image	39	13	45	34	29	31	21
3 <sup>rd</sup> Image	42	13	46	35	23	39	23
4 <sup>th</sup> Image	37	15	40	33	27	40	19
5 <sup>th</sup> Image	35	14	44	35	30	31	23
6 <sup>th</sup> Image	40	18	41	35	29	39	14
7 <sup>th</sup> Image	36	19	44	40	25	39	24
8 <sup>th</sup> Image	35	11	45	36	29	37	17
9 <sup>th</sup> Image	39	20	47	37	24	39	15
10 <sup>th</sup> Image	39	17	44	43	26	41	32



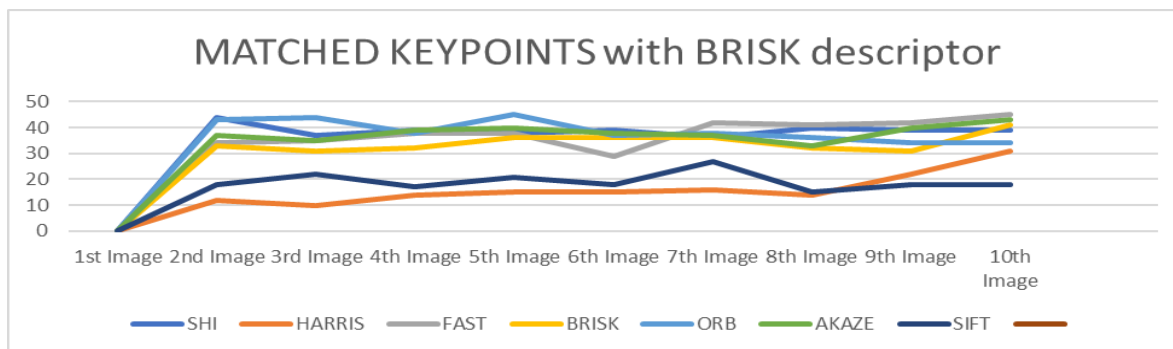
BRIEF	SHI	HARRIS	FAST	BRISK	ORB	AKAZE	SIFT
1 <sup>st</sup> Image	0	0	0	0	0	0	0
2 <sup>nd</sup> Image	38	14	45	36	31	38	25
3 <sup>rd</sup> Image	37	11	46	30	18	37	26
4 <sup>th</sup> Image	39	15	40	35	23	39	21
5 <sup>th</sup> Image	39	19	44	36	32	39	29
6 <sup>th</sup> Image	39	22	41	33	27	39	21
7 <sup>th</sup> Image	44	23	44	34	37	44	31
8 <sup>th</sup> Image	39	15	45	37	36	39	19
9 <sup>th</sup> Image	39	23	47	35	33	39	20
10 <sup>th</sup> Image	45	22	44	36	35	45	29



ORB	SHI	HARRIS	FAST	BRISK	ORB	AKAZE	SIFT
1 <sup>st</sup> Image	0	0	0	0	0	0	0
2 <sup>nd</sup> Image	12	12	42	29	32	36	0
3 <sup>rd</sup> Image	12	12	43	33	36	38	0
4 <sup>th</sup> Image	15	15	41	31	37	35	0
5 <sup>th</sup> Image	17	17	43	37	37	36	0
6 <sup>th</sup> Image	23	23	42	35	40	33	0
7 <sup>th</sup> Image	19	19	44	37	37	36	0
8 <sup>th</sup> Image	14	14	43	33	37	34	0
9 <sup>th</sup> Image	23	23	49	34	39	37	0
10 <sup>th</sup> Image	22	22	47	36	39	41	0



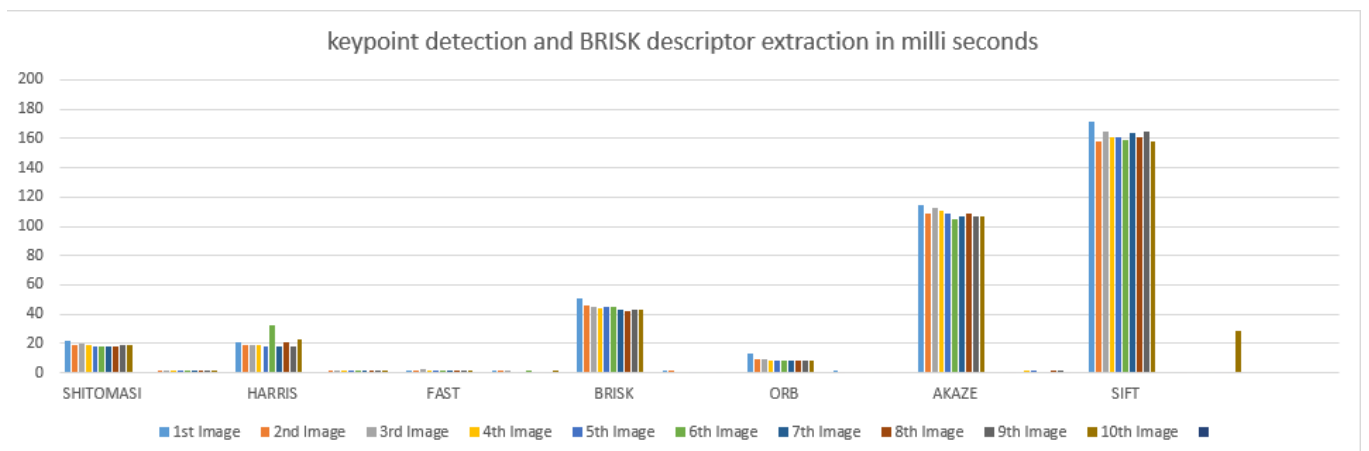
BRISK	SHI	HARRIS	FAST	BRISK	ORB	AKAZE	SIFT
1 <sup>st</sup> Image	0	0	0	0	0	0	0
2 <sup>nd</sup> Image	44	12	34	33	43	37	18
3 <sup>rd</sup> Image	37	10	35	31	44	35	22
4 <sup>th</sup> Image	39	14	38	32	38	39	17
5 <sup>th</sup> Image	38	15	38	36	45	40	21
6 <sup>th</sup> Image	39	15	29	36	37	38	18
7 <sup>th</sup> Image	36	16	42	36	38	37	27
8 <sup>th</sup> Image	40	14	41	32	36	33	15
9 <sup>th</sup> Image	39	22	42	31	34	40	18
10 <sup>th</sup> Image	39	31	45	41	34	43	18



## MP.9 Performance Evaluation 3 – TOP3 detector / descriptor combinations

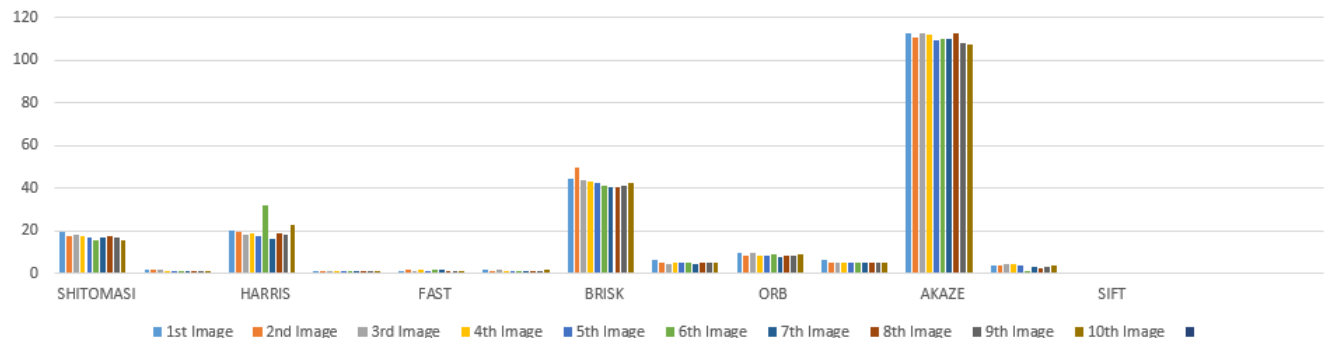
1. FAST Key point detection with BRIEF/BRISK descriptor.
2. ORB Key point detection with BRIEF descriptor.
3. HARRIS Key point detection with ORB descriptor.

Brisk	SHITOMASI		HARRIS		FAST		BRISK		ORB		AKAZE		SIFT	
1 <sup>st</sup> Image	21.61	1.01	20.55	0.63	1.43	1.93	50.75	1.81	13.5	1.74	114.17	0.95	171.58	0.83
2 <sup>nd</sup> Image	19.18	1.74	19.21	1.32	1.34	1.71	46.38	1.47	9.17	0.87	108.8	0.83	157.66	0.8
3 <sup>rd</sup> Image	19.52	1.81	19.3	1.42	2.09	1.72	45.09	0.9	9.32	0.84	112.91	0.83	165.13	0.8
4 <sup>th</sup> Image	19.08	1.74	18.95	1.38	1.41	0.9	44.41	0.88	8.74	0.86	110.7	1.7	160.64	0.8
5 <sup>th</sup> Image	18.21	1.67	18.17	1.46	1.25	0.86	45.01	0.9	8.69	0.82	108.58	1.62	160.44	0.8
6 <sup>th</sup> Image	18.25	1.66	32.51	1.56	1.31	1.11	44.72	0.88	7.98	0.88	105.24	0.8	158.813	0.78
7 <sup>th</sup> Image	18.21	1.71	17.77	1.33	1.23	0.87	43.34	0.9	8.29	0.85	106.97	0.79	163.33	0.81
8 <sup>th</sup> Image	18.23	1.71	20.67	1.53	1.25	0.92	42.46	0.86	8.07	0.84	108.73	1.57	161.09	0.81
9 <sup>th</sup> Image	18.46	1.7	18.23	1.48	1.41	0.88	42.85	0.89	8.19	0.94	107.05	1.62	164.43	0.78
10 <sup>th</sup> Image	18.86	1.66	23.14	1.47	1.5	1.69	43.29	0.9	8.29	0.84	106.61	0.81	158.31	29



ORB	SHITOMASI		HARRIS		FAST		BRISK		ORB		AKAZE		SIFT	
1 <sup>st</sup> Image	19.3	1.48	19.86	1.14	0.98	1.77	44.5	6.34	9.7	6.16	112.47	3.73	0	0
2 <sup>nd</sup> Image	17.58	1.56	19.61	1.19	1.45	1.27	49.71	4.94	8.57	4.72	110.46	3.83	0	0
3 <sup>rd</sup> Image	18.29	1.42	18.4	1.16	1.13	1.46	43.77	4.62	9.72	4.98	112.84	4.04	0	0
4 <sup>th</sup> Image	17.43	1.22	18.67	1.11	1.36	1.24	42.92	4.65	8.11	5	111.88	4.11	0	0
5 <sup>th</sup> Image	16.78	1.11	17.72	1.07	1.24	1.16	42.62	4.76	7.96	4.8	109.36	3.69	0	0
6 <sup>th</sup> Image	15.71	1.17	31.7	1.33	1.37	1.22	40.91	5	8.66	5.11	109.8	0.8	0	0
7 <sup>th</sup> Image	16.66	1.15	16.28	1.24	1.4	1.32	40.76	4.13	7.69	4.94	110.07	2.75	0	0
8 <sup>th</sup> Image	17.51	1.23	19.03	1.22	1.22	1.31	40.37	4.99	8.09	4.79	112.67	2.54	0	0
9 <sup>th</sup> Image	16.83	1.27	17.81	1.11	1.29	1.26	40.82	4.91	8.03	5.07	108.29	2.73	0	0
10 <sup>th</sup> Image	15.63	1.15	22.53	1.1	1.06	1.37	42.27	5.06	9.19	4.75	107.33	3.94		0

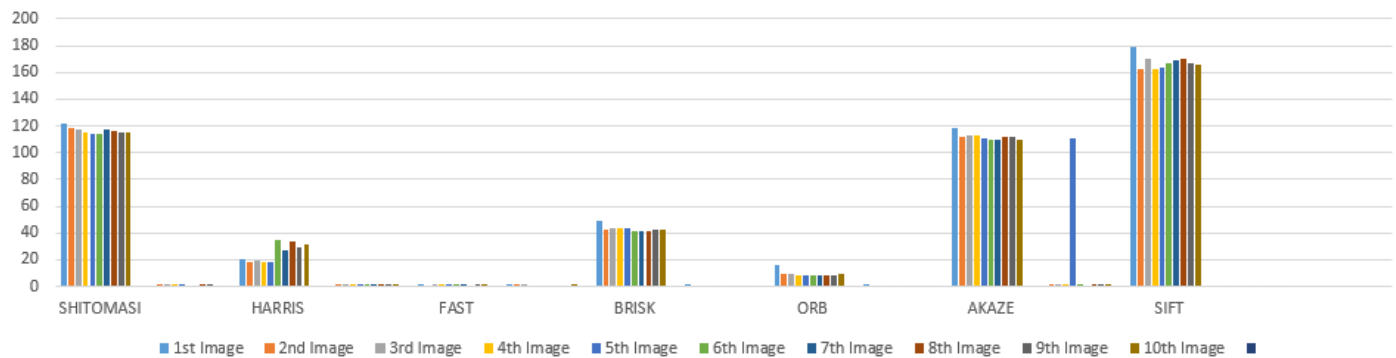
keypoint detection and ORB descriptor extraction in milli seconds



BRIEF	SHITOMASI		HARRIS		FAST		BRISK		ORB		AKAZE		SIFT	
1 <sup>st</sup> Image	122.07	0.93	20.81	0.54	2.25	1.61	49.15	1.61	16.148	1.43	118.7	0.79	178.5	0.9
2 <sup>nd</sup> Image	118.4	1.4	18.59	1.33	1.09	1.43	42.3	0.62	9.13	0.73	112.02	1.41	162.46	0.68
3 <sup>rd</sup> Image	116.86	1.91	18.89	1.41	1.35	1.9	43.54	0.69	9.34	0.94	113.33	1.69	170.18	0.71
4 <sup>th</sup> Image	115.56	1.77	18.51	1.33	1.26	0.75	43.54	0.61	8.06	0.62	112.95	1.54	162.69	0.69
5 <sup>th</sup> Image	114.18	1.59	18.45	1.48	1.37	0.77	43.37	0.66	8.33	0.61	111.12	111.12	163.24	0.7
6 <sup>th</sup>	114.48	1.17	35.04	1.48	1.38	0.96	41.91	0.66	8.66	0.73	109.43	1.87	166.43	0.69

Image														
7 <sup>th</sup> Image	117.01	0.87	26.87	1.47	1.37	0.97	41.1	0.65	8.35	0.63	109.46	0.73	168.73	0.7
8 <sup>th</sup> Image	116.15	1.69	33.2	1.67	1.03	0.82	41.43	0.67	8.2	0.65	112.32	1.53	170.38	0.7
9 <sup>th</sup> Image	115.51	1.77	29.34	1.57	1.42	0.99	41.98	0.73	8.88	1.05	111.91	1.52	166.39	0.71
10 <sup>th</sup> Image	114.93	0.94	31.75	1.76	1.22	1.65	42.22	0.67	9.3	0.63	110.05	1.55	165.36	0.97

keypoint detection and BRIEF descriptor extraction in milli seconds



FREAK	SHITOMASI		HARRIS		FAST		BRISK		ORB		AKAZE		SIFT	
1 <sup>st</sup> Image	19.7	42.07	19.19	41.54	2.25	1.61	1.37	43.69	9.91	43.19	116.188	39.57	173.49	39.52
2 <sup>nd</sup> Image	17.21	38.46	17.5	38.22	1.09	1.43	1.21	42.26	9.32	42.07	111.81	39.37	163.86	39.02
3 <sup>rd</sup> Image	19.29	38.74	17.54	38.26	1.35	1.9	1.36	43.42	8.58	41.75	113.45	44.01	172.01	42.79
4 <sup>th</sup> Image	12.83	38.57	13.62	38.17	1.26	0.75	1.02	38.77	8.25	38.83	111.55	43.65	164.43	39.76
5 <sup>th</sup> Image	12.22	38.56	13.7	55.01	1.37	0.77	1.33	38.97	7.82	39.74	104.37	39.94	166.72	39.56
6 <sup>th</sup> Image	11.92	38.2	27.67	38.51	1.38	0.96	1.26	38.92	7.81	39.42	112.15	44.12	170.64	40.6
7 <sup>th</sup> Image	12.1	38.91	12.69	38.52	1.37	0.97	1.05	42.84	7.9	39.74	106.97	44.39	168.26	40.32
8 <sup>th</sup> Image	12.64	38.91	38.64	38.64	1.03	0.82	1.12	39.33	8.39	39.17	107.43	39.35	167.9	39.79
9 <sup>th</sup> Image	12.8	39.1	13.57	38.08	1.42	0.99	1.361	39.3	8.09	39.17	113.1	43.74	167.201	39.68
10 <sup>th</sup> Image	12.62	39.03	18.44	38.32	1.22	1.65	1.31	39.31	8.49	39.16	107.22	43.38	168.15	40.4

keypoint detection and FREAK descriptor extraction in milli seconds

