Read Me file from Camera Mid Term Project

Implementation of the descriptors, detectors and matchers.

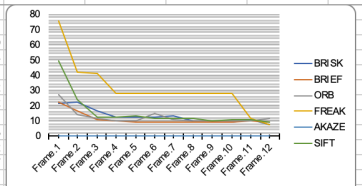
1. A buffer ring was introduced by creating a new class which contains a vector and a variable with the max size. Each new element will be put at the end and will displace a position the rest of the elements.
2. A chain of if clauses was added with the corresponding code for the keypoints detection to be selected by introducing the desired method.
3. For academic purposes we are reducing the amount of keypoints to focus only on a specific car and appreciate better the performance of the methods.
4. For tasks 4,5,6 a chain of if clauses was also added to select the desired implementation accordingly.
5. A spreadsheet was filled with all the combinations to have the overview of the methods and how they perform better.

Recommended descriptor-detector pairs

Based on the processing time the recommendations for the top 3 combinations are the following:

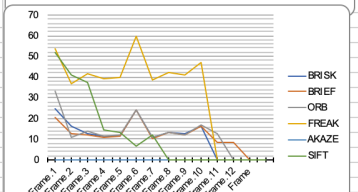
1. FAST-ORB
2. ORB-BRIEF
3. Shitomasi-BRIEF

Detec.	Frame	Descriptors BRISK	BRIEF	ORB	FREAK	AKAZE	SIFT	Lidar
Shi-Thomasi	Frame.1	21,719	22,7505	27,3914	75,8916	xx	49,5304	12,2891
	Frame.2	22,2338	16,6885	14,40779	42,4035	xx	24,3339	12,2891
	Frame.3	16,432	11,0282	12,123928	41,0708	xx	12,4	12,7299
	Frame.4	12,5693	9,77382	10,333159	28,0325	xx	12,5093	13,7314
	Frame.5	12,6851	9,47406	10,358358	27,93107	xx	13,0971	13,7901
	Frame.6	12,3198	9,36097	15,25998	27,76598	xx	12,0611	11,8642
	Frame.7	13,1014	9,34033	10,493221	27,78556	xx	12,0238	11,9682
	Frame.8	9,73817	9,4909	10,188633	27,90473	xx	11,8855	9,88711
	Frame.9	9,57874	9,64168	10,223949	27,7631	xx	10,2993	9,30215
	Frame.10	9,41594	9,4222	10,237209	27,73292	xx	10,9093	8,3212
	Frame.11	11,0839	10,321	10,2624	11,5161	xx	11,2667	8,89867
	Frame.12	7,87897	9,14916	11,7152	7,25857	xx	9,64049	11,0301



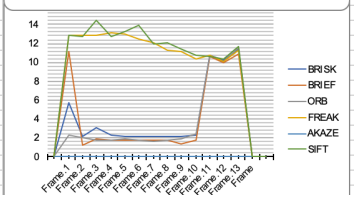
Detec-Desc.	Lidar to CameraTTC difference
Shi-BRISK	15,66953
Shi-BRIEF	-6,4571
Shi-ORB	20,809187
Shi-FREAK	184,6001
Shi-AKAZE	-123,81213
Shi-SIFT	44,21106

	Frame	BRISK	BRIEF	ORB	FREAK	AKAZE	SIFT	Lidar
HARRIS	Frame.1	24,67834	20,35271	33,42528	53,6509	xx	51,9306	12,2891
	Frame.2	16,087294	12,9398	11,045154	36,8234	xx	41,0367	12,2891
	Frame.3	12,693163	11,837796	13,89565	41,4946	xx	37,3809	12,7299
	Frame.4	11,341376	11,09757	11,644225	38,967	xx	14,2744	13,7314
	Frame.5	11,770773	11,460124	12,086182	39,8163	xx	13,5704	13,7901
	Frame.6	24,308011	23,965392	24,414015	59,4873	xx	6,60338	11,8642
	Frame.7	10,794533	10,465904	11,157347	38,3882	xx	11,8634	11,9682
	Frame.8	13,163374	13,024395	13,330575	41,9831	xx	-inf	9,88711
	Frame.9	12,706962	11,843837	12,141787	40,8943	xx		9,30215
	Frame.10	16,514723	16,162939	16,66857	46,9789	xx		8,3212
	Frame.11	-inf	8,54246	12,5848		xx		8,89867
	Frame.12		8,34398	-inf		xx		11,0301



Harris-BRISK	17,957319
Harris-BRIEF	23,935677
Harris-ORB	36,292355
Harris-FREAK	302,38277
Harris-AKAZE	-136,10123
Harris-SIFT	40,55855

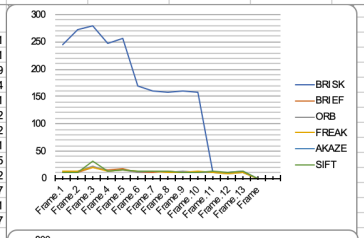
	Frame	BRISK	BRIEF	ORB	FREAK	AKAZE	SIFT	Lidar
FAST	Frame.1	5,76917	11,11775	2,355129	12,8553	xx	12,8174	12,2891
	Frame.2	2,183903	1,240122	2,081823	12,886	xx	12,7635	12,2891
	Frame.3	3,045215	1,879157	1,809269	12,9022	xx	14,3911	12,7299
	Frame.4	2,294097	1,780071	1,747287	13,193	xx	12,7354	13,7314
	Frame.5	2,166379	1,815823	1,8866	12,9506	xx	13,3262	13,7901
	Frame.6	2,216426	1,782323	1,809419	12,5268	xx	13,9144	11,8642
	Frame.7	2,234151	1,779226	1,615518	12,0531	xx	11,9088	11,9682
	Frame.8	2,164223	1,754794	1,837715	11,3317	xx	12,0801	9,88711
	Frame.9	2,140005	1,323484	1,84587	11,0998	xx	11,4003	9,30215
	Frame.10	2,285311	1,824065	2,410256	10,3855	xx	10,7908	8,3212
	Frame.11	10,7611	10,6503	10,7703	10,7725	xx	10,6011	8,89867
	Frame.12	10,1905	9,91608	10,1523	10,0358	xx	10,3331	11,0301



FAST-BRISK	-85,71342
FAST-BRIEF	-86,888705
FAST-ORB	-92,826814
FAST-FREAK	9,6651
FAST-AKAZE	-144,6368
FAST-SIFT	14,0414

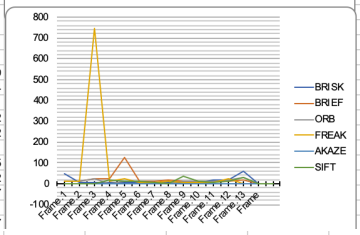
Descriptors

Detec.	Frame	BRISK	BRIEF	ORB	FREAK	AKAZE	SIFT	Lidar
BRISK	Frame.1	245,22677	10,6446	12,2058	12,4708	xx	11,7326	12,2891
	Frame.2	272,41089	10,7013	12,3234	12,4708	xx	11,7677	12,2891
	Frame.3	278,6754	19,8833	21,7158	21,0367	xx	30,5038	12,7299
	Frame.4	246,40928	15,08	13,3823	12,6108	xx	12,996	13,7314
	Frame.5	257,48022	18,8059	15,2256	15,4352	xx	16,4277	13,7901
	Frame.6	168,69304	11,1942	11,3782	13,0544	xx	14,2847	11,8642
	Frame.7	159,36892	11,3195	13,6087	13,0359	xx	12,4881	11,9682
	Frame.8	158,78926	12,8651	11,752	11,688	xx	13,0248	9,88711
	Frame.9	159,51131	10,3847	12,7746	10,8334	xx	11,2474	9,30215
	Frame.10	158,74033	10,421	11,2406	12,1457	xx	11,5667	8,3212
	Frame.11	11,0648	11,82	10,8269	10,2044	xx	14,2821	8,89867
	Frame.12	10,2457	10,2332	8,77247	9,15566	xx	11,7975	11,0301
	Frame.13	12,07	10,3635	11,1472	11,1472	xx	12,1088	8,53557



Detec-Desc.	Lidar to CameraTTC difference
BRISK-BRISK	1994,04912
BRISK-BRIEF	19,0795
BRISK-ORB	21,71677
BRISK-FREAK	20,65216
BRISK-AKAZE	-144,6368
BRISK-SIFT	39,5911

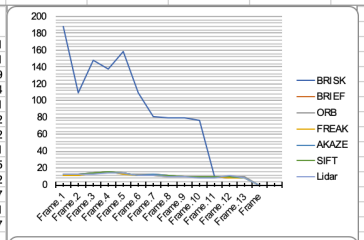
Detec.	Frame	BRISK	BRIEF	ORB	FREAK	AKAZE	SIFT	Lidar
ORB	Frame.1	46,898	13,0283	14,6721	12,5394	xx	-0,311782	12,2891
	Frame.2	7,5079	13,0283	14,4902	12,5394	xx	-0,312877	12,2891
	Frame.3	7,90873	21,8634	21,8774	743,244	xx	-2,21016	12,7299
	Frame.4	7,80323	22,677	-inf	12,6809	xx	17,4175	13,7314
	Frame.5	7,56782	128,514	10,9433	23,5366	xx	10,7914	13,7901
	Frame.6	7,82429	10,7543	10,998	7,95795	xx	11,0292	11,8642
	Frame.7	7,71037	10,8744	7,80056	8,31342	xx	8,64067	11,9682
	Frame.8	7,85225	20,4501	-inf	11,6725	xx	-inf	9,88711
	Frame.9	7,75048	8,92455	13,7519	8,46553	xx	35,8137	9,30215
	Frame.10	8,60596	14,1265	10,018	7,46502	xx	13,594	8,3212
	Frame.11	15,2827	11,1758	10,8633	7,02786	xx	7,99493	8,89867
	Frame.12	18,7061	12,7044	18,7821	24,1855	xx	11,6294	11,0301
	Frame.13	59,7626	18,52	27,4756		xx	29,1115	8,53557



Detec-Desc.	Lidar to CameraTTC difference
ORB-BRISK	66,54363
ORB-BRIEF	162,00425
ORB-ORB	17,03566
ORB-FREAK	734,99128
ORB-AKAZE	-144,6368
ORB-SIFT	-1,449319

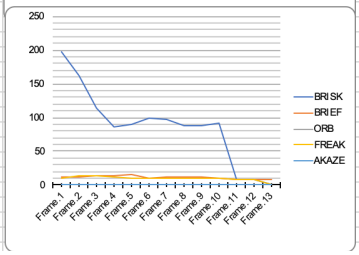
Descriptors

Detec.	Frame	BRISK	BRIEF	ORB	FREAK	AKAZE	SIFT	Lidar
AKAZE	Frame.1	188,11009	12,4103	11,7072	11,612	12,3636	12,4181	12,2891
	Frame.2	108,79219	12,3968	11,7072	11,6101	12,3704	12,3975	12,2891
	Frame.3	148,39936	13,9758	14,0143	13,8267	14,5457	14,9364	12,7299
	Frame.4	137,14745	15,7991	15,3629	15,2874	15,7664	16,2269	13,7314
	Frame.5	158,01979	14,0255	13,4531	13,256	14,4228	14,0331	13,7901
	Frame.6	108,93996	11,9147	12,2297	11,7111	11,7923	11,5818	11,8642
	Frame.7	81,47265	12,4734	12,0939	11,5411	12,3045	11,9996	11,9682
	Frame.8	78,92958	11,0353	10,8372	10,3702	11,2726	10,9742	9,88711
	Frame.9	78,93353	10,5684	9,70708	9,99119	10,5479	9,85734	9,30215
	Frame.10	76,07248	9,91673	10,1552	9,5965	10,3963	10,3469	8,3212
	Frame.11	10,0193	9,83025	9,81256	10,14	9,7871	10,3687	8,89867
	Frame.12	8,78884	9,0035	9,15451	8,66538	9,29621	9,35055	11,0301
	Frame.13	8,69306	8,68856	9,35792	8,64743	8,82989	8,78637	8,53557



Detec-Desc.	Lidar to CameraTTC difference
AKAZE-BRISK	1047,68148
AKAZE-BRIEF	7,40154
AKAZE-ORB	4,95597
AKAZE-FREAK	1,6183
AKAZE-AKAZE	9,0589
AKAZE-SIFT	8,64066

Detec.	Frame	BRISK	BRIEF	ORB	FREAK	AKAZE	SIFT	Lidar
SIFT	Frame.1	198,30655	11,5285	x	10,3451	xx	10,4696	12,2891
	Frame.2	162,59858	11,4433	x	13,0338	xx	10,6308	12,2891
	Frame.3	113,96366	13,6974	x	13,6301	xx	14,0458	12,7299
	Frame.4	86,75519	13,5735	x	12,498	xx	14,1815	13,7314
	Frame.5	90,12319	15,5787	x	10,6544	xx	15,3559	13,7901
	Frame.6	98,28733	10,4647	x	10,0388	xx	10,6268	11,8642
	Frame.7	96,40402	11,7276	x	10,4961	xx	11,238	11,9682
	Frame.8	88,2348	11,2114	x	9,62898	xx	10,782	9,88711
	Frame.9	88,58523	11,9757	x	10,0847	xx	10,315	9,30215
	Frame.10	90,98102	9,31094	x	9,20985	xx	9,57732	8,3212
	Frame.11	8,54246	8,72936	x	8,50987	xx	9,50059	8,89867
	Frame.12	8,34398	8,69641	x	8,60912	xx	8,54246	11,0301
	Frame.13		8,2815	x		xx	8,84183	8,53557



Detec-Desc.	Lidar to CameraTTC difference
SIFT-BRISK	986,48921
SIFT-BRIEF	1,58221
SIFT-ORB	-144,6368
SIFT-FREAK	-17,89798
SIFT-AKAZE	-144,6368
SIFT-SIFT	-0,5292