

Appendix A

Example of the image segmentation and classification

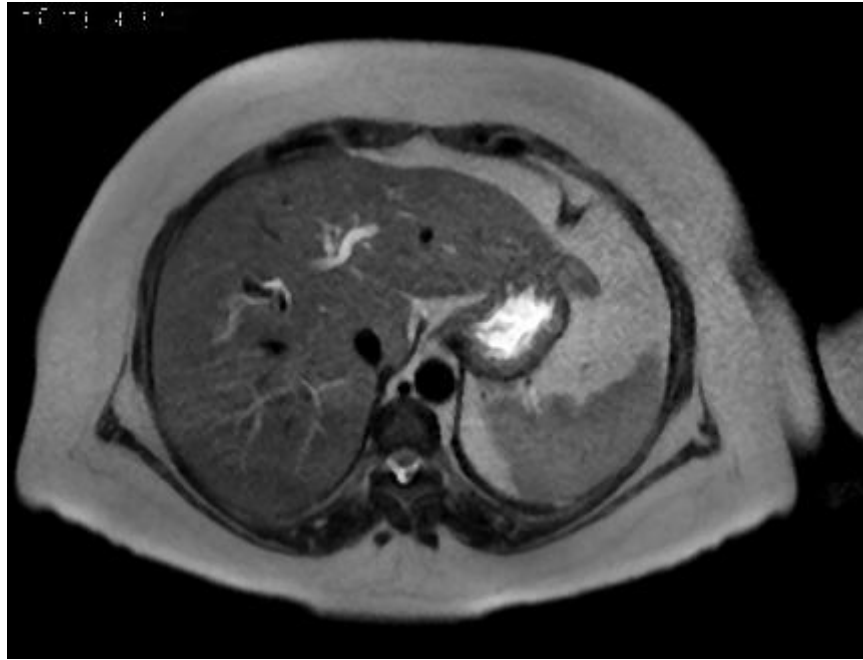


Figure A-1 original MR image

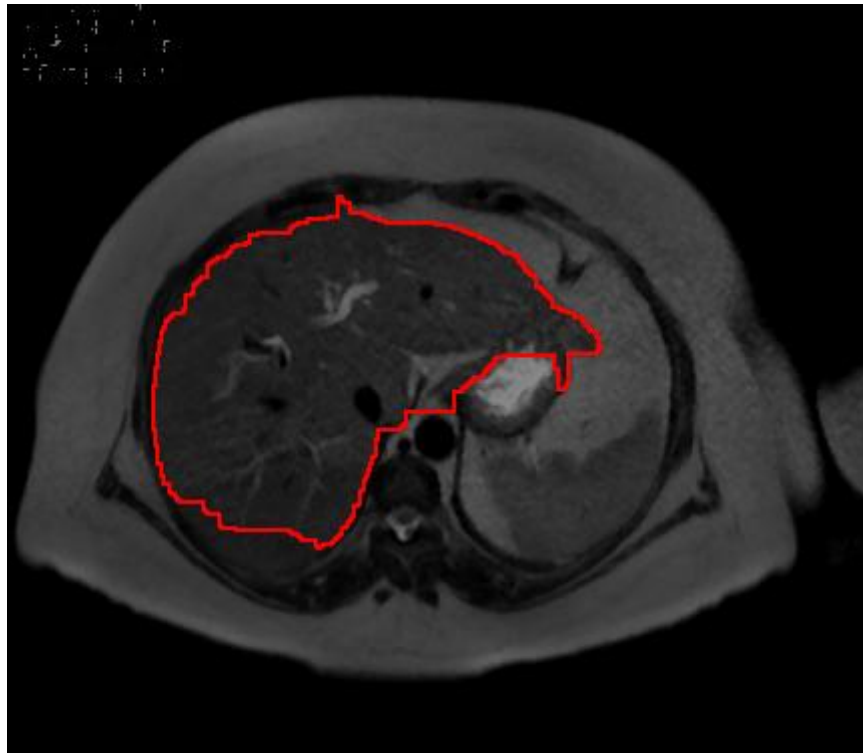


Figure A-2 original MR image in Figure A-1 with demarcation of liver outline using region growing

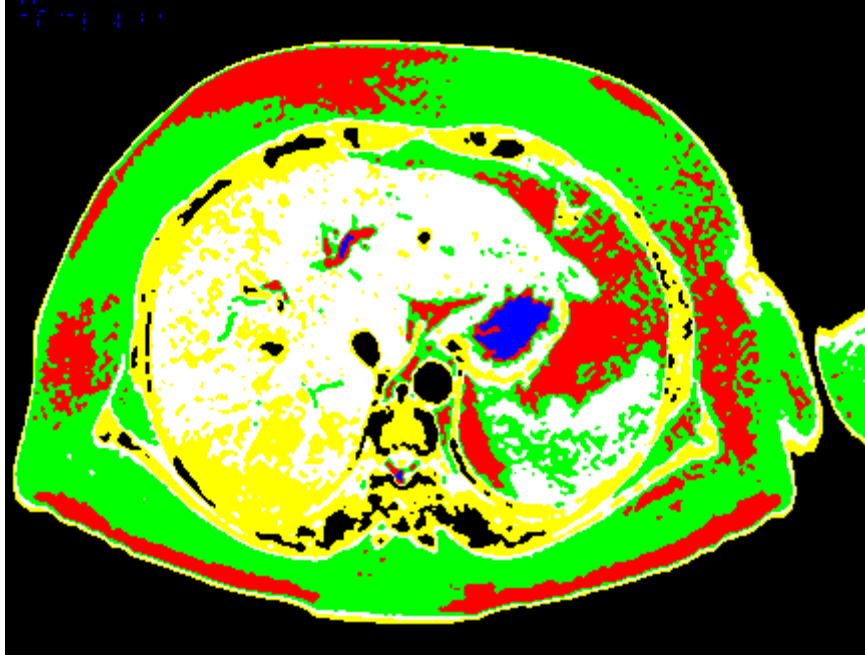


Figure A-3 a classification map for the image shown in Figure A-1 using pixel classification

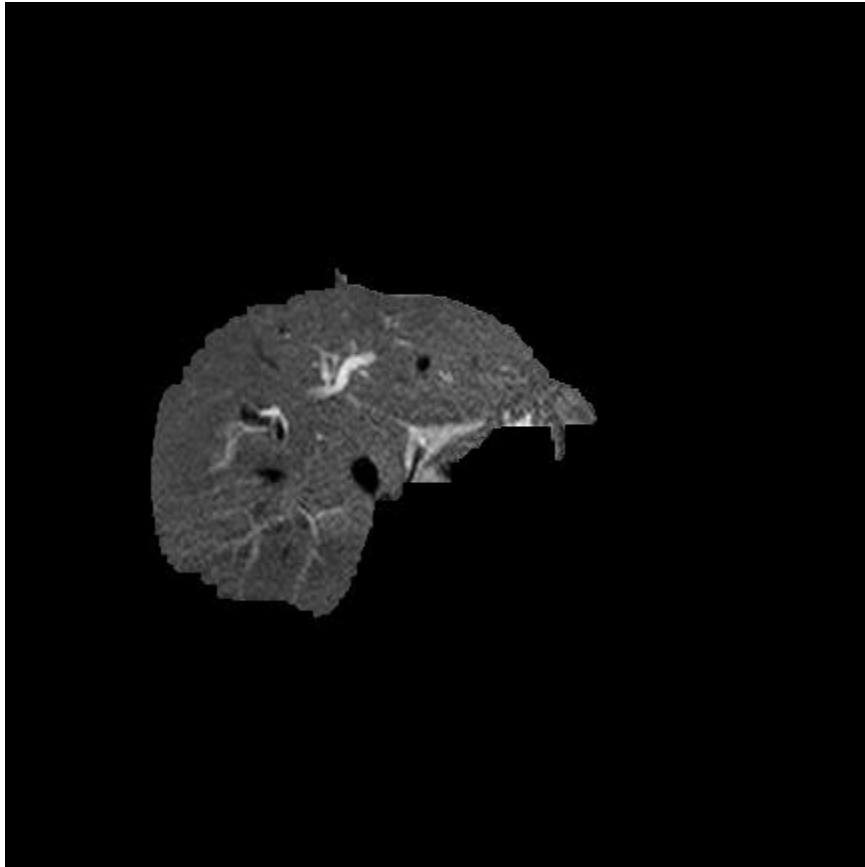
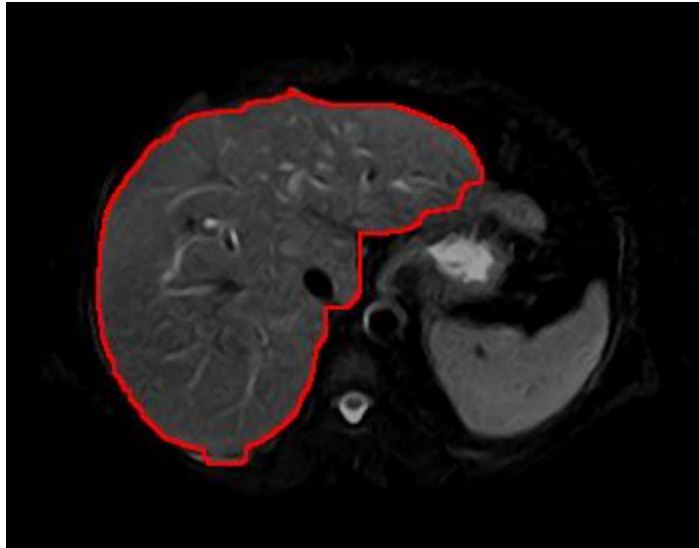
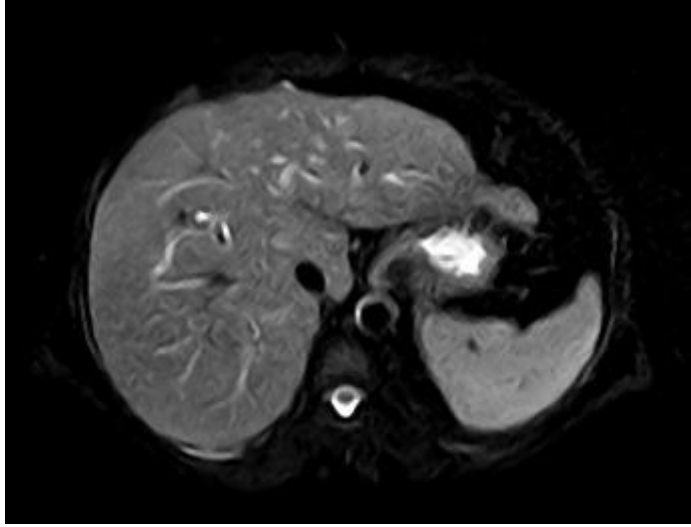
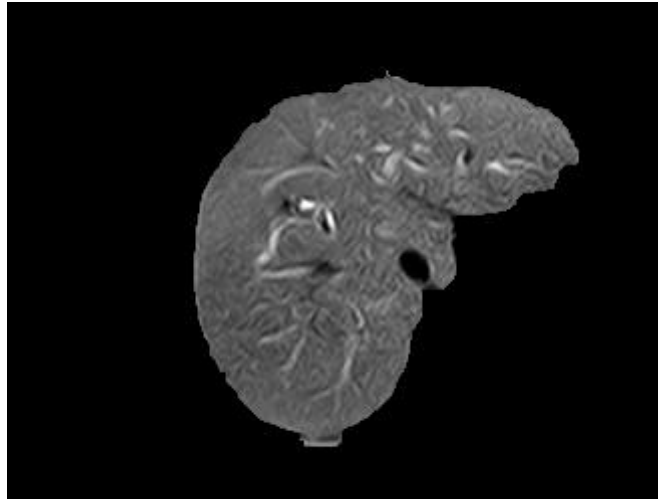
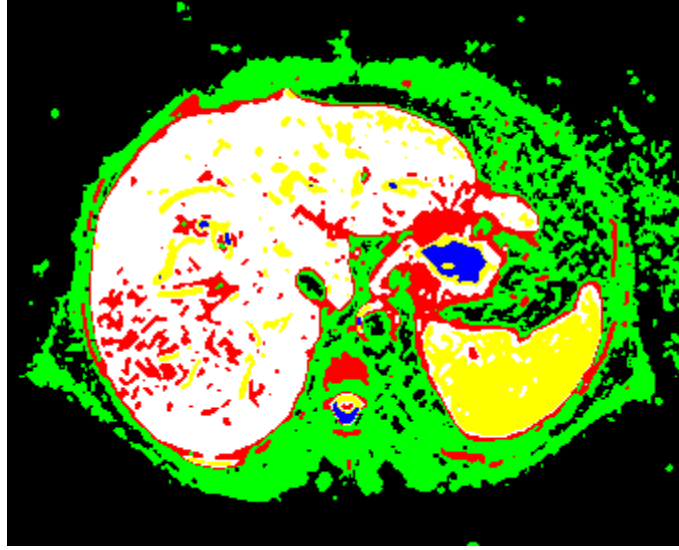
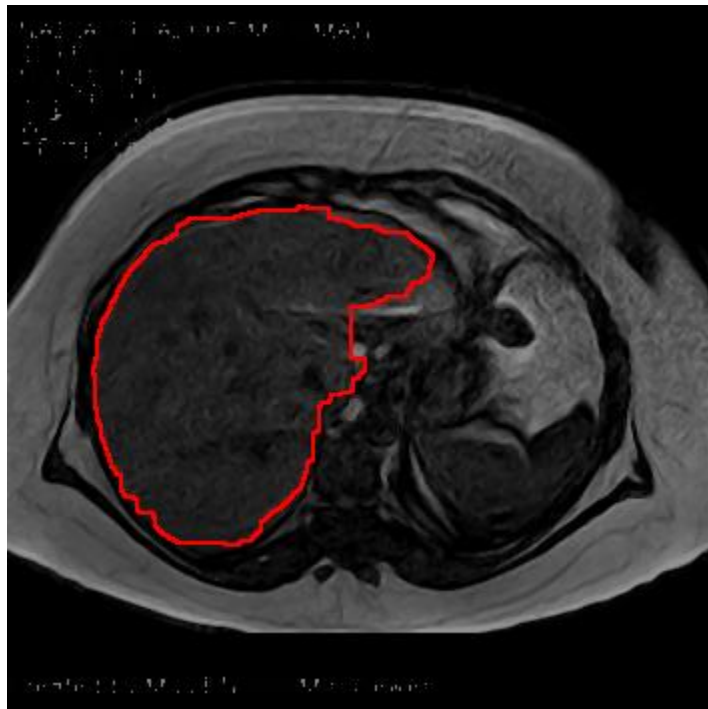
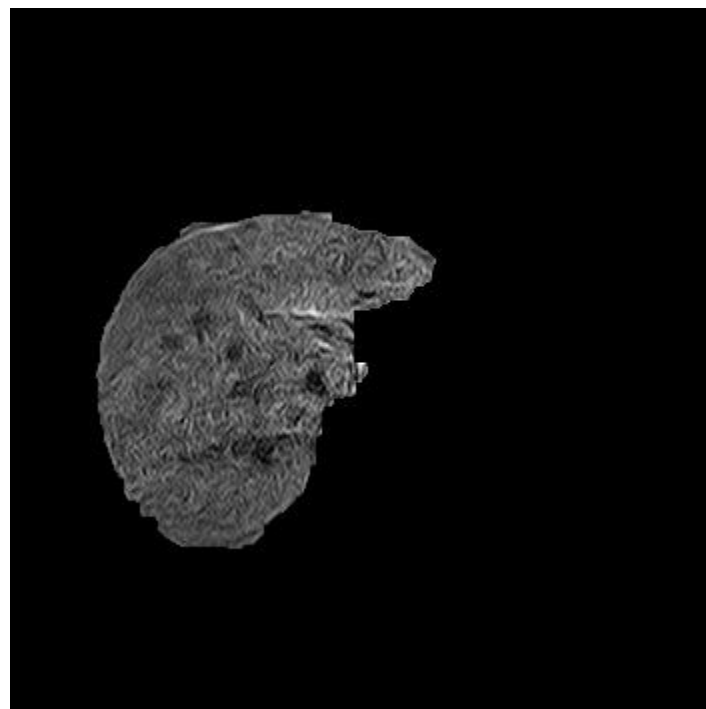
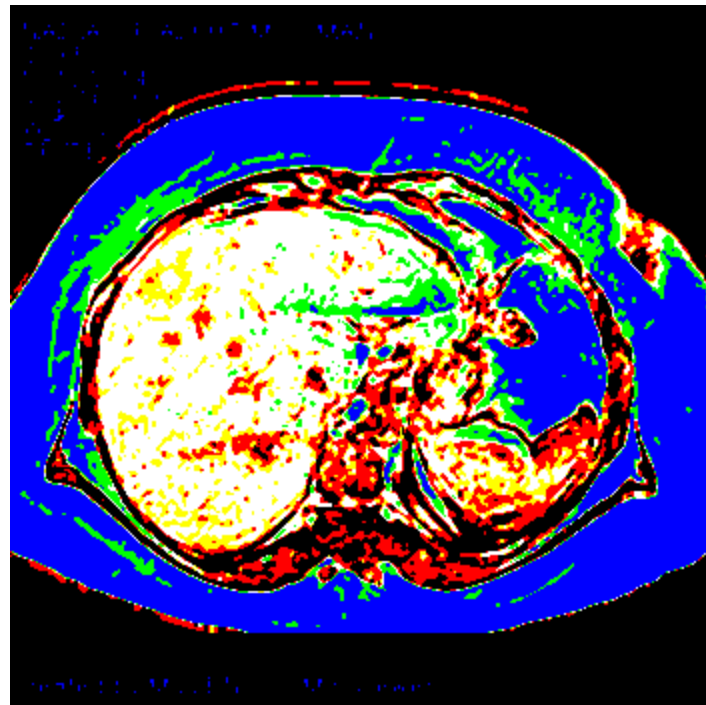


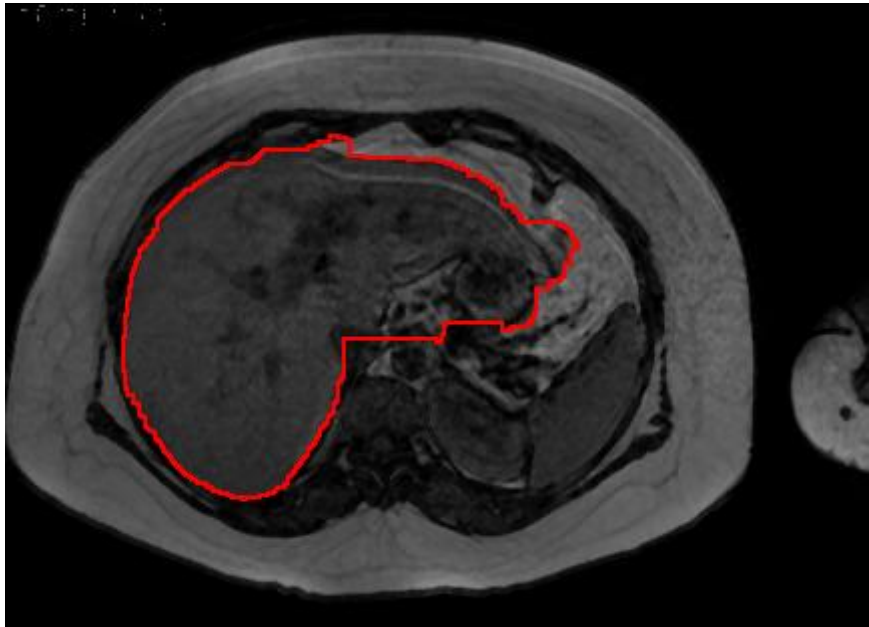
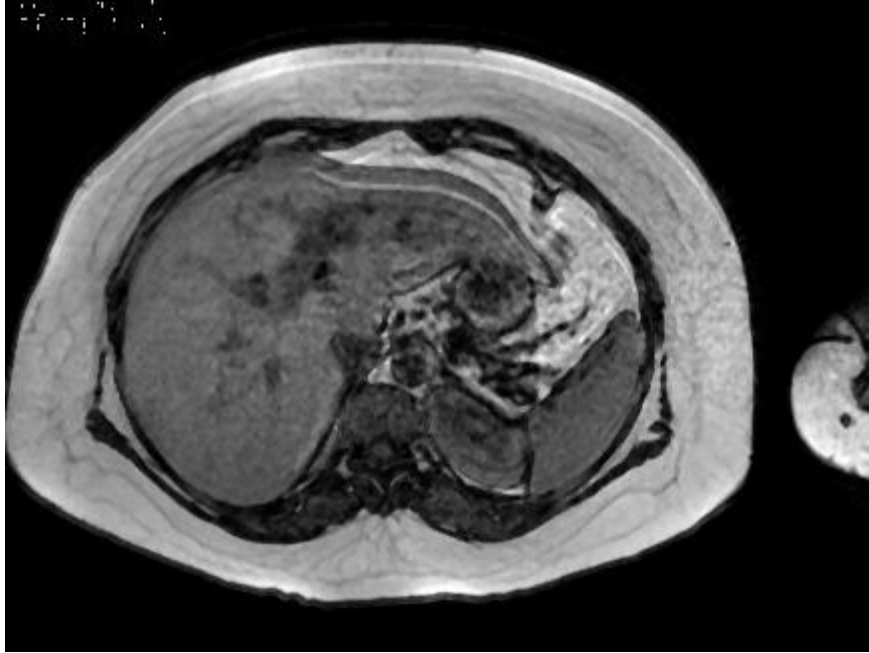
Figure A-4 a segmented liver generated by using the classification map and region growing

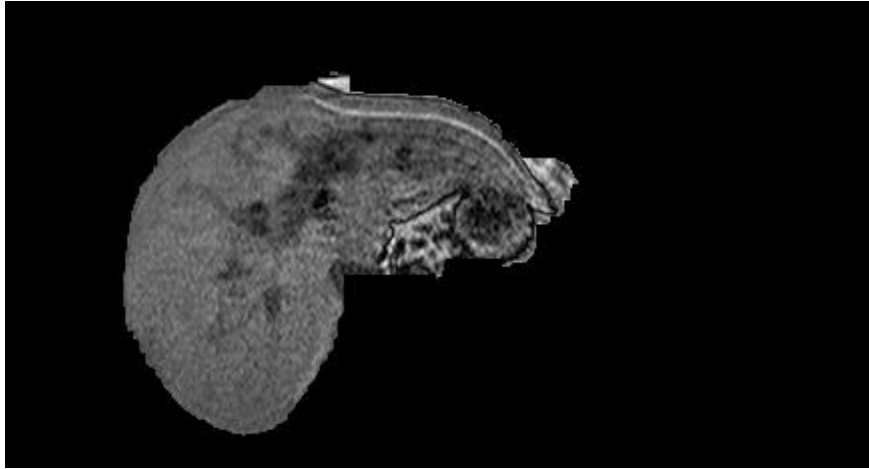
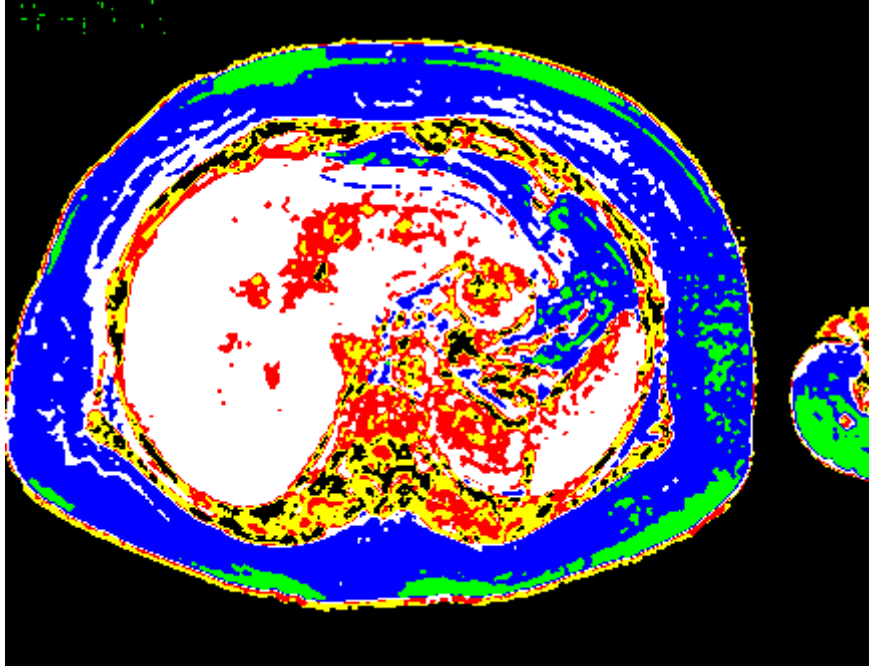


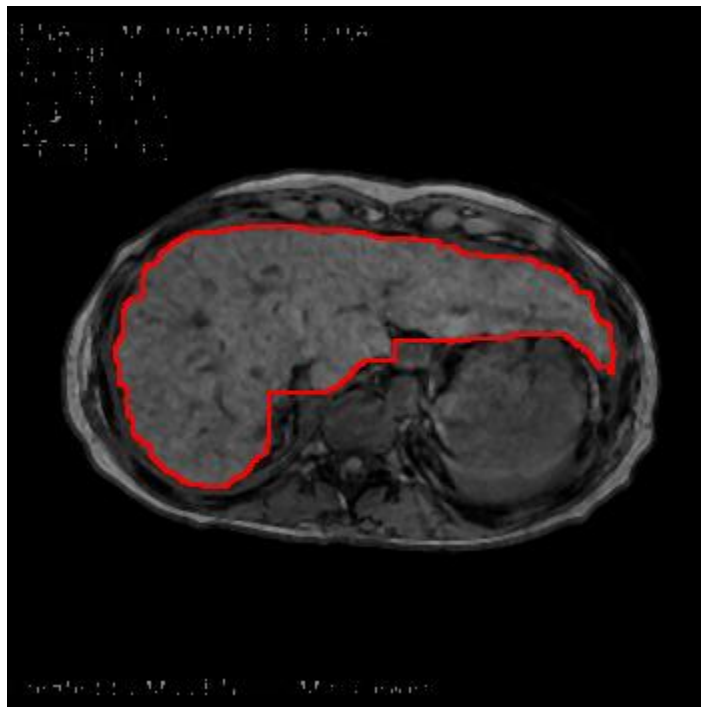
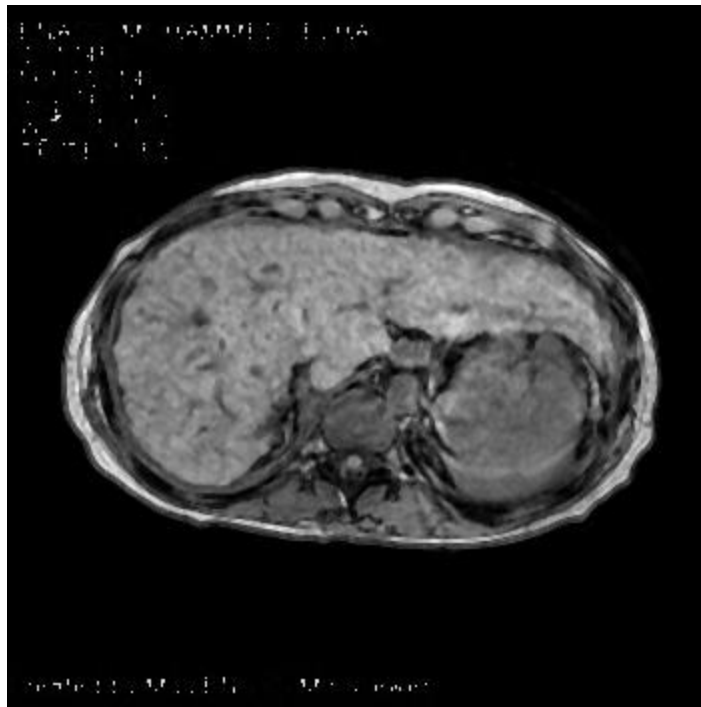


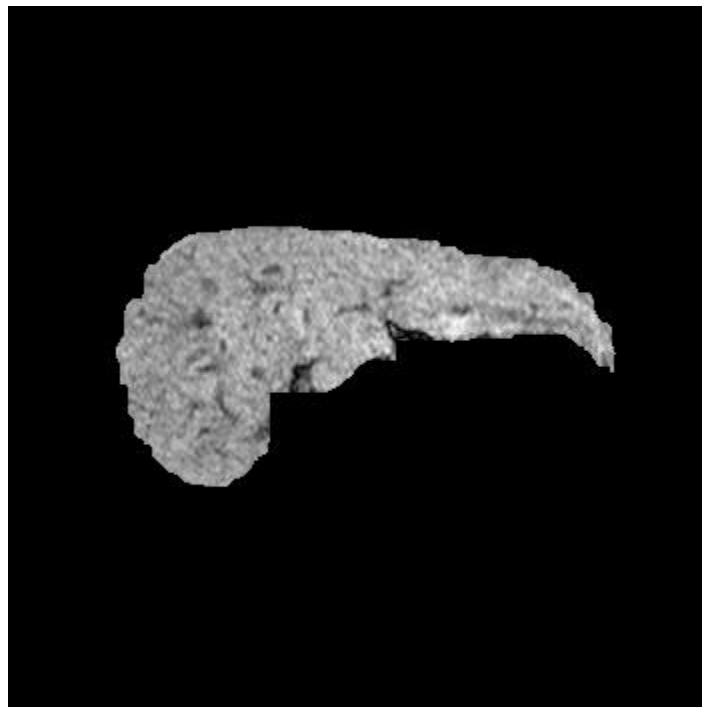
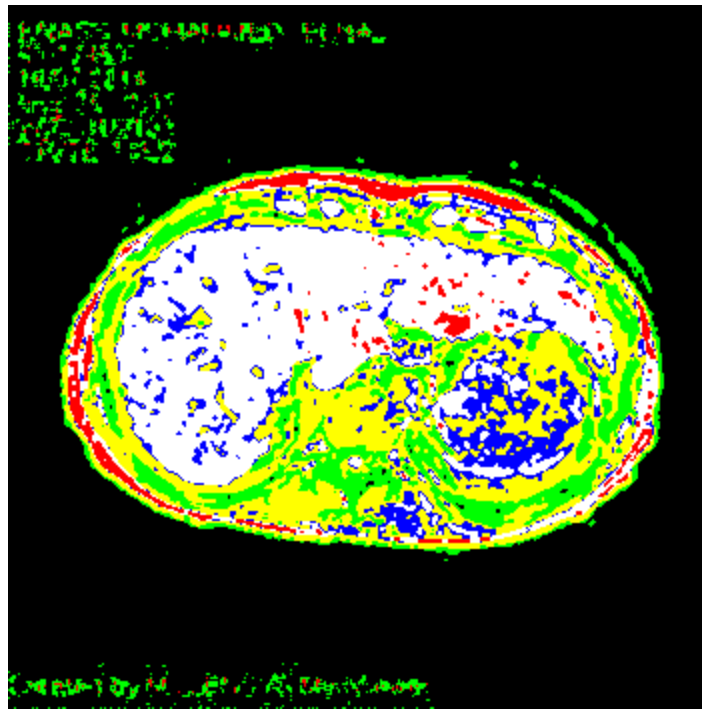


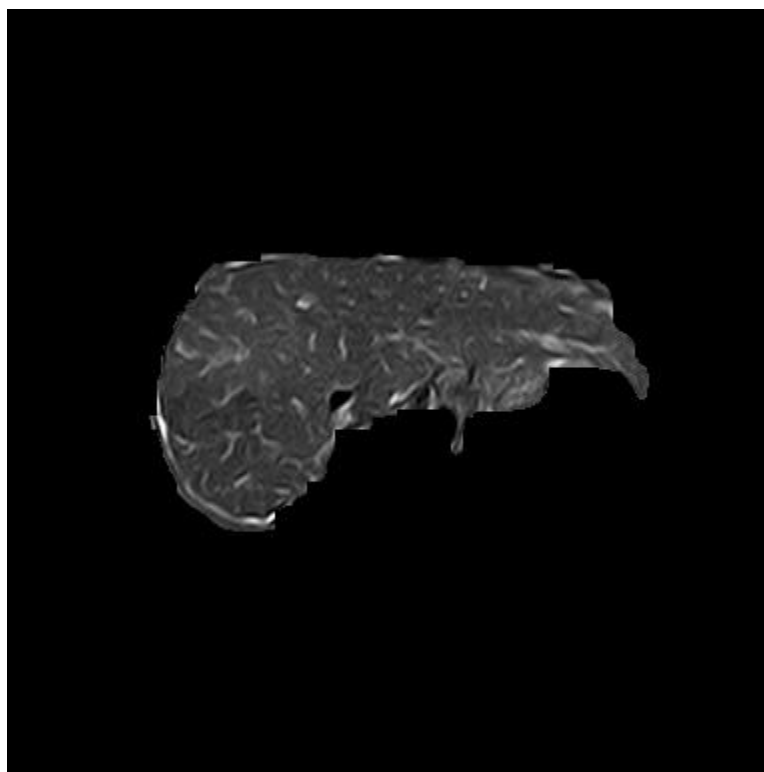
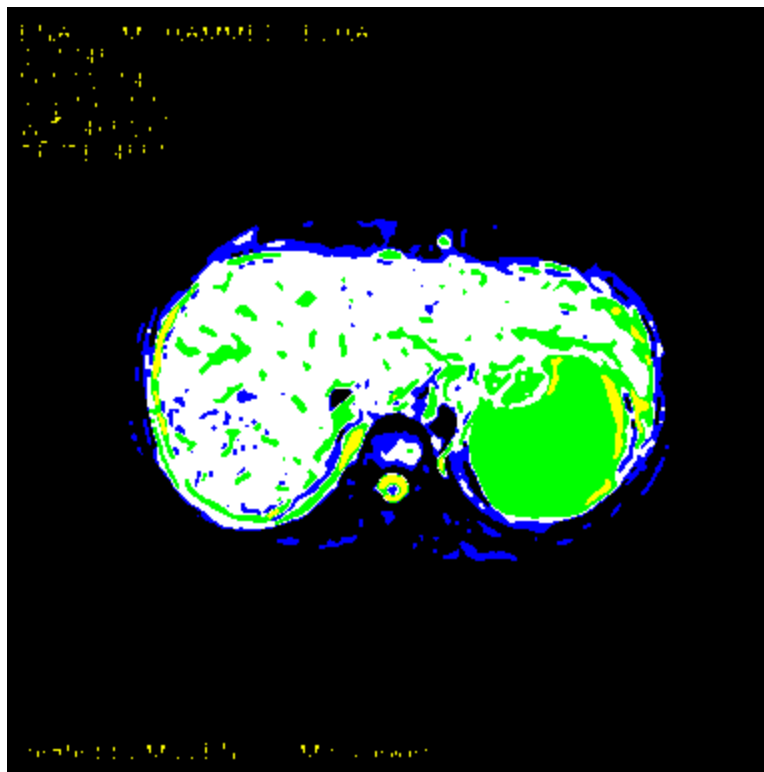


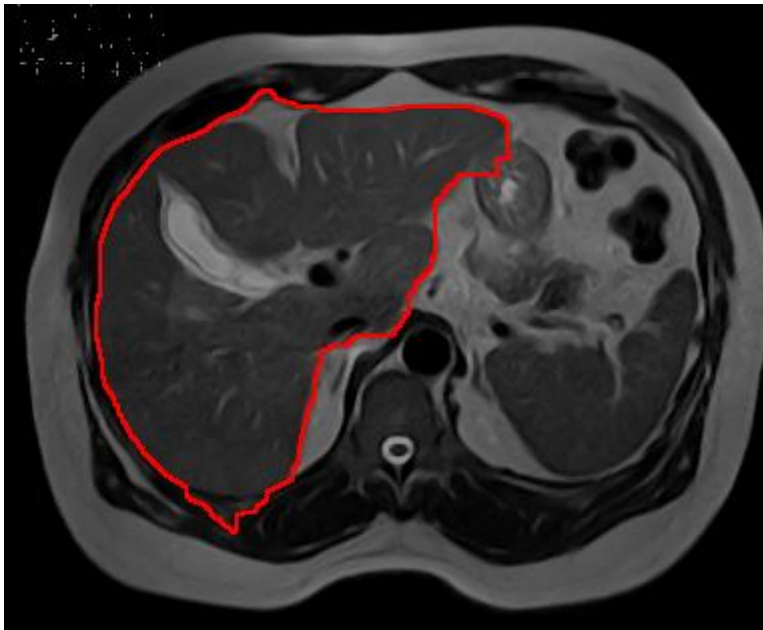
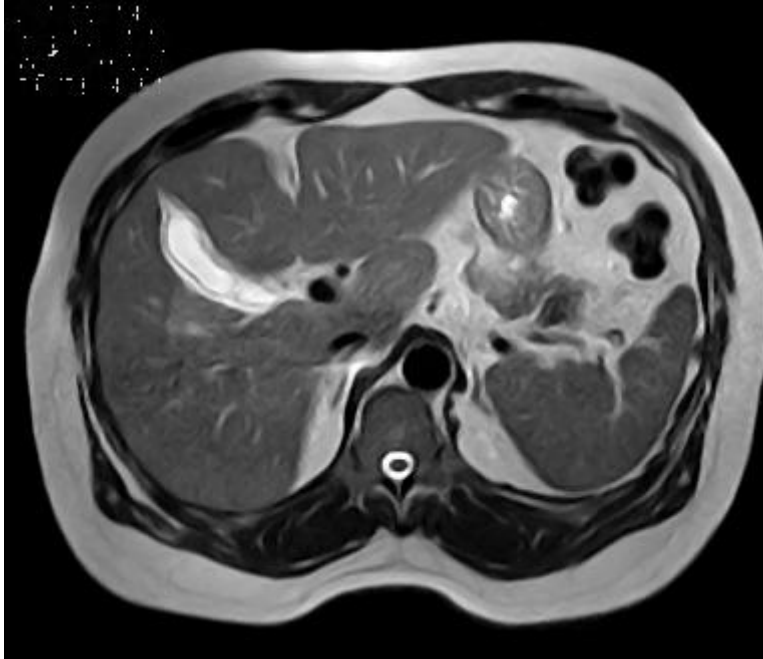


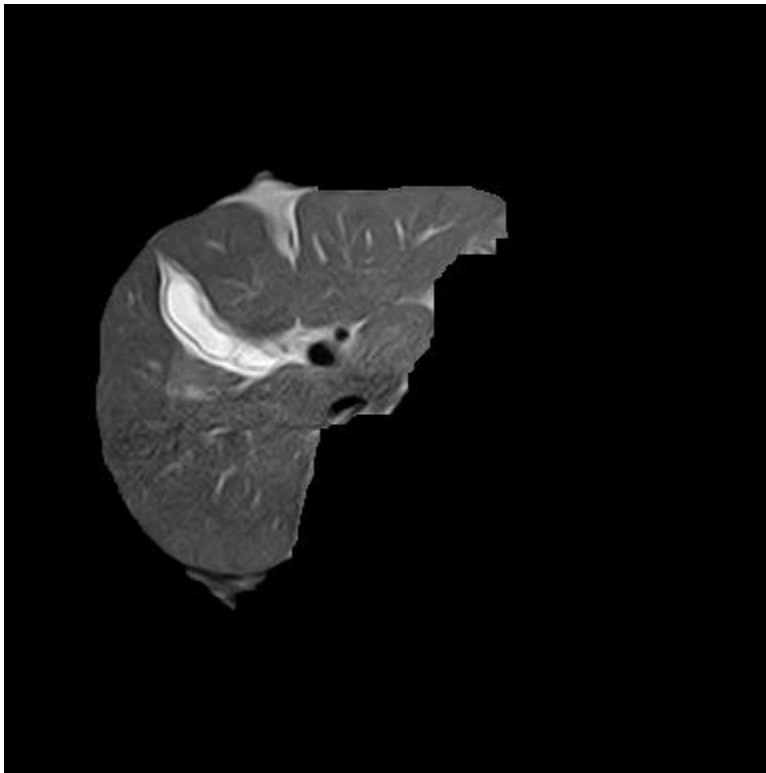
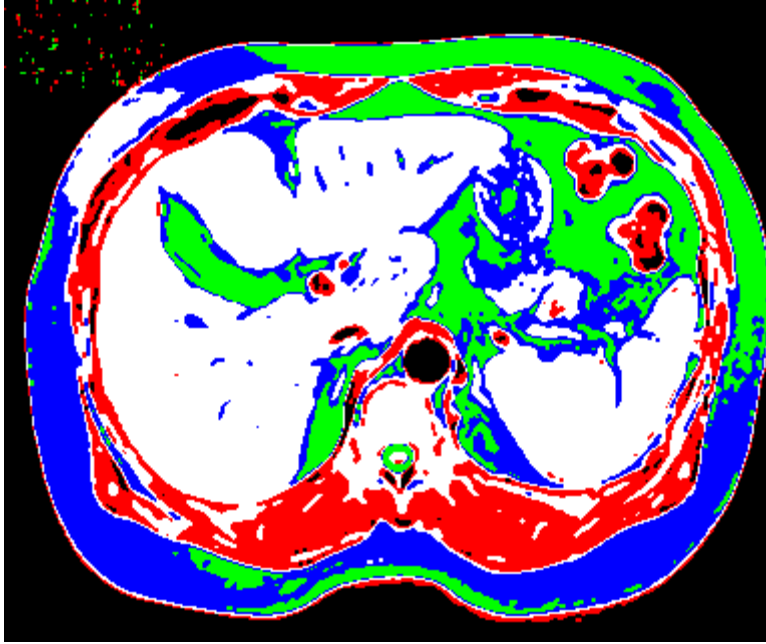




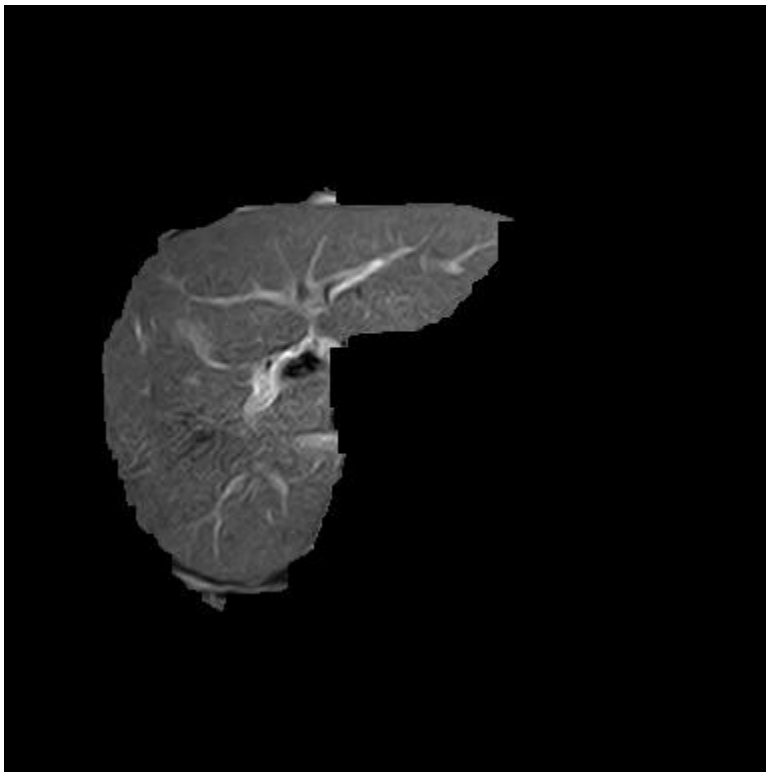
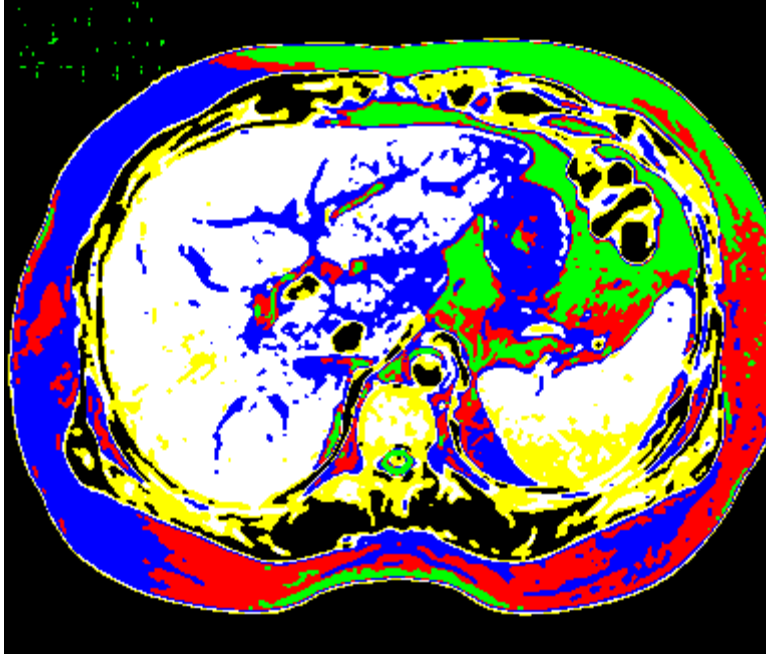












Appendix B

Master data sheet represent the value of textural feature for each class

Classes: 1=liver, 2=ligament, 3=vessels, 4=stone, 5=portal & hepatic vein

COV	Mean	Variance	STD	Signal	Classes
8.06669	95.4444	59.2778	7.69921	29.3087	1
4.63324	93.1111	18.6111	4.31406	28.9482	1
3.56626	93	11	3.31662	28.931	1
4.93278	92.2222	20.6944	4.54911	28.8097	1
4.76431	89.6667	18.25	4.272	28.4077	1
4.38778	89	15.25	3.90512	28.3019	1
5.57631	91	25.75	5.07445	28.6182	1
4.82143	93.3333	20.25	4.5	28.9828	1
4.28433	93.4444	16.0278	4.00347	29	1
3.79933	93.7778	12.6944	3.56293	29.0517	1
4.51268	94.6667	18.25	4.272	29.189	1
4.10043	97.8889	16.1111	4.01386	29.6816	1
4.13369	100.556	17.2778	4.15665	30.0832	1
2.3509	102	5.75	2.39792	30.2985	1
4.44503	100.889	20.1111	4.48454	30.133	1
4.79637	98.2222	22.1944	4.7111	29.7321	1
4.5856	96.7778	19.6944	4.43784	29.5127	1
3.84417	97.3333	14	3.74166	29.5973	1
2.896	97.6667	8	2.82843	29.6479	1
2.11081	97.6667	4.25	2.06155	29.6479	1
1.49962	96.8889	2.11111	1.45297	29.5296	1
3.27619	95.4444	9.77778	3.12694	29.3087	1
3.77941	94.8889	12.8611	3.58624	29.2233	1
6.34916	97.4444	38.2778	6.1869	29.6142	1
6.72393	102.889	47.8611	6.91817	30.4302	1
4.64872	105.444	24.0278	4.90181	30.8058	1
5.35799	104.333	31.25	5.59017	30.6431	1
3.61178	102.667	13.75	3.7081	30.3974	1
4.10939	104.667	18.5	4.30116	30.692	1
3.55877	107	14.5	3.80789	31.0322	1
5.66038	106	36	6	30.8869	1
6.68925	101.667	46.25	6.80074	30.249	1
4.92639	98.1111	23.3611	4.83333	29.7153	1
5.97812	99.6667	35.5	5.95819	29.95	1
5.66872	102.778	33.9444	5.82619	30.4138	1
4.88427	103.444	25.5278	5.0525	30.5123	1
5.96088	100.111	35.6111	5.9675	30.0167	1

4.59596	97.7778	20.1944	4.49382	29.6648	1
4.46003	98.4444	19.2778	4.39065	29.7658	1
4.97939	103.111	26.3611	5.13431	30.4631	1
9.07752	111.667	102.75	10.1366	31.7017	1
7.79088	121.222	89.1944	9.44428	33.0303	1
5.18414	123.556	41.0278	6.40529	33.3467	1
9.59268	117.222	126.444	11.2448	32.4808	1
5.95957	108.889	42.1111	6.48931	31.305	1
3.75896	105.111	15.6111	3.95109	30.7571	1
4.73503	104	24.25	4.92443	30.5941	1
4.74682	102.667	23.75	4.8734	30.3974	1
4.63099	102.111	22.3611	4.72875	30.315	1
7.40537	110.556	67.0278	8.18705	31.5436	2
5.97818	120.333	51.75	7.19375	32.909	2
5.96875	117.111	48.8611	6.99007	32.4654	2
6.6497	114.556	58.0278	7.6176	32.1092	2
5.57698	130.778	53.1944	7.29345	34.3074	2
4.7561	136.667	42.25	6.5	35.0714	2
5.23364	140.444	54.0278	7.35036	35.5528	2
5.2967	140.333	55.25	7.43303	35.5387	2
6.1667	118.333	53.25	7.29726	32.6343	2
7.40304	111.889	68.6111	8.28318	31.7333	2
7.79323	105.444	67.5278	8.21753	30.8058	2
7.9917	102.444	67.0278	8.18705	30.3645	2
5.08109	156.556	63.2778	7.95473	37.5366	2
5.71091	179	104.5	10.2225	40.1373	2
5.60711	179.111	100.861	10.043	40.1497	2
7.25887	114.111	68.6111	8.28318	32.0468	2
6.96176	110.333	59	7.68115	31.5119	2
6.56513	115.111	57.1111	7.55719	32.187	2
5.62286	117.222	43.4444	6.59124	32.4808	2
7.13099	120.111	73.3611	8.56511	32.8786	2
6.72904	125	70.75	8.4113	33.541	2
4.77095	131.222	39.1944	6.26055	34.3657	2
6.11016	137.444	70.5278	8.39808	35.171	2
4.11088	143.111	34.6111	5.88312	35.8887	2
7.05933	120.778	72.6944	8.5261	32.9697	2
6.60701	109.667	52.5	7.24569	31.4166	2
6.25921	137.667	74.25	8.61684	35.1994	2
8.26148	99.2222	67.1944	8.19722	29.8831	2
6.67498	109.778	53.6944	7.32765	31.4325	2

6.14621	119.222	53.6944	7.32765	32.7567	2
5.87058	132.889	60.8611	7.80135	34.5832	2
6.85472	137.778	89.1945	9.44428	35.2136	2
3.59987	143	26.5	5.14782	35.8748	2
6.67197	140.889	88.3611	9.40006	35.609	2
5.6284	142.444	64.2778	8.01734	35.805	2
4.83013	247.889	143.361	11.9734	47.2335	2
5.3625	132.556	50.5278	7.10829	34.5398	2
7.51528	105.778	63.1944	7.94949	30.8545	2
6.90716	109.889	57.6111	7.5902	31.4484	2
6.98118	112.333	61.5	7.84219	31.7962	2
7.42425	104.333	60	7.74597	30.6431	2
5.49014	136	55.75	7.46659	34.9857	2
6.44011	138.667	79.75	8.93029	35.327	2
4.56969	141.444	41.7778	6.46357	35.6791	2
6.71008	134.333	81.25	9.01388	34.7707	2
5.40453	129.778	49.1944	7.01388	34.176	2
6.51943	128.333	70	8.3666	33.9853	2
8.01709	103.444	68.7778	8.29324	30.5123	2
6.88289	113.111	60.6111	7.78531	31.9061	2
6.45015	139.556	81.0278	9.00154	35.4401	2
5.43295	142.111	59.6111	7.72082	35.7631	2
5.6873	139.222	62.6944	7.91798	35.3977	2
4.08454	76.5556	9.77778	3.12694	26.2488	3
11.7342	118.222	192.444	13.8724	32.619	3
125.3	5	39.25	6.26498	6.7082	3
0.328371	253.778	0.694444	0.833333	47.7912	3
8.44538	132.222	124.694	11.1667	34.4964	3
157.302	9.22222	210.444	14.5067	9.11043	3
156.524	7.44444	135.778	11.6524	8.18535	3
162.446	8.11111	173.611	13.1762	8.544	3
200.598	5.44444	119.278	10.9214	7	3
124.102	9	124.75	11.1692	9	3
248.903	2.11111	27.6111	5.25463	4.3589	3
154.374	4.33333	44.75	6.68954	6.245	3
163.459	0.444444	0.527778	0.726483	2	3
198.431	2	15.75	3.96863	4.24264	3
198.431	0.222222	0.194444	0.440959	1.41421	3
180.313	6.44444	135.028	11.6201	7.61577	3
240	0.555556	1.77778	1.33333	2.23607	3
300	0.111111	0.111111	0.333333	1	3

118.732	6	50.75	7.1239	7.34847	3
220.205	2.11111	21.6111	4.64878	4.3589	3
104.704	3.11111	10.6111	3.25747	5.2915	3
161.555	1.66667	7.25	2.69258	3.87298	3
264.575	1	7	2.64575	3	3
300	0.888889	7.11111	2.66667	2.82843	3
94.3222	3.11111	8.61111	2.93447	5.2915	3
145.966	3.44444	25.2778	5.0277	5.56776	3
168.132	3.11111	27.3611	5.23078	5.2915	3
209.915	2.55556	28.7778	5.36449	4.79583	3
115.311	5.88889	46.1111	6.79052	7.28011	3
104.881	5	27.5	5.24404	6.7082	3
114.054	4.77778	29.6944	5.44926	6.55744	3
176.383	3	28	5.2915	5.19615	3
125.201	4.22222	27.9444	5.28625	6.16441	3
130.676	4.11111	28.8611	5.37225	6.08276	3
223.621	2.22222	24.6944	4.96935	4.47214	3
143.344	2.44444	12.2778	3.50397	4.69042	3
169.874	2.11111	12.8611	3.58624	4.3589	3
240	0.555556	1.77778	1.33333	2.23607	3
160.332	4.44444	50.7778	7.12585	6.32456	3
223.742	1.88889	17.8611	4.22624	4.12311	3
300	0.111111	0.111111	0.333333	1	3
190.292	4.44444	71.5278	8.45741	6.32456	3
300	0.222222	0.444444	0.666667	1.41421	3
134.465	8.88889	142.861	11.9525	8.94427	3
244.696	1.22222	8.94444	2.99073	3.31662	3
212.21	4.11111	76.1111	8.72417	6.08276	3
177.445	8.44444	224.528	14.9843	8.7178	3
120.386	10.3333	154.75	12.4399	9.64365	3
97.4998	13.2222	166.194	12.8916	10.9087	3
83.3443	14.7778	151.694	12.3164	11.5326	3
4.94413	75	13.75	3.7081	25.9808	4
10.2631	110.667	129	11.3578	31.5595	4
88.4468	9.44444	69.7778	8.35331	9.21954	4
0.382274	254.222	0.944444	0.971825	47.833	4
15.0862	122	338.75	18.4052	33.1361	4
3.15123	168.667	28.25	5.31507	38.9615	4
4.04875	173.333	49.25	7.01783	39.4968	4
3.12584	167	27.25	5.22015	38.7685	4
4.15255	172.444	51.2778	7.16085	39.3954	4

3.67007	175	41.25	6.42262	39.6863	4
2.67954	170	20.75	4.55522	39.1152	4
2.7499	173.556	22.7778	4.77261	39.5221	4
3.12617	174.556	29.7778	5.4569	39.6358	4
4.04888	169.222	46.9444	6.8516	39.0256	4
2.9236	174.222	25.9444	5.09357	39.598	4
2.67486	177.333	22.5	4.74342	39.95	4
2.899	178.222	26.6944	5.16667	40.05	4
3.20239	177.333	32.25	5.67891	39.95	4
3.76994	182.333	47.25	6.87386	40.5093	4
3.7668	184.778	48.4444	6.9602	40.7799	4
3.95953	191.556	57.5278	7.58471	41.5211	4
3.38388	194.222	43.1944	6.57225	41.8091	4
4.15317	193	64.25	8.01561	41.6773	4
3.52941	186.333	43.25	6.57647	40.9512	4
3.37415	184.556	38.7778	6.22718	40.7554	4
2.43935	183.333	20	4.47214	40.6202	4
4.37629	183.556	64.5278	8.03292	40.6448	4
3.03752	182.889	30.8611	5.55528	40.5709	4
2.58756	184.444	22.7778	4.77261	40.7431	4
3.98845	181.667	52.5	7.24569	40.4351	4
3.9429	185.556	53.5278	7.31627	40.8656	4
3.63986	186.222	45.9444	6.77823	40.939	4
3.92415	182.778	51.4444	7.17248	40.5586	4
3.99361	185.889	55.1111	7.42369	40.9023	4
3.7798	185.667	49.25	7.01783	40.8779	4
3.78	182.222	47.4444	6.88799	40.4969	4
1.76335	179.333	10	3.16228	40.1746	4
3.33355	180.889	36.3611	6.03002	40.3485	4
2.11527	181.222	14.6944	3.83333	40.3856	4
4.00684	177.111	50.3611	7.09656	39.9249	4
2.64493	180.333	22.75	4.7697	40.2865	4
2.0148	183.111	13.6111	3.68932	40.5956	4
2.65785	180.222	22.9444	4.79004	40.2741	4
2.00121	183.222	13.4444	3.66667	40.6079	4
3.34417	184.333	38	6.16441	40.7308	4
2.71628	178.889	23.6111	4.85913	40.1248	4
2.78629	180.444	25.2778	5.0277	40.2989	4
4.26111	183.667	61.25	7.82624	40.6571	4
3.76392	188.333	50.25	7.08872	41.1704	4
4.08109	173.889	50.3611	7.09656	39.5601	4

3.74409	170.556	40.7778	6.38575	39.1791	4
12.9744	94.2222	149.444	12.2247	29.1204	5
16.2657	102.111	275.861	16.6091	30.315	5
17.4605	118	424.5	20.6034	32.5883	5
8.23895	135.444	124.528	11.1592	34.9142	5
7.25091	121.889	78.1111	8.83805	33.121	5
6.93788	118.444	67.5278	8.21753	32.6497	5
7.40518	120.111	79.1111	8.89444	32.8786	5
7.15209	124.667	79.5	8.91628	33.4963	5
7.67803	131.556	102.028	10.1009	34.4093	5
8.8665	129.333	131.5	11.4673	34.1174	5
10.6189	124.667	175.25	13.2382	33.4963	5
6.23615	129.889	65.6111	8.10007	34.1906	5
8.35346	131	119.75	10.943	34.3366	5
8.83539	129.556	131.028	11.4467	34.1467	5
10.1723	123.667	158.25	12.5797	33.3617	5
9.67872	124.889	146.111	12.0876	33.5261	5
7.72671	131.667	103.5	10.1735	34.4238	5
8.82489	130.778	133.194	11.541	34.3074	5
9.93555	124.778	153.694	12.3974	33.5112	5
9.49937	124	138.75	11.7792	33.4066	5
8.71983	130	128.5	11.3358	34.2053	5
6.78743	125.111	72.1111	8.49183	33.5559	5
9.81764	116.222	130.194	11.4103	32.3419	5
9.11329	114.444	108.778	10.4297	32.0936	5
7.3691	113.333	69.75	8.35165	31.9374	5
7.86447	118.222	86.4444	9.29755	32.619	5
8.80571	121.222	113.944	10.6745	33.0303	5
7.80843	124	93.75	9.68246	33.4066	5
6.17364	132.778	67.1944	8.19722	34.5688	5
6.00836	139.111	69.8611	8.3583	35.3836	5
9.23529	144.667	178.5	13.3604	36.0832	5
8.08933	123	99	9.94987	33.2716	5
10.8706	125.778	186.944	13.6728	33.6452	5
28.3936	77.4444	483.528	21.9893	26.4008	5
15.0361	83	155.75	12.48	27.3313	5
13.2706	89.7778	141.944	11.914	28.4253	5
16.529	118.778	385.444	19.6327	32.6956	5
15.0247	104.556	246.778	15.7092	30.6757	5
15.2894	96.7778	218.944	14.7968	29.5127	5
15.3662	96.1111	218.111	14.7686	29.4109	5

14.9319	101.222	228.444	15.1144	30.1828	5
13.9277	101.667	200.5	14.1598	30.249	5
19.7151	91.2222	323.444	17.9846	28.6531	5
15.5205	86.8889	181.861	13.4856	27.9643	5
9.71776	102	98.25	9.91211	30.2985	5
10.6535	110.667	139	11.7898	31.5595	5
8.09667	106.444	74.2778	8.61846	30.9516	5
12.9181	94.3333	148.5	12.1861	29.1376	5
17.7823	106.444	358.278	18.9282	30.9516	5
6.37594	129.333	68	8.24621	34.1174	5
6.27224	124.889	61.3611	7.83333	33.5261	5