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Appendices-1, 2, 3, 4 and 5

Appendix – 1 (a) Result of only 40 single benign cells features were shown here out of 223 cells.

Appendix 1 (a) - Single benign cells (223)

Features (F1 to F30)-morphology, intensity and texture

	F1	F2	F3	F4	F5	F6	F7
S. No.	Area	Convex Area	Solidity	Perimeter	Major Axis Length	Minor Axis Length	circularity
1	257	259	0.99228	56.970563	19.3056555	17.11270329	0.9950433
2	150	151	0.99338	43.656854	14.72249452	13.34121682	0.9889999
3	426	438	0.9726	77.79899	26.93090824	20.54192083	0.8844465
4	206	209	0.98565	51.313708	16.59645406	16.07344652	0.9831285
5	415	418	0.99282	72.870058	24.18080769	22.05863409	0.9821091
6	336	344	0.97674	68.970563	25.78335234	16.80350899	0.8876088
7	435	442	0.98416	75.213203	24.859714	22.49711174	0.9662977
8	334	339	0.98525	66.627417	24.06481528	17.80873267	0.9454757
9	275	278	0.98921	58.970563	19.70070043	17.95113049	0.9937383
10	449	455	0.98681	76.627417	25.61958918	22.53477242	0.9609213
11	408	414	0.98551	74.384776	25.7484164	20.4815542	0.9266205
12	264	266	0.99248	58.727922	20.00844025	17.07559666	0.961888
13	262	264	0.99242	58.142136	20.01610752	16.93418392	0.9739333
14	232	235	0.98723	55.313708	19.01318479	15.81113114	0.952867
15	285	289	0.98616	60.384776	20.54625427	17.85086567	0.9821997
16	274	277	0.98917	58.384776	19.51877408	18.03758388	1.0100926
17	258	260	0.99231	58.142136	20.69721138	16.10325691	0.959064
18	272	275	0.98909	58.384776	19.43025971	17.97807116	1.0027197
19	222	223	0.99552	52.727922	17.99336029	15.97716834	1.0034172
20	204	206	0.99029	51.313708	17.87433524	14.77590742	0.9735835
21	294	295	0.99661	61.556349	20.65507943	18.41095666	0.9750154
22	275	278	0.98921	60.727922	21.99869992	16.19824479	0.9370564
23	371	376	0.9867	71.556349	26.29438144	18.3092707	0.9105157
24	292	295	0.98983	62.142136	21.88823695	17.28439744	0.9502117
25	548	574	0.9547	89.79899	30.6417859	23.51644838	0.8539796
26	456	462	0.98701	78.627417	27.65847976	21.51619286	0.9268868
27	467	469	0.99574	80.970563	30.77807969	19.67219688	0.8951018
28	159	161	0.98758	44.485281	14.97755134	13.79815734	1.009658
29	173	173	1	47.071068	16.88378488	13.40309788	0.9811781
30	173	173	1	47.071068	16.88378488	13.40309788	0.9811781
31	441	458	0.96288	85.79899	34.33397856	16.55098769	0.7528078
32	237	241	0.9834	56.970563	21.21722963	14.36944872	0.917608
33	484	491	0.98574	80.870058	29.24179462	21.26120723	0.9299931
34	502	521	0.96353	86.526912	33.48219985	19.28754762	0.8425801
35	219	220	0.99545	52.727922	18.73318669	15.14321637	0.9898575
36	418	425	0.98353	75.213203	25.61016895	21.19747448	0.9285343
37	313	317	0.98738	64.142136	20.91189348	19.39740908	0.9560209
38	196	196	1	49.313708	17.65273485	14.4004913	1.0128161
39	449	457	0.98249	78.384776	26.02823022	22.33750877	0.9183173
40	236	238	0.9916	58.485281	23.31003553	13.18940663	0.8670192

F8	F9	F10	F11	F12	F13
Eccentricity	Max Intensity	Min Intensity	Mean Intensity	Standard Deviation	Autocorrelation
0.462903235	92	24	50.8	19.11057106	30.47730017
0.422894125	111	0	77.1	17.02108406	26.73655914
0.646677235	92	60	80.1	7.305018482	24.95369746
0.249064927	92	17	49.6	22.74992752	32.78618421
0.409662246	92	0	55.6	14.24311557	24.37739955
0.758460231	129	30	84.2	18.87590205	23.02704929
0.425491091	90	22	46.7	18.25517013	25.79730152
0.672571694	91	16	45.0	19.30027753	34.1636602
0.411980857	92	43	66.2	9.725974453	24.7465
0.475729781	93	55	73.2	8.11289881	25.84238463
0.606020426	92	39	66.8	10.20877623	25.76194415
0.521224377	92	19	44.6	21.56985434	25.41270621
0.533138742	92	51	72.0	10.93772271	23.69927352
0.55539342	92	33	53.1	17.14592499	25.36810662
0.495139256	92	25	46.3	17.98878342	28.99303732
0.382115463	92	27	50.7	20.01582366	21.57761824
0.628214825	92	0	59.6	14.26827615	23.19166667
0.379329889	92	51	69.9	8.771400598	24.87300829
0.459943849	91	19	48.4	20.75933803	23.45382975
0.562709179	92	30	53.5	17.40230596	29.39995525
0.453310846	92	14	42.6	20.69248575	31.38933532
0.676625457	90	6	33.8	20.94911417	22.84250676
0.717732683	92	30	51.6	14.48897621	28.17711767
0.613536912	95	54	77.4	7.354665543	21.3167231
0.641092794	92	24	50.0	20.66875935	25.13027654
0.628358483	92	54	71.5	9.173036537	23.0468502
0.769071644	92	21	47.3	20.53999496	34.77929198
0.388957055	92	34	56.0	13.20047507	30.06963048
0.608120948	92	23	52.7	23.16014631	31.51120511
0.608120948	92	34	54.8	12.48262026	31.51120511
0.876139008	91	32	57.3	12.63775584	25.17764478
0.735749504	90	4	31.21	19.98960038	30.12096394
0.686549733	92	16	40.7	21.32074755	23.82453507
0.817411798	92	11	38.44	25.11131401	23.8386198
0.588684246	92	33	53.50	13.18310968	27.2747636
0.56117443	93	0	42.8	19.13094375	28.32813239
0.373629953	92	18	47.51	15.48098741	19.15389426
0.578382849	92	0	50.67774086	16.18865249	25.7892935
0.513310218	92	23	54.80185759	14.05284159	27.9126615
0.82452519	92	0	47.15358362	13.79399422	34.76278709
0.557470912	92	18	41.55673759	18.78001438	27.98347081

F14 Contrast	F15 Correlation	F16 Cluster Prominence	F17 Dissimilarity	F18 Energy	F19 Entropy	F20 Homogeneity
2.552537	0.57478363	178.2443201	1.195551936	0.03449	3.535446	0.574612135
2.269795	0.51225445	121.6806589	1.130987292	0.03896	3.427871	0.587365591
2.228694	0.50688745	107.8635775	1.144837432	0.0388	3.423049	0.572661365
2.081579	0.56712729	126.6626036	1.101973684	0.04226	3.379221	0.581702694
3.27092	0.35799716	112.6723706	1.370213294	0.03361	3.560612	0.540799334
3.928832	0.23878459	93.83488906	1.562560132	0.03037	3.613636	0.504119095
2.268591	0.43758938	77.68454533	1.148724349	0.04214	3.349381	0.575881847
1.555804	0.72850245	193.2202485	0.911678505	0.04416	3.309597	0.635532944
2.14655	0.52462114	109.4072457	1.126453689	0.03914	3.394396	0.576943856
2.315193	0.44137591	84.51193442	1.151159781	0.041	3.375026	0.579275285
1.85899	0.56055018	94.29440682	1.027634804	0.04401	3.314256	0.603271767
3.115275	0.4150208	127.442289	1.384660907	0.03114	3.60455	0.525169159
3.388665	0.37098163	119.5912207	1.451236029	0.03002	3.640013	0.516132062
3.075368	0.38289829	106.6186916	1.372242647	0.03301	3.546998	0.530162377
1.676287	0.74749133	265.1157587	0.909929215	0.04796	3.311971	0.649132056
2.507589	0.44589831	99.59800209	1.210340251	0.04015	3.415003	0.563602158
2.346429	0.44479909	86.42795575	1.161904762	0.04146	3.388075	0.575069444
1.797014	0.61172693	130.6427454	1.0166622	0.04176	3.356831	0.602096941
2.286939	0.44710483	84.56472539	1.157738908	0.04224	3.380322	0.571486627
1.901865	0.67060025	193.8384054	1.031591041	0.03752	3.428148	0.603367558
1.534541	0.71663139	182.0074281	0.915318627	0.04343	3.29759	0.631393412
2.196319	0.49498082	99.45190226	1.137582724	0.04059	3.383785	0.575458193
1.517869	0.69394948	146.7581362	0.897635073	0.04449	3.298985	0.636961953
1.966878	0.53351755	96.63463027	1.067784926	0.04411	3.319875	0.591639254
1.598473	0.65407396	126.2492526	0.947587995	0.04415	3.314451	0.620014069
1.878578	0.57536497	118.7724375	1.054453957	0.04178	3.353137	0.589714117
1.259549	0.71268019	125.4790704	0.811970267	0.05514	3.137342	0.660127971
1.85835	0.64275642	160.6835019	1.032403163	0.03841	3.413848	0.599732278
1.776807	0.68476458	180.6741839	0.991247129	0.04477	3.350823	0.615000431
1.776807	0.68476458	180.6741839	0.991247129	0.04477	3.350823	0.615000431
1.678222	0.51066224	66.26423403	0.968820551	0.05201	3.183442	0.615354512
1.876666	0.59100736	114.7711073	1.024752326	0.04324	3.34264	0.606847298
1.956818	0.45067419	63.72599436	1.054856201	0.04703	3.234786	0.596772505
1.427573	0.60817818	84.12643961	0.891255399	0.05275	3.160149	0.633190068
2.359058	0.44401669	87.67552924	1.184442635	0.0406	3.387652	0.564284037
1.783452	0.58485241	104.3867644	0.986288416	0.04392	3.316959	0.617431048
1.337649	0.55824454	54.87676659	0.85627853	0.06475	3.000225	0.644159572
1.885523	0.60395334	132.7492759	1.038080384	0.04236	3.35675	0.601352448
1.49509	0.62177418	93.42365491	0.910594315	0.04907	3.205732	0.630314384
1.544329	0.74782172	245.568672	0.898300624	0.04722	3.301522	0.64141355
1.295762	0.69656938	115.950496	0.833587809	0.05007	3.169496	0.650330915

F21	F22	F23	F24	F25	F26
Maximum probability	Sum of sqaures	Sum average	Sum variance	Sum entropy	Difference variance
0.066820939	31.54708095	10.7235023	77.88406109	2.452004323	2.552537211
0.072336266	27.6661013	10.10948192	67.03822177	2.36206921	2.269794721
0.064300758	26.02286023	9.759218323	61.74150951	2.347039107	2.228693623
0.091118421	33.91776059	11.2125	86.06649988	2.349051121	2.081578947
0.059102183	26.25191825	9.685391865	60.81210033	2.347364096	3.270920139
0.050030578	25.19413108	9.468501799	57.60412925	2.311725633	3.928832421
0.075825704	26.67338795	9.983154015	65.44270538	2.260007926	2.268591107
0.081669843	34.45143404	11.32837462	88.78480108	2.445548551	1.555803592
0.068997627	25.88797879	9.708466114	60.95917897	2.354425092	2.146550119
0.075013303	26.94950949	9.986057227	65.34337809	2.280235871	2.315193257
0.082169118	26.50007208	9.915519958	64.23306392	2.323193937	1.858989846
0.051263413	26.28328922	9.861191061	63.33479264	2.390284568	3.115274554
0.053821886	25.25192328	9.528754826	58.46837928	2.381666227	3.388665414
0.056066176	26.58437213	9.882352941	63.58964142	2.352256741	3.075367647
0.120965251	29.43341117	10.2965444	73.08714135	2.457234017	1.676287001
0.071794562	22.90119255	9.070966055	52.15791656	2.317108611	2.507589286
0.07797619	24.40333194	9.43452381	57.17190831	2.288274813	2.346428571
0.080946696	25.38285916	9.687607514	60.68962091	2.390323102	1.797013556
0.078222	24.51034024	9.493257816	57.87586319	2.289399419	2.286938753
0.066532024	30.47781068	10.47750097	73.76516999	2.47468236	1.901864841
0.089898459	31.6733387	10.8559232	79.83303085	2.453994585	1.534541317
0.069285114	23.88790801	9.331830229	55.63675145	2.320882703	2.196318643
0.073173077	28.27928203	10.28987866	70.16203087	2.427466656	1.51786859
0.087466138	22.16958148	8.986542183	51.07361316	2.308572708	1.966877902
0.089350036	25.85080998	9.719763352	61.3694604	2.390148489	1.598472676
0.077147246	23.59517178	9.333211536	55.65302115	2.354925827	1.878578328
0.12672021	35.05593619	11.52743506	91.83578862	2.343709138	1.259549442
0.066443143	30.62078735	10.65809566	76.08807512	2.439411827	1.85835031
0.121923184	32.38399774	10.87848815	81.02452851	2.420087245	1.77680748
0.121923184	32.38399774	10.87848815	81.02452851	2.420087245	1.77680748
0.083567957	25.88283158	9.859572409	63.47377483	2.224375719	1.678222249
0.094492447	30.68728069	10.72712285	77.39044573	2.354461702	1.876666309
0.082722693	24.70111553	9.596199338	59.56834066	2.220567523	1.956818465
0.096139791	24.51070477	9.535836433	58.41267305	2.285822931	1.427572953
0.06886492	28.28522696	10.26359734	69.61415956	2.29502138	2.359057997
0.075886525	29.09006388	10.40614657	71.79269414	2.34483246	1.783451537
0.131800134	19.67352439	8.557701478	45.64694663	2.160172969	1.337648587
0.08369762	26.25100154	9.870000424	63.48123055	2.39679885	1.885522593
0.087338501	28.55751158	10.33126615	70.58408113	2.320411854	1.495090439
0.111572716	35.36538268	11.39864108	90.41295358	2.468556565	1.54432873
0.087589213	28.53155447	10.29538142	70.02323996	2.371470327	1.295761671

F27	F28	F29	F30
Difference entropy	IMC-2	IDN	IDMN
1.376408647	0.601396	0.880775	0.964513
1.325824084	0.563136	0.886009	0.967889
1.298349641	0.530058	0.883891	0.968409
1.276642788	0.595722	0.887633	0.97035
1.457129206	0.419345	0.866324	0.955749
1.533391823	0.312031	0.849694	0.946737
1.318669413	0.467536	0.883854	0.967828
1.180541696	0.727003	0.905439	0.977477
1.290499516	0.55293	0.885406	0.969315
1.335633179	0.474013	0.883987	0.967304
1.240041033	0.586646	0.894488	0.973258
1.431804225	0.458407	0.863454	0.956964
1.47690391	0.416397	0.858068	0.953429
1.437318179	0.425885	0.864641	0.957357
1.226859047	0.767261	0.906777	0.976081
1.341235135	0.488845	0.878657	0.96485
1.338211532	0.499524	0.882947	0.966968
1.222043876	0.630508	0.895204	0.974038
1.3175695	0.497589	0.882899	0.967662
1.241139662	0.684347	0.894369	0.972787
1.171035897	0.735765	0.904823	0.977661
1.298802508	0.533746	0.884525	0.96871
1.151971371	0.708151	0.906669	0.978143
1.252436989	0.556249	0.890723	0.971737
1.176978652	0.664653	0.901567	0.976762
1.230045298	0.592015	0.891473	0.972865
1.096522032	0.710648	0.914541	0.981489
1.237565146	0.659463	0.893898	0.973251
1.232372907	0.694409	0.898072	0.974369
1.232372907	0.694409	0.898072	0.974369
1.199275083	0.52538	0.899755	0.97575
1.254134344	0.605947	0.895021	0.973007
1.26347245	0.467942	0.892134	0.971981
1.134749602	0.623331	0.906663	0.979092
1.3040685	0.48656	0.880416	0.966614
1.235348679	0.596681	0.898687	0.974385
1.114114239	0.575645	0.910011	0.980305
1.21795182	0.631094	0.893548	0.972781
1.155057424	0.633384	0.905017	0.978162
1.178543271	0.746155	0.906926	0.977669
1.093257049	0.710224	0.912261	0.981007

Appendix – 1 (b) Result of only 40 single malignant cells features were shown here out of 240 cells.

Appendix 1 (b) - Single malignant cells (240)

Features (F1 to F30)-morphology, intensity and texture

	F1	F2	F3	F4	F5	F6	F7
S. No.	Area	ConvexArea	Solidity	Perimeter	MajorAxisLength	Minor AxisLength	circularity
1	882	909	0.970297	112.4264	37.07332073	30.74761832	0.876883276
2	1011	1030	0.981553	117.0122	38.43685829	33.74071005	0.927894883
3	513	581	0.88296	96.04163	34.2997301	20.87843169	0.698888959
4	1722	1918	0.89781	184.1838	53.21087595	45.16740751	0.637881949
5	59	59	1	27.41421	11.40622397	6.85210858	0.98652999
6	478	493	0.969574	82.97056	29.03253029	21.64891071	0.872548727
7	799	1038	0.76975	163.598	45.51951951	28.39694937	0.375146389
8	737	757	0.97358	104.0416	35.98027579	26.77443223	0.855584783
9	836	928	0.900862	129.2548	43.80148023	25.95633006	0.628814508
10	623	640	0.973438	97.1127	35.56672661	22.94816956	0.830129538
11	654	679	0.963181	97.1127	32.12365013	26.41342433	0.871436144
12	724	738	0.98103	104.2843	40.7492542	22.8213379	0.836586417
13	529	554	0.954874	86.87006	30.90069705	22.18116761	0.880897376
14	564	567	0.994709	86.18377	30.78659188	23.42146918	0.954196965
15	859	1027	0.836417	140.9117	43.35711586	28.249659	0.54363698
16	506	568	0.890845	96.38478	31.49104693	22.39103717	0.684452782
17	363	375	0.968	71.45584	26.50285321	17.72474409	0.893389782
18	66	66	1	30	12.70170592	6.92820323	0.921533845
19	511	523	0.977055	84.04163	29.12862248	22.64468486	0.909163149
20	767	783	0.979566	103.6985	33.61669181	29.79221826	0.896314468
21	535	547	0.978062	86.52691	31.71307249	21.64670592	0.897968779
22	586	601	0.975042	91.79899	32.22556553	23.55221082	0.873839506
23	649	760	0.853947	123.6985	34.60261141	27.66390687	0.532998272
24	822	840	0.978571	106.1838	36.34356639	29.01391771	0.916147565
25	957	1009	0.948464	121.2548	38.30995507	32.64877046	0.817944203
26	688	701	0.981455	97.69848	34.43914612	25.63252943	0.90577983
27	738	841	0.877527	139.8406	40.40351148	24.84259005	0.474241485
28	653	664	0.983434	93.94113	33.40140478	25.14813448	0.92984707
29	732	755	0.969536	101.9411	35.72140614	26.38845483	0.885160645
30	710	783	0.906769	116.5269	39.22393553	24.33111906	0.657076202
31	526	534	0.985019	84.62742	26.70265222	25.4830422	0.922939933
32	636	644	0.987578	91.94113	29.32095191	27.83032702	0.945469118
33	561	573	0.979058	90.52691	34.22004169	21.23332359	0.860235406
34	522	537	0.972067	85.45584	29.37972462	23.09055312	0.898249181
35	628	646	0.972136	93.69848	31.874128	25.34091202	0.898885494
36	1059	1224	0.865196	158.4264	45.5083312	34.37818231	0.530213375
37	663	678	0.977876	97.35534	36.19235623	23.48559615	0.8790303
38	584	600	0.973333	95.01219	37.73973315	19.91907795	0.812950353
39	591	604	0.978477	89.45584	28.75031233	26.56882117	0.928068236
40	750	798	0.93985	107.3553	37.01855073	26.59484074	0.817756174

F8	F9	F10	F11	F12	F13
Eccentricity	MaxIntensity	MinIntensity	Mean Intensity	Standard Deviation	Autocorrelation
0.55869501	92	49	73.19568345	8.214293707	31.65969139
0.47898746	103	42	76.94235033	13.2620177	25.55982134
0.79339631	107	49	75.4375	11.00381898	24.36778511
0.52865323	94	0	68.34060795	10.92150958	24.49126621
0.79944884	92	46	70.46677215	8.432946314	24.14336234
0.6663068	92	41	69.29841897	9.661184842	25.85133912
0.78155116	131	49	76.47843943	16.15062355	23.24375415
0.66802154	94	35	74.53119093	10.32597696	23.72108867
0.80550406	103	45	79.02558635	10.16918703	23.9536803
0.76400143	93	35	82.62916667	12.22624857	23.48807044
0.56913758	110	48	88.57360406	11.77355962	28.12451826
0.82846349	108	52	88.16059957	12.00205231	23.31864537
0.69622776	98	50	84.9382716	7.137839944	24.45564782
0.64902334	92	0	58.13239437	13.44446387	21.76410137
0.75859915	186	0	82.53980583	29.04374684	24.59116321
0.70316302	111	0	74.96360153	12.93630553	28.28951581
0.74345473	146	38	81.66666667	19.41377001	23.89647905
0.83814041	148	0	75.66123188	16.31282497	25.11398176
0.62900257	92	18	76.35810811	15.55766099	26.65921671
0.46323995	132	23	75.24152542	17.8216728	31.72271087
0.73081097	98	37	69.4787234	14.44127235	29.84269881
0.68253292	145	34	81.97033898	19.70341718	26.67705305
0.60069997	93	17	75.96193772	15.81276969	36.10492986
0.60222905	123	15	74.98727016	16.12016163	24.84128746
0.52317251	107	21	62.8025641	16.08123637	25.86391288
0.66786248	92	20	59.72826087	15.75942728	24.17408755
0.7886346	92	20	59.64989059	15.74592557	23.90814
0.65812751	108	25	60.0171504	17.7351265	23.38025181
0.67400207	128	28	75.02745098	20.1395727	27.06217839
0.78435433	161	25	74.15658915	27.32156068	24.45195911
0.29876645	106	29	67.5495935	16.48798978	22.49150783
0.31478867	106	29	73.91474654	16.33425718	30.84131625
0.78421135	110	22	69.61772853	16.76382071	24.89419848
0.61830916	92	27	49.79772727	16.05932891	24.65414762
0.60656912	162	15	79.72321429	33.56765252	24.67762937
0.65523383	106	32	67.38655462	15.10363316	24.20422463
0.76086484	162	25	74.09612403	27.41610694	25.08320956
0.84936791	124	28	73.24369748	14.54699772	30.41565187
0.38209543	145	32	77.95207254	26.1932662	17.81875708
0.69561033	111	35	69.53700516	15.87007889	21.31352406
0.62882986	92	32	62.77903683	17.24149699	20.72559814

F14	F15	F16	F17	F18	F19	F20
Contrast	Correlation	Cluster Prominence	Dissimilarity	Energy	Entropy	Homogeneity
1.658684648	0.718600231	204.8617564	0.912464986	0.050854	3.338883	0.644999952
2.363765477	0.545636731	146.0208891	1.144984777	0.036147	3.51242	0.585448866
2.538830949	0.529379395	154.1582827	1.207398048	0.033021	3.579319	0.56667806
2.112412887	0.419762578	67.41774198	1.111609372	0.045027	3.270903	0.582221262
3.24793543	0.496477107	205.8706309	1.377156634	0.027322	3.733831	0.537020224
2.768113325	0.535523617	179.6705185	1.246365003	0.031417	3.633812	0.566046414
3.31252849	0.377494502	123.5139326	1.403622982	0.030587	3.636119	0.529861938
2.930912695	0.500524864	170.4154826	1.302887071	0.030069	3.650348	0.549052637
2.83263695	0.451819656	132.80599	1.299392032	0.03216	3.592846	0.546107128
2.528261409	0.523064892	153.6525757	1.203502811	0.034655	3.549051	0.57068972
2.499926418	0.509302469	130.8211549	1.207722111	0.035134	3.489205	0.565437285
2.706585289	0.52806085	170.2630232	1.272666279	0.031041	3.628746	0.548376758
2.420594876	0.556499556	153.6337632	1.192226527	0.033562	3.555361	0.566489618
2.208356847	0.549840924	120.7314968	1.128338515	0.039723	3.433775	0.580047878
1.983976018	0.605654818	144.3240396	1.057376735	0.038567	3.423637	0.596579917
2.630652261	0.556182507	188.2226486	1.238095238	0.032036	3.595502	0.560991063
2.511308257	0.54972511	171.8204968	1.195257816	0.033937	3.573752	0.571774353
3.948762484	0.372569484	169.4205053	1.536691272	0.026355	3.767326	0.511208465
2.641244299	0.317495058	72.8630675	1.236868349	0.042172	3.374119	0.560768906
1.936662255	0.617579899	144.4213715	1.012002443	0.044415	3.335517	0.616779517
2.633440385	0.466804169	131.9049373	1.199059884	0.036495	3.502435	0.579414333
2.636940318	0.533934292	166.5071045	1.222721927	0.032959	3.593603	0.56839306
1.969022523	0.672198716	218.7416276	0.965555341	0.052383	3.314884	0.643870109
2.282278949	0.429938484	89.58697084	1.134665187	0.044453	3.367343	0.583449606
2.034179947	0.55007075	121.8834171	1.083857172	0.040323	3.423323	0.587337684
2.522466222	0.500623734	135.2607006	1.21637863	0.034212	3.558258	0.563187265
2.089886773	0.568414119	137.7204468	1.088619502	0.038404	3.476656	0.589142926
2.268795412	0.532932649	128.7068277	1.150681892	0.03675	3.491001	0.575056457
1.641663784	0.547812841	88.00415827	0.954943641	0.054424	3.194581	0.619629184
2.32398005	0.500026519	122.1321894	1.146962314	0.038222	3.479902	0.580037111
1.803834902	0.541625908	87.64993285	1.001930128	0.046296	3.284315	0.611211059
1.634818194	0.642588498	133.9469188	0.934933437	0.04618	3.296896	0.630402394
2.402175698	0.479764725	120.1505881	1.197337849	0.037684	3.487476	0.562395525
1.861591466	0.573439931	115.3573967	1.006108792	0.043941	3.346484	0.614090252
1.402646169	0.668722447	126.3476026	0.872136617	0.049272	3.228977	0.64070587
2.391418619	0.502347117	126.4828257	1.174607583	0.036576	3.503794	0.572219171
2.616736541	0.40739528	105.0894819	1.23936869	0.038376	3.491479	0.55823904
1.943852597	0.661059324	202.8628894	1.011575927	0.04138	3.449818	0.618990416
1.273060265	0.617247378	74.00331636	0.82557169	0.062715	3.017646	0.653365455
1.638508668	0.614923563	110.3241311	0.944860506	0.048657	3.269425	0.625471031
1.66614268	0.645784697	143.2659131	0.958389532	0.045033	3.330298	0.621196671

F21	F22	F23	F24	F25
Maximum probability	Sum of sqaures	Sum average	Sum variance	Sum entropy
0.153723596	32.52891561	10.87094293	81.23577676	2.437929837
0.070935639	26.48335297	9.8259491	62.9548947	2.416371835
0.057501924	25.65618651	9.579262199	59.16687101	2.443490428
0.074682754	25.55703353	9.742298991	61.67560694	2.22496093
0.045211351	25.99095894	9.495034048	58.41576676	2.512763004
0.063311488	27.0661106	9.85014079	63.47767042	2.479270599
0.049117403	24.80552001	9.431774691	56.9652135	2.386554445
0.043717988	25.3023908	9.435488073	57.30583574	2.469930641
0.052300318	25.27263083	9.547304914	58.54557868	2.402412958
0.065495205	24.54911515	9.402487599	56.76854556	2.424726281
0.058080762	29.18288953	10.35890886	71.11610386	2.394902293
0.055260263	24.58380714	9.338802791	55.9812531	2.467647088
0.059041217	25.72062269	9.578674638	59.37802191	2.445297155
0.08531575	22.92881882	9.036999415	52.00104211	2.373392832
0.068705189	25.29757942	9.60610766	59.71862252	2.419467753
0.068227291	29.58669122	10.32332933	70.71786742	2.481197823
0.071458062	24.95004035	9.458968194	57.50962928	2.46724486
0.045375597	26.87352084	9.78636561	62.27026317	2.46279804
0.069755625	27.6638329	10.2062405	68.94052059	2.21689156
0.106845989	32.66588579	10.98428744	81.80448812	2.403427931
0.060856207	30.67732836	10.71213519	76.68830151	2.379364383
0.064519894	27.89838464	10.03339567	66.07945361	2.456907545
0.139054698	37.34606962	11.67793822	95.65075119	2.423955799
0.086015538	25.92307294	9.793932667	62.42000378	2.264477448
0.075075413	26.66483132	9.923972425	63.99085224	2.375040815
0.058690726	25.60113433	9.573236454	58.89810127	2.409132605
0.069357787	24.94632296	9.493726724	57.7099331	2.414298258
0.070001568	24.34850943	9.39939417	56.47464516	2.39703949
0.099998919	27.93222489	10.21189719	68.83373425	2.260405157
0.073526993	25.22648473	9.651830557	59.92760021	2.37477047
0.090088673	23.16532908	9.25791359	54.52750506	2.29613093
0.084969648	31.5388255	10.83982126	78.98080498	2.38511847
0.070180624	25.8581991	9.753914204	61.420925	2.366052028
0.089690585	25.62902771	9.676601736	60.42203234	2.356712852
0.096023546	25.11939449	9.646196357	60.08397116	2.364699347
0.065609467	25.25485619	9.591254479	59.08705508	2.389168931
0.065721373	26.14283171	9.835432544	62.75381637	2.316124308
0.10785653	31.43738816	10.6813629	76.88819098	2.47318517
0.125870661	18.49408698	8.196530562	41.03907466	2.223725681
0.093087581	22.04732829	8.946192923	50.51081951	2.339224616
0.089306588	21.2422689	8.766155874	48.36058545	2.391434672

F26	F27	F28	F29	F30
Difference variance	Difference entropy	I MC 2	IDN	IDMN
1.658684648	1.214633916	0.727576913	0.906295938	0.976275673
2.363765477	1.349054618	0.572889941	0.885099151	0.966900603
2.538830949	1.370754118	0.543520612	0.879234235	0.964613242
2.112412887	1.289238475	0.450349399	0.886863019	0.969793751
3.24793543	1.464493312	0.515497547	0.865385423	0.955784518
2.768113325	1.414960726	0.551560604	0.876659115	0.961835371
3.31252849	1.476333202	0.406389786	0.862861174	0.954850223
2.930912695	1.427782906	0.520665838	0.87136216	0.959769019
2.83263695	1.409986523	0.4727873	0.871054638	0.960598606
2.528261409	1.355861856	0.548144093	0.879700092	0.964595024
2.499926418	1.347082929	0.537530631	0.878939826	0.964879692
2.706585289	1.38567803	0.543864737	0.87306101	0.962229599
2.420594876	1.339282088	0.573118231	0.880057941	0.96587772
2.208356847	1.309955864	0.561628847	0.885681077	0.968712258
1.983976018	1.263783353	0.618784843	0.892018683	0.971780233
2.630652261	1.383396632	0.580879853	0.876522482	0.963207918
2.511308257	1.367738729	0.57511265	0.880464212	0.964934212
3.948762484	1.541049147	0.399104975	0.852608659	0.947263571
2.641244299	1.381296893	0.386838421	0.876682825	0.963247462
1.936662255	1.259015397	0.664942796	0.89700009	0.972525721
2.633440385	1.3971834	0.51998255	0.881060018	0.963635286
2.636940318	1.392577309	0.554552566	0.878332198	0.963371566
1.969022523	1.290826302	0.713767023	0.902751762	0.972559726
2.282278949	1.331242386	0.458947669	0.885588962	0.967870891
2.034179947	1.272183852	0.565910738	0.88936317	0.970977926
2.522466222	1.365545467	0.514510136	0.878120945	0.964575336
2.089886773	1.287591264	0.582375912	0.889269347	0.970381448
2.268795412	1.314968298	0.542302866	0.883620029	0.967832268
1.641663784	1.193464442	0.574135746	0.901077774	0.976234836
2.32398005	1.336425817	0.52403032	0.884483024	0.967367348
1.803834902	1.236251242	0.566291815	0.897028038	0.974035622
1.634818194	1.201569654	0.663779251	0.903408133	0.976410275
2.402175698	1.330302699	0.502940083	0.87929634	0.966035807
1.861591466	1.250207438	0.594409581	0.897051543	0.97336138
1.402646169	1.133566261	0.682882453	0.908689738	0.979517011
2.391418619	1.340247062	0.522825585	0.881850087	0.966367138
2.616736541	1.379980766	0.431918615	0.876193743	0.963468131
1.943852597	1.273105359	0.681491926	0.897154462	0.972392551
1.273060265	1.097029894	0.631449927	0.913028591	0.98128253
1.638508668	1.197567004	0.626969462	0.902264947	0.976306603
1.66614268	1.203612197	0.650739034	0.900921545	0.9758979

Appendix – 2 (a) Result of only 40 group benign cells features were shown here out of 75 cells.

Appendix 2 (a) - Group benign cells (75)

Features (F1 to F12)-morphology and intensity

	F1	F2	F3	F4	F5	F6
S. No.	Area	Convex Area	Solidity	Perimeter	Major Axis Length	Minor Axis Length
1	242.5	280	0.87793	67.49341025	22.83987	14.9591803
2	243.6667	254.111111	0.952795	60.05550741	23.367626	13.3820897
3	175.5	182	0.964202	49.24383113	18.736763	12.1920013
4	216.3636	237.818182	0.911179	61.21385277	23.564903	12.3170656
5	250	310.666667	0.803865	76.63554587	28.488488	13.1332345
6	236.3333	251	0.940532	66.87005769	26.973565	12.386664
7	188.4286	193.857143	0.973437	49.47614921	17.877431	13.3411502
8	165	174.5	0.951118	48.1629509	17.171508	12.7910121
9	186.2	193.2	0.964187	50.59554108	18.067251	13.4260484
10	173.3333	177.666667	0.977287	47.29408366	16.948977	13.0796841
11	242.6667	251.666667	0.964799	59.11269837	22.44542	14.22249
12	341	354.75	0.962554	71.0520382	26.228296	17.1313723
13	228.5	239.5	0.959028	60.11269837	24.216325	12.0169314
14	251.5	265	0.945597	68.99137803	30.252773	10.8939415
15	283.3333	293.666667	0.964845	64.80305431	24.519233	14.9376534
16	160	184.8	0.879211	54.42152955	21.894056	11.3874182
17	228.6667	236	0.970917	54.51303508	19.432032	14.8774325
18	238.5	292.25	0.834767	75.15863992	25.361311	14.9028369
19	218.3333	241	0.906708	60.13638764	19.554363	15.0910411
20	267	279.6	0.957019	64.29259736	23.272821	14.9363988
21	229.25	238.25	0.964779	56.28427125	20.706461	14.0580389
22	246.6667	255.333333	0.9661	58.33164979	21.014021	15.3066615
23	275	282.666667	0.97288	60.9844396	21.462419	16.5263793
24	197.6667	205.666667	0.959224	52.31777294	19.2632	13.2061545
25	236.6667	254.333333	0.937142	58.96481477	19.364631	16.0363754
26	193.5	203.5	0.952496	57.57716447	21.137716	12.6670608
27	268	271	0.988881	57.87005769	19.436733	17.6329561
28	499.5	573.5	0.879469	101.9619408	28.631324	24.3609636
29	254	271.666667	0.951259	63.46972098	23.87025	14.0106521
30	461.5	502.25	0.920003	98.19417382	33.343267	19.364848
31	233	247	0.944537	62.44603171	21.977964	14.6204323
32	191	194.5	0.982276	49.33452378	16.731409	14.8415767
33	211.75	219	0.967598	55.52691193	20.964778	13.2103464
34	377.3333	423.333333	0.90227	82.73605093	29.219675	18.0938491
35	301.3333	323.333333	0.936046	70.02200573	24.938405	16.4024928
36	412	424.5	0.970549	76.254834	28.166595	18.907733
37	267	292.666667	0.930232	66.40559159	23.027342	15.6751122
38	237	247.8	0.95639	58.04995667	20.814153	14.9953843
39	336	358.5	0.940652	70.9411255	25.727788	17.141884
40	350.2	399.2	0.875924	86.35777772	28.489452	17.8304047

F7	F8	F9	F10	F11	F12
circularity	Eccentricity	Max Intensity	Min Intensity	Mean Intensity	Standard Deviation
0.668958	0.72764621	94.66667	47.33333	71.48645	11.67397
0.8489856	0.79667347	91.44444	23.66667	53.499	17.66665
0.9094594	0.74107583	91.5	26.66667	54.69935	15.44067
0.7255957	0.82273459	91.90909	33.09091	63.78985	14.46829
0.5349206	0.88481243	94	64.66667	82.2254	6.925922
0.6641581	0.80606496	94.33333	40.33333	72.99349	12.13218
0.9673081	0.6508064	92	40.71429	61.8991	14.28381
0.8938561	0.6105024	92	18.5	45.63439	18.08287
0.9140397	0.64616937	92.2	22.4	53.63971	17.88637
0.9738192	0.63781206	91	22.33333	42.47084	18.2927
0.8726868	0.72810131	91.66667	29.66667	56.12047	14.3619
0.8488113	0.71670126	92.5	25	47.73958	17.32907
0.7946276	0.86041825	92	15.5	45.12313	19.7259
0.6639849	0.92717997	92	13	39.96992	20.10594
0.8478452	0.78692576	92	15	46.61554	18.7951
0.6788727	0.82521167	91.6	12.8	50.54466	18.80376
0.9669678	0.635677	92	14	47.48717	19.06766
0.5305672	0.67092171	92.25	36.5	60.84322	14.14068
0.7586741	0.62800781	97.33333	21.66667	55.32347	21.11143
0.8117068	0.76289339	91.8	13.2	43.17133	16.77594
0.9093794	0.70503142	91.75	19	48.16899	16.10855
0.9109862	0.62687705	91.33333	22.33333	50.73821	16.56095
0.9291899	0.57764572	91.66667	6	49.7208	17.89271
0.9074962	0.72340769	89.66667	27.66667	53.89787	14.32315
0.8553839	0.55867826	96.33333	24.33333	59.66973	19.18324
0.7334834	0.80071818	92	50	76.83568	12.07499
1.0056268	0.42035872	92	41.5	69.01842	17.98279
0.6037667	0.51555382	92	21	39.16014	14.12517
0.7923378	0.70360245	91.66667	27.5	62.3849	22.65988
0.6014647	0.77298495	96.5	9.666667	35.94649	12.47408
0.750855	0.67861754	92	13.75	69.01899	17.4534
0.9861463	0.42506208	91.5	7.666667	55.78748	21.31675
0.8630307	0.72701445	91.25	6	31.36663	18.9174
0.6927004	0.77441997	92	26.33333	53.07805	17.74737
0.7723034	0.67785015	92	42	68.1542	11.75316
0.8903737	0.70202031	92	44.5	67.12768	10.49964
0.7608724	0.71828451	91.66667	28.33333	60.7768	13.9379
0.8838008	0.66097016	92.8	28.6	61.55774	16.02223
0.8389827	0.73641298	91.5	22	56.00837	14.63601
0.5900966	0.75925654	91.8	1.6	41.78347	24.50687
0.812987	0.75454733	91.66667	11.33333	41.59973	23.9983

Appendix – 2 (b) Result of only 40 group malignant cells features were shown here out of 73 cells.

Appendix 2 (b) - Group malignant cells (73)

Features (F1 to F12)-morphology and intensity

	F1	F2	F3	F4	F5	F6
S. No.	Area	Convex Area	Solidity	Perimeter	Major Axis Length	Minor Axis Length
1	541.5	569	0.932788	87.99747	31.21373	21.22843
2	584	660.6667	0.869812	112.5963	30.10793	26.13076
3	578.3333	598.3333	0.966661	90.40678	31.77742	23.40141
4	649.6667	688	0.94979	100.3259	35.02308	24.27072
5	765.25	911.25	0.867953	138.3927	40.64455	27.13596
6	1220.5	1585.5	0.780377	204.3797	56.679	32.35269
7	390.6667	421	0.92569	78.3594	25.14556	20.13946
8	367.5714	384.5714	0.956922	73.72474	25.00846	19.63648
9	386.3333	402.6667	0.963895	72.29815	24.11579	20.4458
10	408.5	449.75	0.908662	92.42641	31.02212	19.3099
11	564	633.75	0.881422	107.6543	33.32482	22.91749
12	343.25	485	0.746341	100.5183	35.39316	18.17948
13	618	756	0.816033	120.5015	39.94949	23.42821
14	392.25	444.75	0.861495	89.03301	28.62516	20.08107
15	538.25	621.25	0.878059	110.15	35.63757	21.82895
16	317.3333	348.8333	0.903952	75.38597	24.56672	17.49125
17	320.3333	387.3333	0.831072	93.03995	28.73235	17.12324
18	433.6	508.2	0.829643	93.85727	30.91931	20.85043
19	862.3333	973.3333	0.916268	129.0342	43.51761	25.14989
20	558	611	0.932605	104.8782	34.81785	22.17782
21	318	356.6667	0.866239	73.17395	26.95248	15.80248
22	448	474.3333	0.94516	85.17395	26.35212	22.43337
23	444.3333	525.6667	0.857792	99.03995	29.1128	22.92829
24	320	392.6667	0.772151	90.13064	25.19063	19.15153
25	382.4	400.2	0.957087	76.70092	27.44918	18.1663
26	554.25	600.5	0.932777	96.1188	35.07093	20.88194
27	453.5	526.5	0.843459	106.1543	32.50077	21.48107
28	378.3333	404	0.933373	75.36922	25.47912	18.8444
29	223.6667	269	0.82582	68.15026	21.65323	15.30515
30	536.6667	589	0.921102	94.67599	30.88118	22.2276
31	539.6	573	0.944677	92.26905	31.39988	22.26224
32	588	676	0.882563	111.2297	35.46887	23.80062
33	575	643.3333	0.888364	99.28259	33.15022	23.64302
34	666.6667	793.6667	0.871237	118.5824	40.85679	23.28079
35	349.6667	365	0.959443	72.65517	24.7089	18.66404
36	531.6667	663.6667	0.836821	120.3398	40.11163	20.05105
37	492.75	528.25	0.930387	85.31549	30.62545	20.27666
38	739.6667	886.3333	0.844279	150.0579	40.89002	26.72689
39	597.5	649	0.922915	107.9117	41.44427	19.99512
40	872.5	1202.5	0.738993	180.8736	45.18743	33.3647

F7	F8	F9	F10	F11	F12
circularity	Eccentricity	Max Intensity	Min Intensity	Mean Intensity	Standard Deviation
0.8787553	0.720921	99.5	47	74.72788	10.27907
0.5788612	0.473594	104.3333	43.66667	77.61587	10.02927
0.8891726	0.664065	100.6667	51	77.0915	9.340889
0.8110999	0.678284	98.33333	48	73.70204	11.61589
0.5020961	0.661466	98.5	33.75	74.29874	10.22934
0.3671742	0.817121	104.5	43	78.12308	10.06779
0.7995287	0.596197	96.33333	55.33333	84.97323	7.069202
0.8498163	0.509699	98.85714	44.57143	79.06759	10.5398
0.9287902	0.467361	95	40	71.26598	10.55022
0.6009104	0.6477	113.25	27	79.31003	13.25718
0.6115419	0.676414	117.25	29.25	79.34598	15.88707
0.4269039	0.803214	103.25	41.25	71.38118	13.04518
0.5348271	0.792613	105	27	70.86263	15.29988
0.6218286	0.631759	111.75	22.5	71.94487	19.4707
0.5574744	0.721644	127.75	33.75	76.98339	17.97959
0.7016887	0.676919	117.6667	35.16667	71.82492	17.27519
0.4650215	0.750186	98.66667	32	66.29166	16.49206
0.6185336	0.730722	115.4	31.4	75.36325	17.46247
0.6508417	0.809094	92.33333	18	48.59539	17.21024
0.6374903	0.668891	92	26.33333	57.79312	16.32792
0.7463181	0.794968	96	23	57.62301	18.49379
0.7760225	0.503005	121.3333	8.666667	59.84877	24.13245
0.5692433	0.556072	99.33333	4.333333	52.48041	24.33691
0.4950111	0.630555	108.3333	17.33333	72.07652	19.00428
0.8168204	0.698523	96.8	34.6	68.04639	13.2756
0.7538742	0.757326	103.75	27.5	70.12216	14.56893
0.5057221	0.676446	96.5	23	71.96452	13.70321
0.836944	0.659459	167.3333	21.66667	77.98338	25.35182
0.6051683	0.691393	128.3333	32.33333	77.45206	19.31803
0.7523758	0.696306	100.8333	23.66667	59.5177	16.90543
0.7964705	0.669998	97.2	24	58.19406	15.73324
0.5972356	0.72493	104.75	12.75	60.93576	17.11188
0.7330465	0.676687	106.6667	16.66667	62.52967	17.23399
0.5957693	0.745336	97.66667	14	54.58889	19.47164
0.8323981	0.636745	92	33.33333	66.66703	11.74188
0.4613502	0.832345	97.66667	42.66667	71.67823	10.38486
0.8507084	0.747429	128.25	21.75	63.87668	20.21777
0.4127891	0.71321	104	15.66667	63.16818	19.03842
0.6447787	0.800385	92	12.5	52.26838	18.87074
0.335139	0.673152	166	15	71.47138	22.70039
0.7468498	0.751825	106.75	36.25	71.39485	14.5295

Appendix – 3 (a) Result of 35 benign breast images feature were shown here

Appendix 3(a) - benign breast image (35)

Features (F1 to F16)

S.No.	benign dataset	F1 Count	F2 Total Area	F3 Average Size	F4 Area Fraction(%)
1	ytma10_010704_b1.tif	40	8816	220.4	14.541
2	ytma10_010704_b2.tif	42	9267	220.643	11.743
3	ytma10_010704_b3.tif	62	14066	226.871	17.029
4	ytma12_010804_b1.tif	62	12023	193.919	23.65
5	ytma12_010804_b2.tif	60	9669	161.15	18.507
6	ytma12_010804_b3.tif	36	7106	197.389	11.66
7	ytma23_022103_b1.tif	32	6349	198.406	9.782
8	ytma23_022103_b2.tif	45	9274	206.089	13.51
9	ytma23_022103_b3.tif	51	10892	213.569	12.821
10	ytma49_042003_b1.tif	72	10909	151.514	11.968
11	ytma49_042003_b2.tif	34	7007	206.088	12.489
12	ytma49_042003_b3.tif	63	10362	164.476	13.03
13	ytma49_042203_b1.TIF	84	12122	144.31	13.977
14	ytma49_042203_b2.TIF	55	11515	209.364	17.166
15	ytma49_042203_b3.TIF	41	6234	152.049	9.759
16	ytma49_042403_b1.TIF	36	11135	309.306	14.423
17	ytma49_042403_b2.TIF	38	7836	206.211	11.507
18	ytma49_042403_b3.TIF	51	11802	231.412	13.562
19	ytma49_072303_b1.TIF	62	10090	162.742	14.211
20	ytma49_072303_b2.tif	49	10510	214.49	15.312
21	ytma49_111003_b1.TIF	59	15665	265.508	17.623
22	ytma49_111003_b2.tif	39	6436	165.026	10.296
23	ytma49_111003_b3.TIF	54	12019	222.574	17.857
24	ytma49_111303_b1.tif	57	14594	256.035	19.314
25	ytma49_111303_b2.tif	77	12689	164.792	21.759
26	ytma49_111303_b3.TIF	59	11395	193.136	13.654
27	ytma55_030603_b1.TIF	43	8631	200.721	11.348
28	ytma55_030603_b2.tif	42	8771	208.833	10.946
29	ytma55_030603_b3.TIF	55	12376	225.018	14.565
30	ytma55_030603_b4.TIF	27	8325	308.333	12.136
31	ytma55_030603_b5.TIF	92	18244	198.304	19.046
32	ytma55_030603_b6.TIF	24	5432	226.333	7.267
33	1ytma10_010704 b1.tif	42	9453	225.071	10.333
34	2ytma10_010704_b1.tif	59	16336	276.881	15.623
35	ytma55_030603_benign2_ccd - C	59	13718	232.508	12.674

F5	F6	F7	F8	F9	F10	F11
Perimeter	Major axis length	Minor axis length	Angle	Circularity	Solidity	Feret
58.944	21.182	12.787	102.703	0.774	0.895	22.59
61.805	22.022	12.568	101.047	0.719	0.877	23.817
62.886	22.683	12.448	94.406	0.716	0.875	24.362
57.897	20.788	11.785	87.65	0.738	0.884	22.491
50.34	18.241	10.928	97.307	0.774	0.89	19.554
61.073	23.59	10.368	82.501	0.646	0.87	24.972
59.071	21.478	11.523	88.703	0.739	0.885	23.32
60.042	20.827	12.287	94.437	0.73	0.876	22.336
61.756	21.504	12.071	92.976	0.697	0.863	23.27
48.987	17.55	10.706	93.22	0.767	0.883	18.943
57.761	20.714	11.506	97.211	0.725	0.879	22.444
52.45	18.215	11.206	99.411	0.729	0.87	19.992
48.505	17.239	10.435	86.959	0.747	0.868	18.681
59.596	20.53	12.757	89.826	0.729	0.868	22.574
51.21	18.833	9.866	75.239	0.708	0.867	20.352
71.943	24.79	15.841	85.213	0.749	0.894	26.959
59.04	20.851	12.043	69.533	0.728	0.877	22.597
62.339	23.544	12.356	111.561	0.741	0.894	24.976
50.657	17.715	11.233	85.119	0.766	0.875	19.21
59.918	21.07	12.809	83.435	0.749	0.881	22.744
69.689	24.486	13.508	93.741	0.686	0.873	26.508
54.177	20.148	10.202	95.522	0.68	0.862	21.611
63.252	21.86	12.469	60.194	0.71	0.876	23.661
64.895	22.329	14.005	93.126	0.765	0.89	24.151
53.612	18.988	10.813	87.348	0.708	0.863	20.704
59.901	21.859	10.626	98.353	0.658	0.851	23.63
61.141	21.924	11.429	76.214	0.684	0.862	24.353
58.109	20.721	12.297	93.594	0.744	0.875	22.454
61.618	22.37	12.713	86.713	0.749	0.887	24.23
70.415	25.53	15.095	93.729	0.756	0.903	27.267
59.624	21.418	11.607	92.576	0.705	0.867	23.066
58.608	20.588	13.83	79.127	0.808	0.905	21.921
60.56	22.544	12.715	75.356	0.783	0.907	23.783
68.269	25.058	13.865	76.019	0.739	0.894	26.776
61.762	22.698	12.892	91.274	0.757	0.896	24.068

F12	F13	F14	F15	F16
FeretX	FeretY	FeretAngle	MinFeret	Integrated Density
101.6	119.25	96.295	13.748	56202
137.429	130.976	101.973	13.922	56263.929
141.048	124.677	99.487	13.734	57852.097
119.758	99.952	83.561	12.863	49449.435
114.95	99.633	103.51	11.862	41093.25
126.861	105.194	81.685	11.522	50334.167
111.906	106.188	84.862	12.604	50593.594
131.244	146.489	90.716	13.476	52552.667
135.941	148.451	98.353	13.612	54460
145.778	147.972	90.531	11.627	38636.042
118.853	107.618	107.299	12.828	52552.5
129.063	132.095	96.801	12.279	41941.429
136.857	146.488	91.532	11.467	36798.929
121.473	138.291	89.025	14.055	53387.727
142.122	159.976	75.129	10.955	38772.439
132.472	110.306	87.406	16.965	78872.917
109.658	120.395	80.005	13.256	52583.684
141.118	157.51	108.985	13.285	59010
146.839	138.452	90.201	12.221	41499.194
135.633	125.653	95.186	13.982	54694.898
138.339	153.102	91.807	14.945	67704.661
130.308	98.103	92.171	11.474	42081.538
135.167	116.481	65.025	13.848	56756.389
125.842	119.316	88.756	15.276	65288.947
126.39	115.831	89.731	12.083	42022.013
138.814	125.254	108.33	12.027	49249.576
156.837	110.465	74.689	12.804	51183.837
136.881	130.69	100.084	13.627	53252.5
131.145	127.855	86.916	13.85	57379.636
124.481	122.852	92.984	16.404	78625
148.261	147.935	97.065	12.937	50567.609
112.625	130.333	79.393	14.588	57715
140.929	147.095	76.552	13.628	57393.214
166.898	159.051	85.397	15.133	70604.746
158.644	174.576	86.084	14.106	59289.661

Appendix – 3 (b) Result of 35 malignant breast images feature were shown here.

Appendix 3 (b) - malignant breast image (35)

Features (F1 to F16)

S.no.	Malignant dataset	F1 Count	F2 Total Area	F3 Average Size	F4 Area Fraction(%)	F5 Perimeter
1	ytma10_010704_m1.tif	35	9381	268.029	10.931	64.115
2	ytma10_010704_m2 .tif	42	12725	302.976	16.654	69.676
3	ytma10_010704_m3.tif	67	19664	293.493	20.891	71.131
4	ytma12_010804_m1.tif	27	12449	461.074	16.108	87.331
5	ytma12_010804_m2.TIF	21	8879	422.81	14.864	92.512
6	ytma12_010804_m3.TIF	28	6343	226.536	9.145	64.076
7	ytma23_022103_m1.TIF	24	10943	455.958	12.409	91.212
8	ytma23_022103_m2.TIF	27	8706	322.444	11.147	73.579
9	ytma23_022103_m3.TIF	38	10937	287.816	12.159	71.84
10	ytma49_042003_m1.TIF	32	10926	341.438	13.18	71.957
11	ytma49_042003_m2 .TIF	25	8040	321.6	12.214	75.091
12	ytma49_042003_m3 .TIF	30	9232	307.733	13.097	71.79
13	ytma49_042203_m1.TIF	29	9136	315.034	13.522	70.012
14	ytma49_042203_m2 .TIF	27	6089	225.519	11.437	62.115
15	ytma49_042203_m3.TIF	42	9483	225.786	13.934	59.06
16	ytma49_042403_m1.TIF	42	12037	286.595	12.414	72.458
17	ytma49_042403_m2.tif	40	11794	294.85	17.687	72.987
18	ytma49_042403_m3.TIF	33	12307	372.939	17.336	75.826
19	ytma49_072303_m1.TIF	34	11142	327.706	15.828	76.135
20	ytma49_072303_m2.TIF	40	12322	308.05	13.979	77.865
21	ytma49_111003_m1.TIF	31	16918	545.742	12.285	94.614
22	ytma49_111003_m2.TIF	50	10518	210.36	14.435	57.767
23	ytma49_111003_m3.TIF	32	6521	203.781	8.29	66.762
24	ytma49_111303_m1.TIF	55	14980	272.364	20.326	66.026
25	ytma49_111303_m2.TIF	33	14073	426.455	13.348	97.963
26	ytma49_111303_m3.TIF	19	5914	311.263	7.792	72.218
27	1ytma10 010704_m1.tif	48	28010	583.542	22.356	99.912
28	ytma10_010704_m2_.tif	30	9716	323.867	25.971	69.242
29	ytma12_010804_m1.tif	32	18418	575.562	19.489	100.198
30	ytma49_042203_m1_.tif	22	9718	441.727	21.321	83.388
31	ytma49_042203_m1_.tif	26	12751	490.423	23.131	88.012
32	ytma49_111303_m3_.tif	29	9566	329.862	24.036	69.29
33	ytma49_111303_m3_.tif	41	15273	372.512	19.779	74.454
34	ytma10_010704_m2.tif	22	8689	394.955	16.187	77.353
35	ytma49_111003_m2tif	30	15660	522	15.387	94.251

F6	F7	F8	F9	F10	F11	F12	F13
Major axis length	Minor axis length	Angle	Circularity	Solidity	Feret	FeretX	FeretY
22.566	14.307	88.298	0.77	0.894	24.094	148.371	152.314
24.254	15.705	83.022	0.76	0.903	25.972	127.31	134.905
24.421	15.154	78.512	0.733	0.879	26.274	130.194	154
29.532	18.911	98.597	0.705	0.882	31.709	128.444	138.333
30.81	17.03	71.832	0.651	0.852	33.342	130.619	109.81
24.055	11.313	81.426	0.676	0.859	25.887	142.179	113.964
31.896	17.853	72.132	0.683	0.889	34.776	124.75	137.333
26.195	14.263	103.444	0.68	0.872	28.284	127.481	121.63
24.449	14.637	64.084	0.701	0.865	26.697	138	157.263
25.001	16.689	97.139	0.793	0.904	26.542	121.531	141.125
25.72	15.872	97.211	0.709	0.878	28.037	119.68	121.76
25.31	15.064	101.411	0.724	0.883	26.917	142.767	106.733
24.371	15.192	93.495	0.762	0.886	25.758	121.138	119.414
22.124	12.983	75.968	0.738	0.878	23.854	100.63	103.481
20.521	13.698	78.408	0.797	0.9	22.093	108.214	127.262
26.4	13.463	73.555	0.686	0.882	28.543	152.929	160.381
26.395	13.922	123.765	0.677	0.873	28.226	127.6	101.925
26.33	17.178	109.641	0.763	0.896	28.041	114.758	124.061
26.953	15.171	104.368	0.712	0.886	28.82	127	101.676
27.411	14.069	75.696	0.648	0.854	29.985	137.2	178.6
35.267	18.128	90.816	0.648	0.891	37.245	181.935	169.677
19.985	12.216	105.386	0.75	0.872	21.517	126.98	136.72
24.269	10.464	45.02	0.596	0.841	26.517	112.188	143.531
23.292	14.338	94.526	0.749	0.89	25.048	128.964	127.982
36.675	14.688	107.905	0.588	0.855	39.226	152.303	176.545
25.286	15.301	91.449	0.725	0.891	27.246	150.053	127.316
35.601	20.875	103.241	0.734	0.895	37.322	178.667	171.75
23.362	17.57	91.368	0.84	0.914	24.553	97.1	95.233
34.572	20.888	100.875	0.719	0.887	37.115	149.438	151.844
29.44	18.813	79.07	0.78	0.915	31.164	99.045	110.045
30.501	19.834	69.826	0.775	0.906	32.142	121.385	114.885
23.315	17.693	90.193	0.85	0.92	24.732	103.103	109.586
25.587	18.367	76.728	0.84	0.918	26.973	140.585	151.537
26.424	18.887	97.885	0.82	0.919	28.116	127.136	101.136
31.004	21.316	83.167	0.739	0.882	33.289	155.8	150.633

F14	F15	F16
Feret Angle	Min Feret	Integrated Density
90.994	15.323	68347.286
90.044	16.805	77258.929
82.331	16.785	74840.597
93.785	20.403	117573.889
67.869	19.563	107816.429
75.119	12.75	57766.607
79.683	19.365	116269.375
92.745	15.642	82223.333
71.465	16.393	73393.026
99.505	17.764	87066.562
88.235	17.131	82008
101.035	16.531	78472
100.163	16.277	80333.793
71.438	13.96	57507.222
75.555	14.572	57575.357
73.153	14.714	73081.786
120.553	15.321	75186.75
92.928	18.224	95099.545
102.992	16.66	83565
78.362	15.811	78552.75
98.317	19.283	139164.194
107.047	13.481	53641.8
44.264	12.106	51964.219
93.308	15.577	69452.727
109.111	16.919	108745.909
102.454	16.6	79372.105
99.233	22.395	148803.125
83.759	18.441	82586
102.388	22.834	146768.438
76.205	20.189	112640.455
79.719	21.316	125057.885
84.485	18.412	84114.828
90.876	19.144	94990.61
93.828	19.984	100713.409
85.485	23.057	133110

Appendix - 4

70 x 16 attribute relation file format(.arff format) of total 70 breast histopathological images including 35 benign (No) and 35 malignant (yes) image.

40,8816,220.4,14.541,58.944,21.182,12.787,102.703,0.774,0.895,22.59,101.6,119.25,96.295,13.748,56202,No

42,9267,220.643,11.743,61.805,22.022,12.568,101.047,0.719,0.877,23.817,137.429,130.976,101.973,13.922,56263.929,No

62,14066,226.871,17.029,62.886,22.683,12.448,94.406,0.716,0.875,24.362,141.048,124.677,99.487,13.734,57852.097,No

62,12023,193.919,23.65,57.897,20.788,11.785,87.65,0.738,0.884,22.491,119.758,99.952,83.561,12.863,49449.435,No

60,9669,161.15,18.507,50.34,18.241,10.928,97.307,0.774,0.89,19.554,114.95,99.633,103.51,11.862,41093.25,No

36,7106,197.389,11.66,61.073,23.59,10.368,82.501,0.646,0.87,24.972,126.861,105.194,81.685,11.522,50334.167,No

32,6349,198.406,9.782,59.071,21.478,11.523,88.703,0.739,0.885,23.32,111.906,106.188,84.862,12.604,50593.594,No

45,9274,206.089,13.51,60.042,20.827,12.287,94.437,0.73,0.876,22.336,131.244,146.489,90.716,13.476,52552.667,No

51,10892,213.569,12.821,61.756,21.504,12.071,92.976,0.697,0.863,23.27,135.941,148.451,98.353,13.612,54460,No

72,10909,151.514,11.968,48.987,17.55,10.706,93.22,0.767,0.883,18.943,145.778,147.972,90.531,11.627,38636.042,No

34,7007,206.088,12.489,57.761,20.714,11.506,97.211,0.725,0.879,22.444,118.853,107.618,107.299,12.828,52552.5,No

63,10362,164.476,13.03,52.45,18.215,11.206,99.411,0.729,0.87,19.992,129.063,132.095,96.801,12.279,41941.429,No

84,12122,144.31,13.977,48.505,17.239,10.435,86.959,0.747,0.868,18.681,136.857,146.488,91.532,11.467,36798.929,No

55,11515,209.364,17.166,59.596,20.53,12.757,89.826,0.729,0.868,22.574,121.473,138.291,89.025,14.055,53387.727,No

41,6234,152.049,9.759,51.21,18.833,9.866,75.239,0.708,0.867,20.352,142.122,159.976,75.129,10.955,38772.439,No

36,11135,309.306,14.423,71.943,24.79,15.841,85.213,0.749,0.894,26.959,132.472,110.306,87.406,16.965,78872.917,No

38,7836,206.211,11.507,59.04,20.851,12.043,69.533,0.728,0.877,22.597,109.658,120.395,80.005,13.256,52583.684,No

51,11802,231.412,13.562,62.339,23.544,12.356,111.561,0.741,0.894,24.976,141.118,157.51,108.985,13.285,59010,No

62,10090,162.742,14.211,50.657,17.715,11.233,85.119,0.766,0.875,19.21,146.839,138.452,90.201,12.221,41499.194,No

49,10510,214.49,15.312,59.918,21.07,12.809,83.435,0.749,0.881,22.744,135.633,125.653,95.186,13.982,54694.898,No

59,15665,265.508,17.623,69.689,24.486,13.508,93.741,0.686,0.873,26.508,138.339,153.102,91.807,14.945,67704.661,No

39,6436,165.026,10.296,54.177,20.148,10.202,95.522,0.68,0.862,21.611,130.308,98.103,92.171,11.474,42081.538,No

54,12019,222.574,17.857,63.252,21.86,12.469,60.194,0.71,0.876,23.661,135.167,116.481,65.025,13.848,56756.389,No

57,14594,256.035,19.314,64.895,22.329,14.005,93.126,0.765,0.89,24.151,125.842,119.316,88.756,15.276,65288.947,No

77,12689,164.792,21.759,53.612,18.988,10.813,87.348,0.708,0.863,20.704,126.39,115.831,89.731,12.083,42022.013,No

59,11395,193.136,13.654,59.901,21.859,10.626,98.353,0.658,0.851,23.63,138.814,125.254,108.33,12.027,49249.576,No

43,8631,200.721,11.348,61.141,21.924,11.429,76.214,0.684,0.862,24.353,156.837,110.465,74.689,12.804,51183.837,No

42,8771,208.833,10.946,58.109,20.721,12.297,93.594,0.744,0.875,22.454,136.881,130.69,100.084,13.627,53252.5,No

55,12376,225.018,14.565,61.618,22.37,12.713,86.713,0.749,0.887,24.23,131.145,127.855,86.916,13.85,57379.636,No

27,8325,308.333,12.136,70.415,25.53,15.095,93.729,0.756,0.903,27.267,124.481,122.852,92.984,16.404,78625,No

92,18244,198.304,19.046,59.624,21.418,11.607,92.576,0.705,0.867,23.066,148.261,147.935,97.065,12.937,50567.609,No

24,5432,226.333,7.267,58.608,20.588,13.83,79.127,0.808,0.905,21.921,112.625,130.333,79.393,14.588,57715,No

42,9453,225.071,10.333,60.56,22.544,12.715,75.356,0.783,0.907,23.783,140.929,147.095,76.552,13.628,57393.214,No

59,16336,276.881,15.623,68.269,25.058,13.865,76.019,0.739,0.894,26.776,166.898,159.051,85.397,15.133,70604.746,No

59,13718,232.508,12.674,61.762,22.698,12.892,91.274,0.757,0.896,24.068,158.644,174.576,86.084,14.106,59289.661,No

35,9381,268.029,10.931,64.115,22.566,14.307,88.298,0.77,0.894,24.094,148.371,152.314,90.994,15.323,68347.286,Yes

42,12725,302.976,16.654,69.676,24.254,15.705,83.022,0.76,0.903,25.972,127.31,134.905,90.044,16.805,77258.929,Yes

67,19664,293.493,20.891,71.131,24.421,15.154,78.512,0.733,0.879,26.274,130.194,154,82.331,16.785,74840.597,Yes

27,12449,461.074,16.108,87.331,29.532,18.911,98.597,0.705,0.882,31.709,128.444,138.333,93.785,20.403,117573.889,Yes

21,8879,422.81,14.864,92.512,30.81,17.03,71.832,0.651,0.852,33.342,130.619,109.81,67.869,19.563,107816.429,Yes

28,6343,226.536,9.145,64.076,24.055,11.313,81.426,0.676,0.859,25.887,142.179,113.964,75.119,12.75,57766.607,Yes

24,10943,455.958,12.409,91.212,31.896,17.853,72.132,0.683,0.889,34.776,124.75,137.333,79.683,19.365,116269.375,Yes

27,8706,322.444,11.147,73.579,26.195,14.263,103.444,0.68,0.872,28.284,127.481,121.63,92.745,15.642,82223.333,Yes

38,10937,287.816,12.159,71.84,24.449,14.637,64.084,0.701,0.865,26.697,138,157.263,71.465,16.393,73393.026,Yes

32,10926,341.438,13.18,71.957,25.001,16.689,97.139,0.793,0.904,26.542,121.531,141.125,99.505,17.764,87066.562,Yes

25,8040,321.6,12.214,75.091,25.72,15.872,97.211,0.709,0.878,28.037,119.68,121.76,88.235,17.131,82008,Yes

30,9232,307.733,13.097,71.79,25.31,15.064,101.411,0.724,0.883,26.917,142.767,106.733,101.035,16.531,78472,Yes

29,9136,315.034,13.522,70.012,24.371,15.192,93.495,0.762,0.886,25.758,121.138,119.414,100.163,16.277,80333.793,Yes

27,6089,225.519,11.437,62.115,22.124,12.983,75.968,0.738,0.878,23.854,100.63,103.481,71.438,13.96,57507.222,Yes

42,9483,225.786,13.934,59.06,20.521,13.698,78.408,0.797,0.9,22.093,108.214,127.262,75.555,14.572,57575.357,Yes

42,12037,286.595,12.414,72.458,26.4,13.463,73.555,0.686,0.882,28.543,152.929,160.381,73.153,14.714,73081.786,Yes

40,11794,294.85,17.687,72.987,26.395,13.922,123.765,0.677,0.873,28.226,127.6,101.925,120.553,15.321,75186.75,Yes

33,12307,372.939,17.336,75.826,26.33,17.178,109.641,0.763,0.896,28.041,114.758,124.061,92.928,18.224,95099.545,Yes

34,11142,327.706,15.828,76.135,26.953,15.171,104.368,0.712,0.886,28.82,127,101.676,102.992,16.66,83565,Yes

40,12322,308.05,13.979,77.865,27.411,14.069,75.696,0.648,0.854,29.985,137.2,178.6,78.362,15.811,78552.75,Yes

31,16918,545.742,12.285,94.614,35.267,18.128,90.816,0.648,0.891,37.245,181.935,169.677,98.317,19.283,139164.194,Yes

50,10518,210.36,14.435,57.767,19.985,12.216,105.386,0.75,0.872,21.517,126.98,136.72,107.047,13.481,53641.8,Yes

32,6521,203.781,8.29,66.762,24.269,10.464,45.02,0.596,0.841,26.517,112.188,143.531,44.264,12.106,51964.219,Yes

55,14980,272.364,20.326,66.026,23.292,14.338,94.526,0.749,0.89,25.048,128.964,127.982,93.308,15.577,69452.727,Yes

33,14073,426.455,13.348,97.963,36.675,14.688,107.905,0.588,0.855,39.226,152.303,176.545,109.111,16.919,108745.909,Yes

19,5914,311.263,7.792,72.218,25.286,15.301,91.449,0.725,0.891,27.246,150.053,127.316,102.454,16.6,79372.105,Yes

48,28010,583.542,22.356,99.912,35.601,20.875,103.241,0.734,0.895,37.322,178.667,171.75,99.233,22.395,148803.125,Yes

30,9716,323.867,25.971,69.242,23.362,17.57,91.368,0.84,0.914,24.553,97.1,95.233,83.759,18.441,82586,Yes

32,18418,575.562,19.489,100.198,34.572,20.888,100.875,0.719,0.887,37.115,149.438,151.844,102.388,22.834,146768.438,Yes

22,9718,441.727,21.321,83.388,29.44,18.813,79.07,0.78,0.915,31.164,99.045,110.045,76.205,20.189,112640.455,Yes

26,12751,490.423,23.131,88.012,30.501,19.834,69.826,0.775,0.906,32.142,121.385,114.885,79.719,21.316,125057.885,Yes

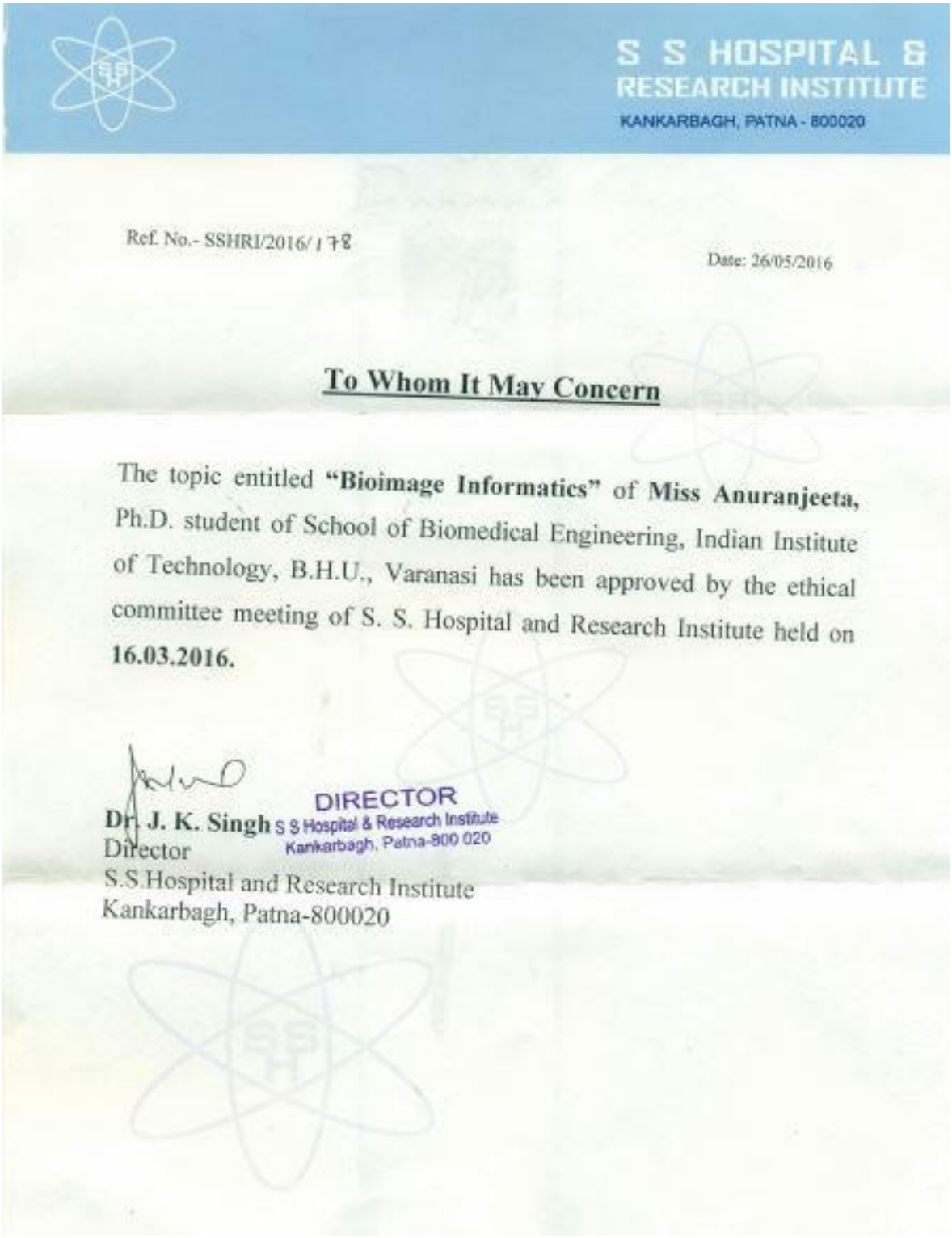
29,9566,329.862,24.036,69.29,23.315,17.693,90.193,0.85,0.92,24.732,103.103,109.586,84.485,18.412,84114.828,Yes

41,15273,372.512,19.779,74.454,25.587,18.367,76.728,0.84,0.918,26.973,140.585,151.537,90.876,19.144,94990.61,Yes

22,8689,394.955,16.187,77.353,26.424,18.887,97.885,0.82,0.919,28.116,127.136,101.136,93.828,19.984,100713.409,Yes

30,15660,522,15.387,94.251,31.004,21.316,83.167,0.739,0.882,33.289,155.8,150.633,85.485,23.057,133110,Yes

Appendix – 5 (a) Ethical clearance certificate



S S HOSPITAL & RESEARCH INSTITUTE
KANKARBAGH, PATNA - 800020

Ref. No.- SSHRI/2016/178

Date: 26/05/2016

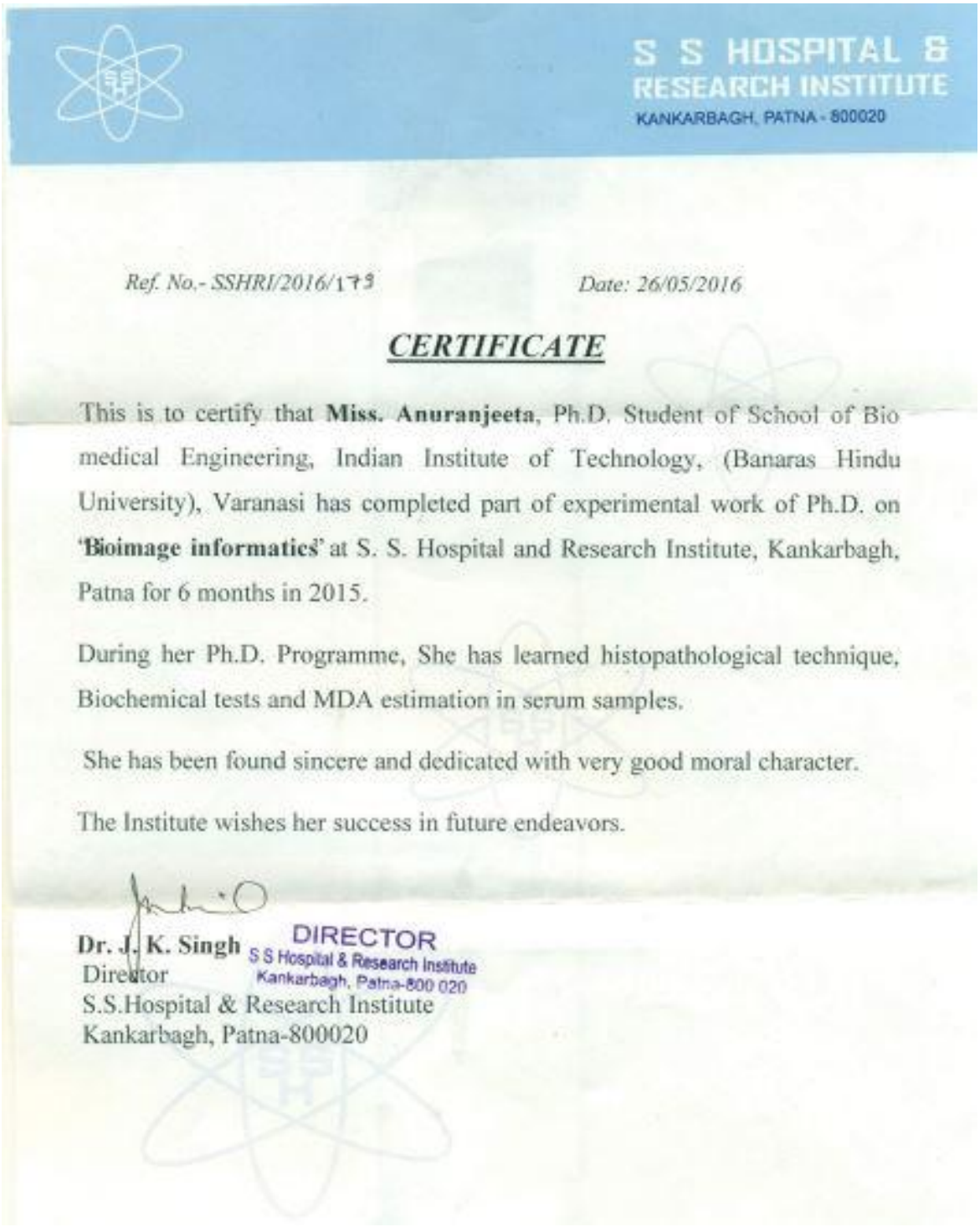
To Whom It May Concern

The topic entitled **"Bioimage Informatics"** of **Miss Anuranjeeta,** Ph.D. student of School of Biomedical Engineering, Indian Institute of Technology, B.H.U., Varanasi has been approved by the ethical committee meeting of S. S. Hospital and Research Institute held on **16.03.2016.**

DIRECTOR
S S Hospital & Research Institute
Kankarbagh, Patna-800 020

Dr. J. K. Singh
Director
S.S.Hospital and Research Institute
Kankarbagh, Patna-800020

Appendix – 5 (b) Certificate



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Ref. No.- SSHRI/2016/173 *Date: 26/05/2016*

CERTIFICATE

This is to certify that **Miss. Anuranjeeta**, Ph.D. Student of School of Bio medical Engineering, Indian Institute of Technology, (Banaras Hindu University), Varanasi has completed part of experimental work of Ph.D. on '**Bioimage informatics**' at S. S. Hospital and Research Institute, Kankarbagh, Patna for 6 months in 2015.

During her Ph.D. Programme, She has learned histopathological technique, Biochemical tests and MDA estimation in serum samples.

She has been found sincere and dedicated with very good moral character.

The Institute wishes her success in future endeavors.

Dr. J. K. Singh
Director
S.S.Hospital & Research Institute
Kankarbagh, Patna-800020

DIRECTOR
S S Hospital & Research Institute
Kankarbagh, Patna-800 020

Research Publication

1. **Anuranjeeta.,** Saxena S., Shukla K.K. and Sharma S., **Cellular Image Segmentation using Morphological Operators and Extraction of Features for Quantitative Measurement.** ***Biosciences Biotechnology Research Asia.,*** **vol. 13(2)**, pp1101-1112, **(2016). Published** (**Scopus Index-Journal**)

2. **Anuranjeeta.,** Tiwari A ., Shukla K.K., Sharma N and Sharma S., **Classification of Histopathology Images of Cancerous and Non-cancerous Tissues based on Morphological Features"** ***Biomedical and Pharmacology*****., Vol. 10 (1),** pp-353-366 **(2017). (Published)** (**Scopus Index-Journal**)

3. **Anuranjeeta.,** Anshu A K., Shukla K.K. and Sharma S., **"Evaluation of Morphological Changes in Histopathological Images of Ovarian and Breast Cancer Tissues and its Correlation with their Biochemical Parameters"** ***Research Journal of Biotechnology*****., Vol. 12 (4),** pp 30-38 **(2017). Published** (**SCI Index-Journal**)

4. **Anuranjeeta.,** Bhattacharjee R., Shukla K.K., and Sharma S.,**"Classification and Quantitative Analysis of Histopathology Cellular Image of Breast Cancer" International Journal of Biomedical Engineering and Technology (IJBET) [accepted in march 2018]**

5. **Anuranjeeta.,** Singh M ., Shukla K.K., Sharma N and Sharma S., **"Enhancement and Segmentation of Histopathology Images of Cancer Using Dynamic Stochastic Resonance" International Journal of Medical Engineering and Informatics (IJMEI) [under review]**

Conferences and Workshop

1. Presented a poster entitled "**Correlation between histopathological status and MDA of Ovarian cancer patients"** at the Global Cancer Summit International Collaborative Conference on '**Frontiers in Oncology: Genetics, Diagnostics and Therapeutics'** held during 18th - 20th November, 2015 at the J.N.Tata Auditorium, Indian Institute of Science, Bengaluru, India.
2. Presented a poster entitled **"Interdependence of histopathological status and MDA of Breast cancer patients"** at **International Conference on 'Reproductive Health with Emphasis on Occupational, Environmental and Lifestyle Factors'** held from 18th - 20th february, 2016 at the NIOH, Ahmedabad-380016.
3. Presented a poster entitled **"Comparative Assessment of Morphological Changes in Tissues and Biochemical Parameters Associated with Ovarian Cancer'** held from 23th - 25th January, 2017 at the AIIMS, New Delhi-380016.
4. Presented a paper entitled "**Sequence analysis of the human mitochondrial genome"** at the National Conference on "**Mathematical Modeling and Computer Simulation"** held during March 23-25, 2012 at the Department of Applied Mathematics, Institute of Technology, Banaras Hindu University,Varanasi-221005.
5. Presented a poster entitled **"Classification of histopathology images of cancerous cells based on morphological features'** held from 25th - 26th February, 2017 during Institute Day, at the Indian Institute of Technology, Banaras Hindu University,Varanasi-221005.
6. Presented a poster entitled **"Interdependence of histopathological status and malondialdehyde in Breast cancer patients'** held from 2nd – 3rd april, 2016 during Institute Day, at the Indian Institute of Technology, Banaras Hindu University,Varanasi-221005.

7. Abstract selected on entitled "**Sequence Analysis of the Agrobacterium *Vitis* S4 Plasmid Genome"** at the **National Seminar on 'Intelligent Computing in Biological Sciences' ICIBS 2012** held on the 19th and 20th March 2012 organized by the Department of Biotechnology & Bioinformatics, Padmashree Dr.D.Y.Patil University CBD Belapur, Navi Mumbai 400614.

8. Participated at the National Workshop on '**Computational Biology'2012** held from 21th to 25th March 2012 organized by the Department of Biotechnology & Bioinformatics, Padmashree Dr. D. Y. Patil University CBD Belapur, Navi Mumbai 400614.

9. Participated at the Workshop on IInd School on Signal, Image, Speech and Language Processing workshop held on July 21- Aug 01, 2014 organised by DST-Centre for Interdisciplinary Mathematical Sciences (CIMS) BHU, Varanasi.

10. Participated at the Workshop on Hand on Training Program on 'MATLAB' held on Dec 09 -14, 2013 organised by DST-Centre for Interdisciplinary Mathematical Sciences (CIMS) BHU, Varanasi.