

**Liver and Bladder Cancer detection accuracy. Comparing PCA and ICA**  
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Number of modes used	Algorithm 1				Algorithm 2				Algorithm 3			
	PCA accuracy		ICA accuracy		PCA accuracy		ICA accuracy		PCA accuracy		ICA accuracy	
	Tumor	Normal	Tumor	Normal	Tumor	Normal	Tumor	Normal	Tumor	Normal	Tumor	Normal
1	69.39	99.92	68.79	91	81.54	100	84.10	97.80	81.01	99.92	90.20	90.68
2	80.94	99.50	71.21	95.43	80.56	99.62	83.02	95.71	85.16	99.50	91.80	94.30
3	81.39	99.67	78.05	97.01	83.08	99.12	81.27	96.03	86.50	99.37	91.68	96.40
4	81.21	99.61	77.21	96.47	84	99.28	80.15	96.32	87.08	99.43	91.87	96.02
5	81.36	99.67	77.10	96.50	83.74	99.25	79.95	95.93	86.95	99.51	91.80	95.93
6	81.60	99.70	77.23	96.45	83.82	99.28	80.08	95.99	87.06	99.54	91.83	95.86

Table 1: **LIVER data.** 100 random trial runs averaged results. 75% of population used to generate dominant mode. Modes accumulative. No sign check for ICA modes made

**Conclusion:** When the prediction of a test is that the tissue is normal, then this prediction is more likely to be correct if PCA is used with algorithm 2 and with one mode, rather than ICA. In other words, PCA is more accurate in the detection of normal tissue than ICA.

When the prediction of a test is that the tissue is cancerous, then this prediction is more likely to be correct if ICA is used with algorithm 3 rather than PCA with any of the three algorithms. In other words, ICA, in conjunction with algorithm 3 is clearly more accurate in the detection of cancerous samples than PCA is.

Therefore, for most accuracy, one can utilize both methods as follows: Apply PCA with algorithm 2 with one mode on the sample. If the result of the test is that the tissue is normal, then stop. The sample is almost certain to be normal. But if the result of the test is that the tissue is cancerous, then run the test again on the same tissue but now using ICA with algorithm 3. This will confirm the result since ICA with algorithm 3 is more accurate in detection of tumor.

Number of modes used	Algorithm 1				Algorithm 2				Algorithm 3			
	PCA accuracy		ICA accuracy		PCA accuracy		ICA accuracy		PCA accuracy		ICA accuracy	
	Tumor	Normal	Tumor	Normal	Tumor	Normal	Tumor	Normal	Tumor	Normal	Tumor	Normal
1	69.39	99.92	64.77	81.68	81.54	100	84.68	97.99	81.01	99.92	93.01	80.80
2	80.94	99.50	67.21	98.20	80.56	99.62	82.87	96.58	85.16	99.50	90.62	97.16
3	81.39	99.67	66.75	98.30	83.08	99.12	83.34	98.25	86.50	99.37	89.98	98.08
4	81.21	99.61	69.24	99.37	84	99.28	83.54	98.58	87.08	99.43	89.77	99.27
5	81.36	99.67	69.50	99.36	83.74	99.25	83.32	98.84	86.95	99.51	89.79	99.27
6	81.60	99.70	69.67	99.38	83.82	99.28	83.16	98.88	87.06	99.54	89.83	99.30

Table 2: **LIVER data.** 100 random trial runs averaged results. 75% of population used to generate dominant mode. Modes accumulative. Sign check and adjustment for ICA modes is made

Number of modes used	Algorithm 1				Algorithm 2				Algorithm 3			
	PCA accuracy		ICA accuracy		PCA accuracy		ICA accuracy		PCA accuracy		ICA accuracy	
	Tumor	Normal	Tumor	Normal	Tumor	Normal	Tumor	Normal	Tumor	Normal	Tumor	Normal
1	57.10	99.86	68.91	99.91	80.11	100	67.95	70.09	82.07	99.86	86.63	99.36
2	60.58	99.77	66.69	98.32	78.88	100	77.24	97.50	81.53	99.77	84.18	98.05
3	61.17	99.86	63.52	98.27	78.53	100	79.99	99	81.21	99.86	84.61	98.17
4	62.35	99.95	63.50	98.32	78.41	100	80.29	99	80.92	99.95	83.60	98.17
5	62.98	99.95	63.76	98.36	78.41	100	80.08	98.95	81.03	99.95	83.91	98.26
6	62.88	99.95	63.85	98.36	78.34	100	79.87	98.95	80.88	99.95	83.60	98.26

Table 3: **Bladder data.** 100 random trial runs averaged results. 75% of population used to generate dominant mode. Modes accumulative. No sign check for ICA modes is made

**Conclusion:** Tests on bladder cancer data confirms the results observed in the Liver data. ICA is more accurate in detection of tumor when using the third algorithm than PCA.

Both bladder and liver tests show that one dominant mode is sufficient. The only improvement in accuracy with the use of more modes is seen in algorithm 1. But in algorithm 2 and 3, no such improvement is seen.