

Subpop Analysis log

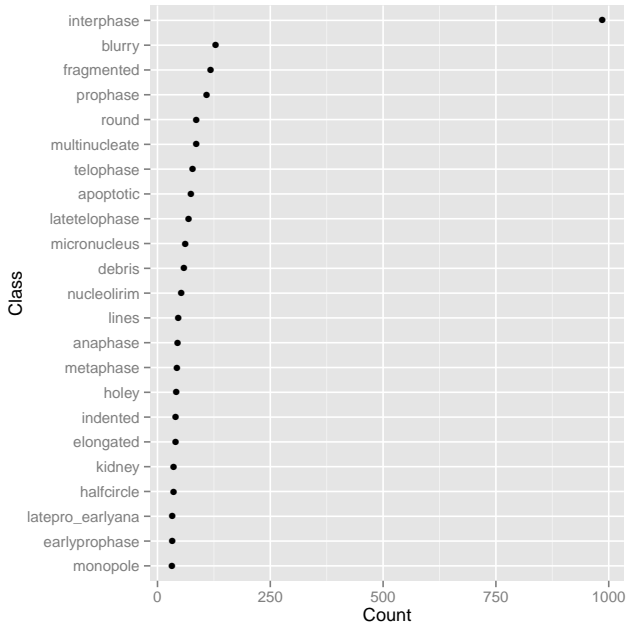
Updated Apr 17, 2014

Apr 17, 2015

Summary

- ▶ We tested classification accuracy using Naive Bayes with and without interphase.
- ▶ Conclusion: At least with Naive Bayes, it doesn't seem to make much of a difference.

Counts



d2255b5a_with_interphase

Classifier = nb.

Predicted	anaphase	apoptotic	blurry	debris	earlyprophase	elongated	fragmented	halfcircle	holey	indented	interphase	kidney	latepro_earlyana	latetelophase	lines	metaphase	micronucleus	monopole	multinucleate	nucleolirim	prophase	round	telophase
anaphase	29	5																					71
apoptotic			4		12			3	14	10	17						11				13	6	76
blurry		1	19	3	6	6		2	2	3				5	2	38	1	2	65	7			
debris				12			14	10	24							13	3	3	45		3		
earlyprophase			5		10	21	3	5	15	3	8					10		62	4		2		
elongated		1		9	2			2	1							53			10	1			
fragmented								2	2								10	2					
halfcircle		4	2														86						3
holey																		93					
indented	7	14	3		2		8			2	6	3	70										10
interphase	11	4	2	2	8	6	3			2	6	79					6				2		3
kidney			9	2	3	2	7	8		2	2	31	6				2	1	2	2			1
latepro_earlyana			2	2	12	2		11	7	20	17						16	3	4	2	6		
latetelophase						5		5	12	2							8	7	2		1		
lines			2	3	15	2	4	8	40	10	11						16	5	11		3		
metaphase			6		3	8		33		5	17	9					3	2	4				
micronucleus		1	2	7	12		31		10	2	3	6	6	2		3		6	6	2			
monopole			2	2		65	4	11		8	3	11				6		2					
multinucleate				18		4	3	2		2	6								8	4			
nucleolirim				66		2	2						2										
prophase		4	39	2		5	3		2	1	8	3	2	2				5	2				
round	2	58	2	10								3	6										4
telophase	51	7	2	2								6	6	5									

Actual

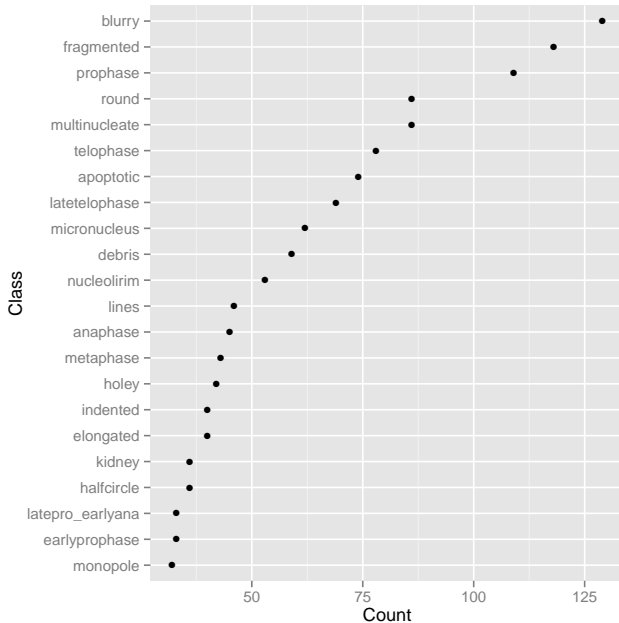
23be6f06_without_interphase

Classifier = nb.

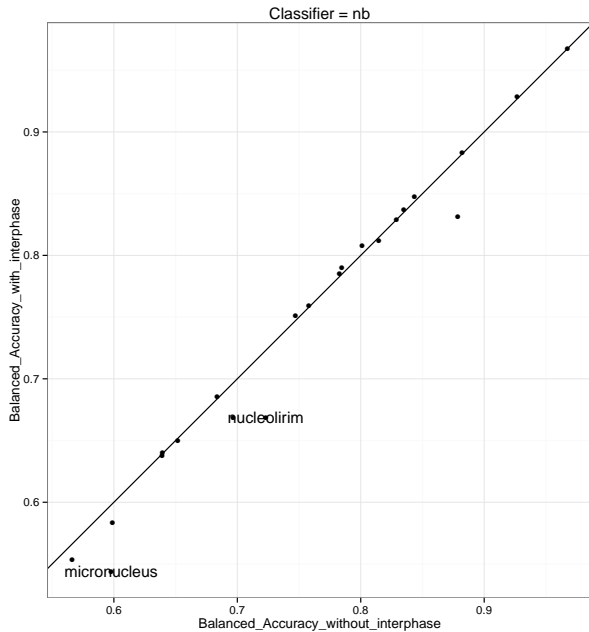
Predicted \ Actual	anaphase	apoptotic	blurry	debris	earlyprophase	elongated	fragmented	halfcircle	holey	indented	kidney	latepro_earlyana	latetelophase	lines	metaphase	micronucleus	monopole	multinucleate	nucleolirim	prophase	round	telophase
anaphase	51	7	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
apoptotic	2	58	2	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
blurry	4	39	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
debris	1	1	1	66	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
earlyprophase	1	1	1	21	4	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
elongated	1	1	1	65	4	14	8	11	1	1	1	1	1	1	1	1	1	1	1	1	1	1
fragmented	1	2	2	1	4	3	2	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
halfcircle	1	1	1	1	4	3	2	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
holey	1	1	1	1	4	3	2	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
indented	1	1	1	1	4	3	2	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
kidney	1	1	1	1	4	3	2	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
latepro_earlyana	11	4	2	2	8	6	3	1	6	79	1	1	1	1	1	1	1	1	1	1	1	1
latetelophase	7	14	1	3	2	8	1	6	3	70	1	1	1	1	1	1	1	1	1	1	1	1
lines	1	1	1	1	1	1	1	1	1	1	1	1	1	93	1	1	1	1	1	1	1	1
metaphase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	86	1	1	1	1	1	1	1
micronucleus	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21	3	1	1	1	1	1
monopole	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	53	1	1	1	1	1
multinucleate	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	62	4	1	1	1
nucleolirim	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	47	3
prophase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	65	7
round	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	71
telophase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Actual

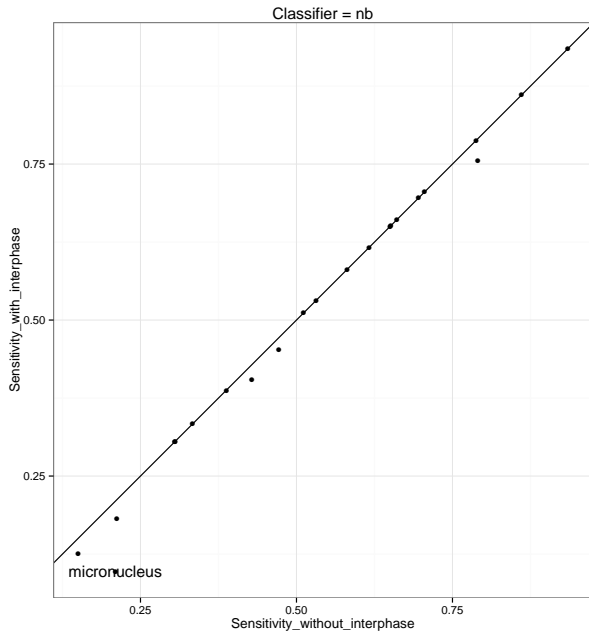
Counts (without interphase)



30aece85_comparison



30aece85_comparison



Jul 17, 2013

Summary

- ▶ Do leave-group-out (lgocv) and leave-one-out (loocv) analysis
- ▶ Only Naive-Bayes (nb) for now
- ▶ Look at confusion matrix as well as sensitivity / specificity to evaluate performance

nb: loocv

Classifier = nb.

Predicted	Actual																			
	anaphase	apoptotic	blurry	debris	earlyprophase	elongated	fragmented	halfcircle	holey	indented	interphase	kidney	latepro_earlyana	latetelophase	lines	metaphase	micronucleus	monopole	multinucleate	nucleolirm
telophase	29	5											7	2						71
round			4	12		3	14	10	17					11				13	6	76
prophase		1	19	3		6	6	2	2	3			5	2	38	1	2	65	7	
nucleolirm				12			14	10	24						13	3	3	45		3
multinucleate			5		10	21	3	5	15	3	8				10		62	4		2
monopole		1		9	2			2	1								53		10	1
micronucleus								2	2							10	2			
metaphase		4	2													86				3
lines															93					
latetelophase	7	14		3	2		8				2	6	3	70						10
latepro_earlyana	11	4	2	2	8	6	3			2	6	79				6			2	3
kidney			9	2	3	2	7	8		2	2	31	6			2		1	2	1
interphase			2	2	12	2		11	7	20	17					16		3	4	6
indented							5		5	12	2					8		7	2	1
holey			2	3	15	2	4	8	40	10	11					16		5	11	3
halfcircle			6		3	8		33			5	17		9		3		2	4	
fragmented		1	2	7	12		31		10	2	3	6	6	2		3		6	6	2
elongated			2	2		65	4	11		8	3	11				6		2		
earlyprophase					18		4	3	2		2	6							8	4
debris				66			2		2							2				
blurry		4	39	2			5	3		2	1	8		3	2	2		5		2
apoptotic	2	58	2	10									3	6					3	4
anaphase	51	7	2	2									3	6		5				9

Actual

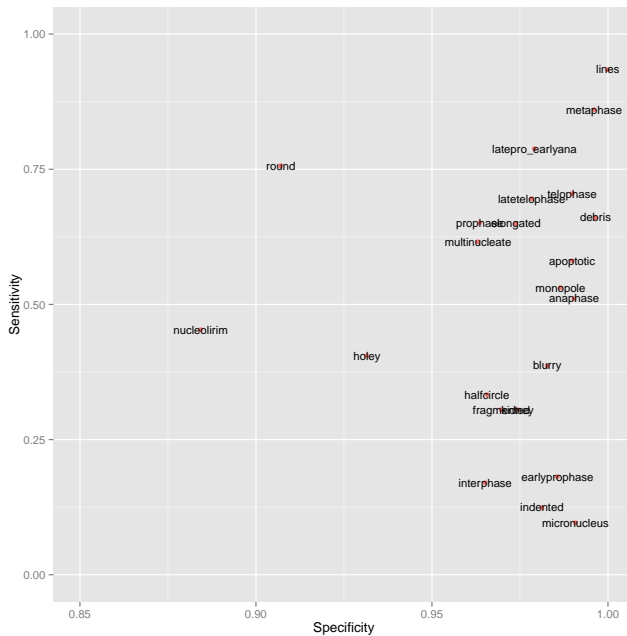
nb: Igocv

Classifier = nb.

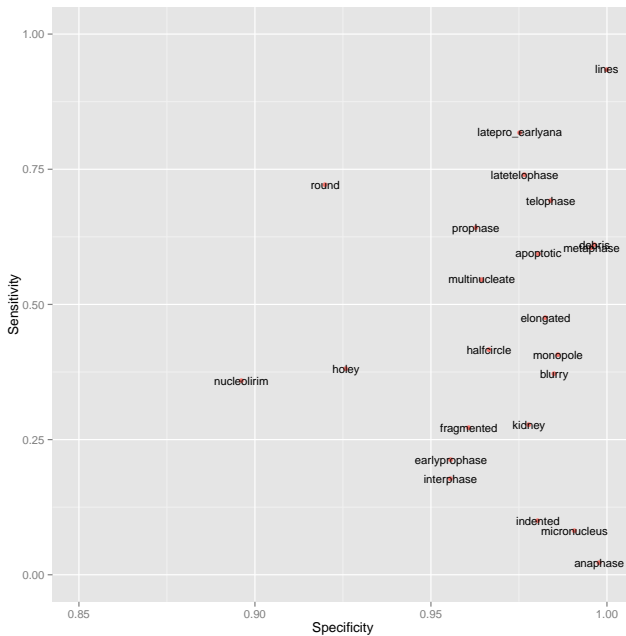
Predicted	Actual																						
	anaphase	apoptotic	blurry	debris	earlyprophase	elongated	fragmented	halfcircle	holey	indented	interphase	kidney	latepro_earlyana	latetelophase	lines	metaphase	micronucleus	monopole	multinucleate	nucleolirim	prophase	round	telophase
anaphase	2	4																					3
apoptotic	13	59	3	8										3	9		16				5		10
blurry		4	37	2		5	3			1	8		1	2	2				5				
debris				61		2	2								2								
earlyprophase					21	3	3	7	5	7	6						8		1	11	4	1	
elongated																							
fragmented		1	3	7	12	5	27		10	10	4	11	6	2		5		10	6	3			
halfcircle																							
holey																							
indented																							
interphase																							
kidney																							
latepro_earlyana	18	5	2	7	3	8	7	3		2	6	82						3		2	3		4
latetelophase	9	15	2	3		2		6			2	6	3	74	2								12
lines															93								
metaphase	2	5	2													60							1
micronucleus																8			2	2			
monopole		1															41				10	2	
multinucleate																							
nucleolirim																							
prophase																							
round																							
telophase	56	3		5											6	5							69
round																							
prophase																							
nucleolirim																							
multinucleate																							
monopole																							
micronucleus																							
metaphase																							
lines																							
latetelophase																							
latepro_earlyana																							
kidney																							
interphase																							
indented																							
holey																							
halfcircle																							
fragmented																							
elongated																							
earlyprophase																							
debris																							
blurry																							
apoptotic																							
anaphase																							

Actual

nb: loocv



nb: lgocv

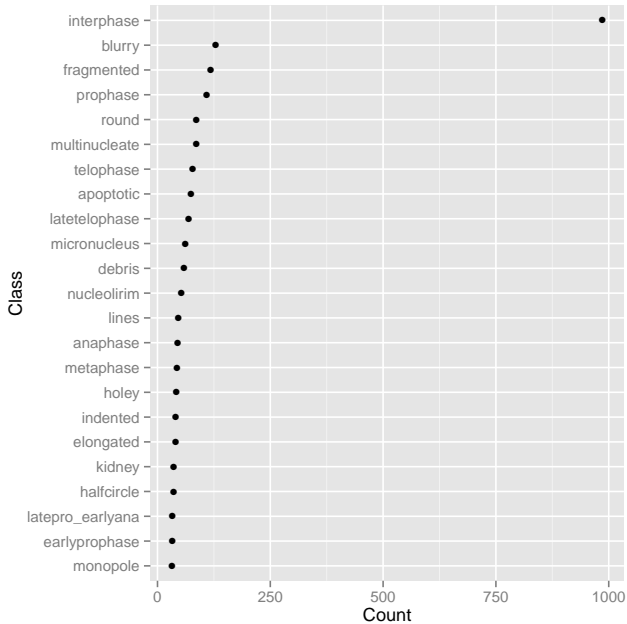


Jul 15, 2013

Summary

- ▶ 5-fold cross validation, 3 repetitions, across different classifiers

Summary



knn: confusion matrix

Classifier = knn.

Predicted \ Actual	anaphase	apoptotic	blurry	debris	earlyprophase	elongated	fragmented	halfcircle	holey	indented	interphase	latepro_earlyana	latetelophase	lines	metaphase	micronucleus	monopole	multinucleate	nucleolirim	prophase	round	telophase
telophase	46	17	3	5									11	16								74
round			2							1										3	18	
prophase		5	13	6	2						4		4	1	34				58	4		
nucleolirim																						
multinucleate			3			8	2	3			1							18				
monopole				6													22			4		
micronucleus												1				1						
metaphase	5	4											1	60						2		
lines														99								
latetelophase	9	14	1	3			6				5	3	59	5								12
latepro_earlyana	4					1					4	43					3					
kidney			2								9	3										
interphase		5	42	22	80	80	64	81	93	92	96	60	32	20	4	94	38	68	97	25	78	
indented																		1				
holey									2							1						
halfcircle							6						1									
fragmented			3	5		18	2	2		6	3							8	1			
elongated						17										2		1				
earlyprophase					8	2					2					2						
debris				60																		
blurry			28		2	1	4	2		12	2	1	2		2			3	1	3		
apoptotic		43	2	3									3				1			2		1
anaphase	34	9	2								2	5	2	8								11

Actual

knn: confusion matrix (remove interphase)

		Classifier = knn.																					
Predicted	telophase	47	19	3	6								11	16						75			
	round			6	2	13			3	26	18				17	12		16	5	83			
	prophase			6	16		10		5	6			4		5	3	53	1	1	73	5		
	nucleolirim				1		20		2		24	22	2			13	1	2	40		4		
	multinucleate				3		2		21	4	5	16	6	1			6		52	3			
	monopole						7		1					1				25		6			
	micronucleus				1		6	7	6	8	22	15	4				24	1	6	9	2		
	metaphase	3	5	1													65				2		
	lines																100						
	latetelophase	8	14	2	7		3		15			11	5	75		5			1		1	12	
	latepro_earlyana	4					2	2					3	57				3					
	kidney				2		3	6	3	4			19	5				2	1	2	1		
	indented				1		1	3	1		2	12						6		4	6	2	1
	holey						4	3		2	5	10						5			9		
	halfcircle	2			2	2	1	13	1	23		3	12	1	2			4		1			
	fragmented					6	10	7	2	36		6	5	17	9			7		17	2	3	2
	elongated				3				57	2	11	2	5	5				2	6		3	4	
	earlyprophase				1		23			5	6	2		2	5				3	3	2	7	
	debris						63			1													
blurry			2	49	1	3	6	7	14		2	19	4	1			3		7	1	3	5	
apoptotic				41		4							1	5								2	
anaphase	35	10						1	2				7	3		5						9	

Actual

knn: summary

	k	Accuracy	Kappa	AccuracySD	KappaSD
1	5	0.59	0.43	0.02	0.02
2	7	0.59	0.43	0.02	0.03
3	9	0.60	0.43	0.02	0.03

knn: summary (remove interphase)

	k	Accuracy	Kappa	AccuracySD	KappaSD
1	5	0.49	0.46	0.02	0.02
2	7	0.50	0.47	0.02	0.02
3	9	0.51	0.48	0.02	0.02

Ida: confusion matrix

telophase	34	17	2	5								6							59		
round			2	4				4	3	5				3			3		60		
prophase		3	8	5	6	3					3		12	2	31			70	1		
nucleolirim				1												5					
multinucleate			2		3	13	2	12		3						55	4				
monopole			3	3	1		2							59			8				
micronucleus					2									8							
metaphase		3	1							3	1		62					3	2		
lines				1									96								
latetelophase	4	13		7	3	6					3	72		6	1			2	11		
latepro_earlyana	4	3	1	3		5					6	66			3						
kidney						5	6				38										
interphase		3	17	2	32	21	8	39	67	62	84	19	1	3	1		67	15	79	1	36
indented			2								5	2				2		5			
holey					3			4	17		1					5		3			
halfcircle	4		3		1	6		36			1	13				3	2				
fragmented			3	5	7	2	43		2	5		9	18	1	1		1	3	14	4	1
elongated			1	2		61	2	3		7	1	8				5		4	1		
earlyprophase				3	43		6	3	7				4				3		4	2	
debris				67																	
blurry		3	50			2	5			2			2	3		1		3	3	1	2
apoptotic	4	41	1	5								3	11		6				4		11
anaphase	48	14	1												13						15

Actual

Ida: confusion matrix (remove interphase)

Classifier = Ida.																								
Predicted	telophase	34	13	2	5									4								62		
	round			2		9				17	5					6				11		81		
	prophase			4	9		9		7	4				3			5	2	29		72	2		
	nucleolirim						10			5	13	12					12		3	45		4		
	multinucleate				1		2	4	13		5	13	6				3		62	5				
	monopole				1		2		1			2							61		7			
	micronucleus				5		3	8	3	5	10	24	2				34		2	12		3		
	metaphase			3	1									3		1		74				2		
	lines					2												96						
	latetelophase	4	13	1	6		5		6				4	5	77		5					2	12	
	latepro_earlyana	6	3	1	3			5					6	66					3	1				
	kidney			1	1			2	4	10		4	37	1						1				
	indented				2		1		1	2	9	12	2					13		8	4		1	
	holey						5				7	37	8					10			14		4	
	halfcircle	4		3		2	6			46		3	20		2			4		2	3		1	
	fragmented				4	6	8			46		4	5	10	15		3		5	3	12		5	1
	elongated				3			70	2	4		5	7					8		5	2			
	earlyprophase					3	48		5	3	6			1					3		3	2		
	debris			1			69			2														
	blurry			4	59				2	6	8		5	3	3	3				3		3	1	2
	apoptotic	5	51	2	5									5	10		3	1				5		8
	anaphase	47	7	1										1	1		12							14
		anaphase	apoptotic	blurry	debris	earlyprophase	elongated	fragmented	halfcircle	holey	indented	kidney	latepro_earlyana	latetelophase	lines	metaphase	micronucleus	monopole	multinucleate	nucleolirim	prophase	round	telophase	

Actual

Ida: summary

	parameter	Accuracy	Kappa	AccuracySD	KappaSD
1	none	0.64	0.55	0.02	0.02

Ida: summary (remove interphase)

	parameter	Accuracy	Kappa	AccuracySD	KappaSD
1	none	0.59	0.56	0.02	0.03

rf: confusion matrix

Classifier = rf.

Predicted \ Actual	anaphase	apoptotic	blurry	debris	earlyprophase	elongated	fragmented	halfcircle	holey	indented	interphase	kidney	latepro_earlyana	latetelophase	lines	metaphase	micronucleus	monopole	multinucleate	nucleolirim	prophase	round	telophase
telophase	41	10												9	2								69
round			1						2	2											4		26
prophase		1	12	8		7	6				2				5	3	55			1	80	2	
nucleolirim																				8			
multinucleate			2			11	3	12											50	2			
monopole				6														25					
micronucleus																	4						
metaphase	1	4	2				1				6					90					2		3
lines															96								
latetelophase	5	5	1	1	1	2		8					2	60									8
latepro_earlyana	7	3	1	2	1		4					3	70					3					2
kidney								2				4											
interphase			24	2	54	66	16	71	88	80	93	45	6	9			85	6	24	82	6	71	
indented																							
holey					1				2														
halfcircle								6															
fragmented			3	6	13	2	51		5	2		19	9				3	1	20	2	5		
elongated						26						3					3						
earlyprophase					16																		
debris		3		80			3									3							
blurry		2	50			2	5	6		2		18	3	7				6	5		5		1
apoptotic		64		8									6	14				3					5
anaphase	44	6	1	2									4			2							12

Actual

rf: confusion matrix (remove interphase)

Classifier = rf.																							
Predicted	telophase	43	12	1											8		2						70
	round			3	12				17	7							8	4		11	4	83	
	prophase			12	12	8	6		3	4	1				4	4	59		2	79	3		
	nucleolirim				10			13	3							8			52			5	
	multinucleate			2			12	6	22	6							9		59	2		1	
	monopole				5													21					
	micronucleus			2	15	5	2	15	23	37	6						40		6	14		2	
	metaphase	2	2	2							3						91					2	3
	lines																96						
	latetelophase	6	5	1	1		5		9		6	1	66			2	2						9
	latepro_earlyana	4	3	2	3		5				2	72					1	2					
	kidney							4			9												
	indented								7	7								5			3		
	holey					7			5	13	3				1		6		1	3			
	halfcircle					1	8		22	2		14		1			1		2	2		2	
	fragmented			4	6	22	3	54		9	4	20	14	1			3	2	21	9	5		
	elongated			2		72	3	20	2	6	10						9		1	1			
	earlyprophase					15			2	3								1			2	1	
	debris		3		80			3	5							2							
	blurry		4	66			5	9	14		6	20	2	8			2	6	8		5	3	1
	apoptotic		64		7			1	3				5	13				5					4
	anaphase	43	5		2								5										12

Actual

rf: summary

	mtry	Accuracy	Kappa	AccuracySD	KappaSD
1	2.00	0.64	0.50	0.01	0.02
2	49.00	0.66	0.55	0.02	0.02
3	97.00	0.66	0.54	0.02	0.02

rf: summary (remove interphase)

	mtry	Accuracy	Kappa	AccuracySD	KappaSD
1	2.00	0.58	0.55	0.03	0.03
2	49.00	0.58	0.56	0.02	0.03
3	97.00	0.58	0.56	0.03	0.03

nb: confusion matrix

Classifier = nb.

Predicted \ Actual	anaphase	apoptotic	blurry	debris	earlyprophase	elongated	fragmented	halfcircle	holey	indented	interphase	kidney	latepro_earlyana	latetelophase	lines	metaphase	micronucleus	monopole	multinucleate	nucleolir	prophase	round	telophase
anaphase	27	5		2												9	4						73
apoptotic			2		12				13	7	14						6	3		12	4		75
blurry		1	18		2		6	6		2	2						5	2	42	1	2	69	5
debris					8				11	2	13						5			38			3
earlyprophase			2		2	2	22	4	5	23	3	6	3				7		59	4			1
elongated					7		1			3								43			7	2	
fragmented					5	4	2		2	2	1						10		5	3	1		
halfcircle			5	2													83						2
holey			1													96							
indented	4	11	1	2		3		7				2	6		68							1	6
interphase	12			3		3	8					2	6	85				2	4				3
kidney			7		5	7	5	5				2	27	2					2	2		2	
latepro_earlyana			4		20	7	2	19	25	38	39	7					38	3	6	23	3	9	
latetelophase							3		4	9	2						6		5	3			
lines			2	3	3		1	5	25	7	6							7		1	6		2
metaphase			3		1	9	1	41			5	14		6			4		3	4	2		
micronucleus		1	2	6	6	3	36		10		4	10	4		2		5		10	4	3		
monopole			2			57	2	7		6	2	6					5		2				
multinucleate					28		3	3	2		1						2	3		2	2		
nucleolir				75			2		2							2							
prophase		2	48	1		2	6	4			2	19	1	2		2			5		3	2	1
round		60	1	7									5	8							2		4
telophase	56	11	2	2										6		5							12

Actual

nb: confusion matrix (remove interphase)

Classifier = nb.

telophase	24	5		3							9	4					71
round			2	12		2	17	8				10	2		13	5	79
prophase		1	18	1	5	6		3				5	3	43	1	3	69
nucleolir				10			17	11				9	3	2	50		2
multinucleate			2	3	5	22	3	5	20	8	3		7		55	3	2
monopole				8		1		3					43			7	3
micronucleus					7	8	2	8	10	20	2			28		4	6
metaphase			5	2									81				2
lines													95				
latetelophase	5	9		1	3	7			6		68						7
latepro_earlyana	13			2	1	2	8			4	85			2	3		2
kidney			7		1	10	5	6		35				3	2	3	
indented			2			2	3		6	14				11	8	4	2
holey			1	2	7		2	6	29	7				12	3	6	2
halfcircle			4			5	1	44		3	16		5	5	4	5	2
fragmented		1	3	6	5	4	36		10	2	6	6		1	5	13	5
elongated			2			59	2	10		8	6			7	1		
earlyprophase					44		3	4	3	2	3			3	2	5	2
debris		2		76			2	3				4					
blurry		2	49				6	3		15	1	3	2		1	5	3
apoptotic		61	1	6							4	10					2
anaphase	57	12	2	2							1	5	6				13

Actual

nb: summary

	fL	usekernel	Accuracy	Kappa	AccuracySD	KappaSD
1	0.00	FALSE	0.38	0.34	0.02	0.02
2	0.00	FALSE	0.48	0.41	0.02	0.02

nb: summary (remove interphase)

	fL	usekernel	Accuracy	Kappa	AccuracySD	KappaSD
1	0.00	FALSE	0.54	0.51	0.03	0.03
2	0.00	FALSE	0.57	0.54	0.03	0.03