Problem 1.A.)

- 1. Training a KNN classifier does take less computation time than testing. This is because KNN algorithms do more computation on test time instead of training time. The concept is to find a list of samples that are close to what needs to be classified.
- 2. The more training examples used in KNN, the higher the possibility of overfitting the data. In theory, each of these training examples are likely to produce the same output. Which would not be ideal for the test or validation data.
- 3. KNN can be used for both classification and regression. To predict the values of new data, KNN uses "feature similarity".
- 4. KNN performs better with a smaller number of features. Too many features may lead to a case of the model overfitting the data.

Problem 1.B.)

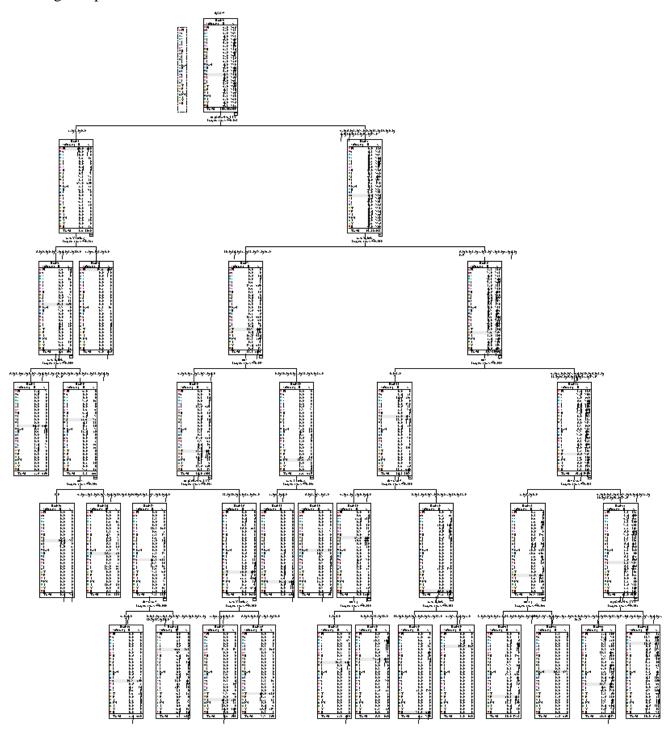
In this case, k=3 might prove to the best accuracy. However, this depends on the size of the data set. If the data is a binary set, the k=3 can be used to avoid a "tie". Ideally, we'd like to keep k as a small value, but in some cases the optimal value may be for k to equal the square root of n.

Problem 2.a.)

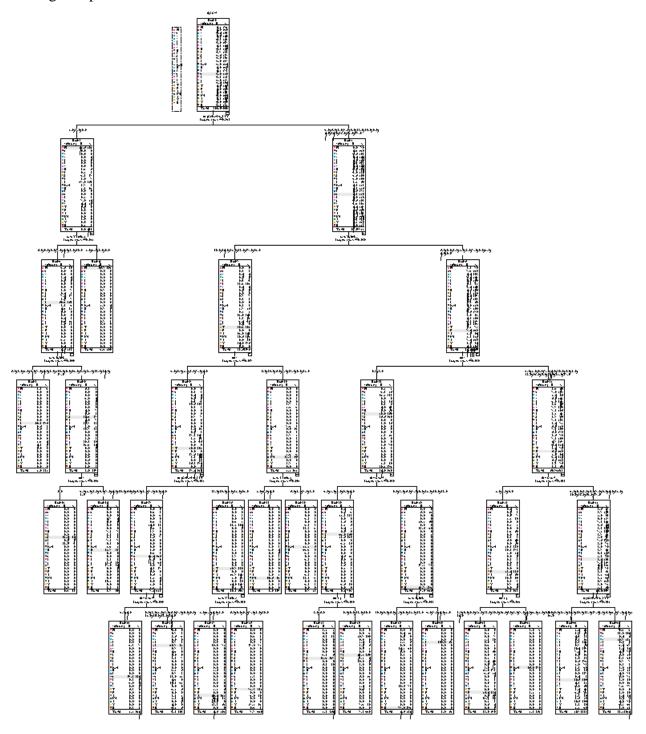
Model Summary #1

	Model Summa	ary #1
Specifications	Growing Method	CRT
	Dependent Variable	alphabet
	Independent Variables	horizonal, vertical, width, height,
		onpix, meanXpixels, meanYpixels,
		meanXvariance, meanYvariance,
		xybarmean, x2ybrMeanXXY,
		xy2brMeanXYY, xege, xegvy,
		edgeCount, yegvx
	Validation	Split Sample
	Maximum Tree Depth	5
	Minimum Cases in Parent	100
	Node	
	Minimum Cases in Child	50
	Node	
Results	Independent Variables	x2ybrMeanXXY, meanYpixels,
	Included	xybarmean, meanXpixels,
		meanYvariance, xege,
		xy2brMeanXYY, meanXvariance,
		xegvy, edgeCount, yegvx, width,
		vertical, height, onpix, horizonal
	Number of Nodes	35
	Number of Terminal Nodes	18
	Depth	5

Training Sample #1



Testing Sample #1



Risk

Sample	Estimate	Std. Error
Training	.632	.004
Test	.632	.006

Keiland Pullen DSC 441 – Fall 2021

Growing Method: CRT

Dependent Variable: alphabet

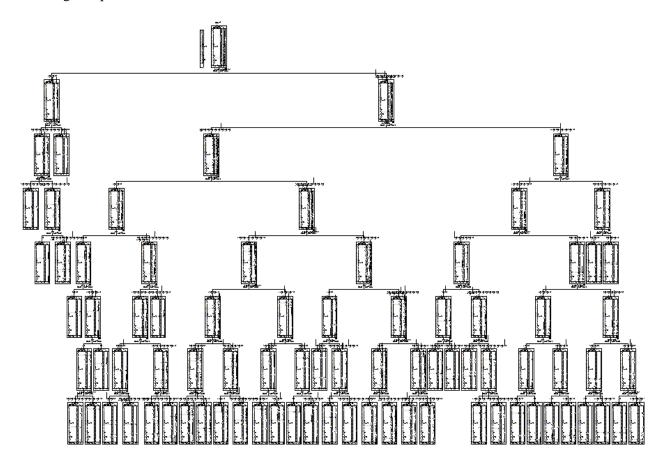
Classification #1

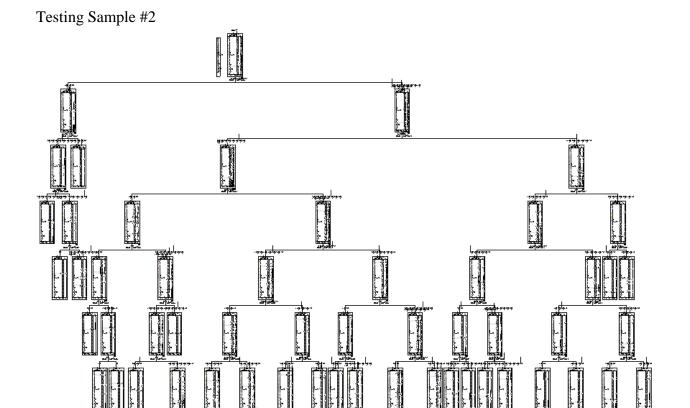
					Predicted																			
Observed	D	E	F	0	н	1.	J	K	L	м	N	0	Р	0	R	8	т	U	v	W	×	Y	z	Percei
. A	12	0	0	0	0	.0	0	0	5	4	9	0	0	100	0	0	0	0	0	0	0	0	0	- 1
В	441	0	0	0	0	4	0	0	0	0	0	0	0	58	0	0	0	1	0	0	0	0	23	
c	- 4	2	8	0	0	244	35	0	0	0	0	0	0	228	0	0	6	6	0	0	0	0	2	
D	471	.0	0	0	0	0	0	0	0	0	13	0	0	29	0	0	0	44	0	0	0	0	0	
E	-1	136	6	0	0	10	0	0	0	0	0	0	0	380	0	0	1	0	0	0	0	0	12	
F	115	0	127	0	0	11	0	0	0	2	0	0	9	30	0	0	136	15	95	0	0	0	0	
G	41	0	2	0	0	5	1	0	0	5	3	0	0	423	0	0	0	0	0	0	0	0	48	
Н	119	0	13	0	0	0	0	0	0	0	8	0	2	218	0	0	1	153	0	0	0	0	0	
1	58	0	8	0	0	439	9	0	0	0	5	0	- 1	19	0	0	0	0	0	0	0	0	4	
J	80	0	14	0	0	10	394	0	0	- 1	- 1	0	0	23	0	0	0	8	0	0	0	0	- 1	
к	31	.0	0	0	0	0	0	0	0	0	11	0	0	400	0	0	0	84	.0	0	0	0	0	
L	5	0	0	0	0	6	25	0	349	0	16	0	0	124	0	0	0	- 1	0	0	0	0	0	
M	43	0	0	0	0	0	0	0	4	373	5	0	0	96	0	0	0	23	0	1	0	0	.0	
N	65	0	13	0	0	0	0	0	1	10	29	0	2	25	0	0	0	382	8	7	0	0	0	
0	103	0	0	0	0	0	0	0	0	4	0	0	2	349	0	0	0	43	0	0	0	0	0	
P	160	0	42	0	0	58	0	0	0	0	0	0	269	26	0	0	13	0	- 4	2	0	0	0	
0	33	0	16	0	0	1	0	0	0	4	2	0	2	482	0	0	1.	6	13	2	0	0	0	
R	225	.0	78	0	0	0	0	0	5	.0	23	0	14	181	0	0	0	2	.0	1	0	0	0	
8	164	0	8	0	0	22	0	0	5	0	23	0	1	158	0	0	0	4	0	0	0	0	159	
T	33	.0	12	0	0	2	0	0	0	0	0	0	24	69	0	0	376	0	33	1	8	0	0	
U	22	0	0	0	0	0	0	0	0	- 6	0	0	0	110	0	0	9	427	0	0	0	0	0	
V	14	0	2	0	0	0	0	0	0	8	0	0	4	48	0	0	17	137	287	6	0	0	0	
W	19	0	5	0	0	0	0	0	0	8	0	0	0	61	0	0	0	169	12	244	0	0	0	
×	117	0	0	0	.0	. 0	0	0	0	0	19	0	0	394	0	0	3	6	0	0	0	0	0	
Y	93	.0	13	0	0	26	0	0	0	4	0	0	0	56	0	0	205	10	149	0	0	0	0	
Z	57	0	14	0	0	0	0	0	0	0	12	0	0	88	0	0	1	0	.0	0	0	0	340	
Overall Percen	ntage 18.0%	1.0%	2.7%	0.0%	0.0%	6.0%	3.3%	0.0%	2.6%	3.1%	1.3%	0.0%	2.4%	29.8%	0.0%	0.0%	5.5%	10.9%	4.3%	1.9%	0.0%	0.0%	4.2%	
Observed	D	E	F	G	н.	1	1	к	L;	М	N	0	P.	٥	R	s	T	U	У	W.	×	Y	z	Pe
A	3	0	0	0	0	0	2	0	3	3	7	0	0	42	0	0	0	0	0	0	0	0	.0	
B	184	0	- 1	0	0	3	0	0	0	0	0	0	0	27	0	0	0	- 1	0	0	0	0	23	
C	4	0	3	0	0	100	11	0	0	0	0	0	0	77	0	0	- 1	5	0	0	0	0	0	
D	212	0	0	0	0	0	0	0	0	1	4	.0	0	13	0	0	0	18	0	0	.0	0	0	
E	0	62	- 1	0	0	8	0	0	0	0	0	0	0	143	0.	0	2	0	0	0	0	0	6	
F	35	0	72	0	0	6	0	0	0	1	0	0	5	9	0	0	52	2	52	- 1	0	.0	0	
G	14	0	1	.0	0	2	0	0	0	3	0	0	0	185	0	0	0	0	0	0	0	0	39	
н	51	0	8	0	0	0	0	0	0	0	5	0	0	95	0	0	0	60	0	0	0	0	0	
1	29	0	0	0	0	160	6	0	0	0	1	0	0	13	0	0	0	0	0	0	0	0	2	
4	38	0	5	0	0	4	149	0	0	0	1	0	0	17	0	0	0	1	0	0	0	0	0	
K	5	0	0	0	0	0	0	0	0	0	5	0	0	153	0	0	0	49	0	- 1	0	0	. 0	
L	1	0	.0	0	0	6	13	0	156	0	8	0	0	51	0	0	0	0	0	0	0	0	0	
М	20	0	0	0	0	0	0	0	- 1	164	2	0	. 0	30	0	.0	0	12	0	- 1	0	0	0	
N	27	0	- 6	0	0	0	.0	0	-1	9.	11.	0	0	16	0	0	0	157	7	4	0	0	0	
0	51	0	- 1	0	0	0	0	0	0	1	0	0	0	175	0	0	0	24	0	0	0	0	0	-
P	52	0	22	0	0	23	0	0	0	0	0	0	114	7	0	0	9	0	0	2	0	0	0	
0	19	0	8	0	0	0	0	0	0	1	1	0	- 1	188	0	0	0	1	2	0	0	0	0	
R	93	0	32	0	0	0	0	0	4	0	19	0	4	72	0	0	0	0	0	0	0	0	0	
8	55	0	.0	0	0	8	0	0	7	0	14	0	0	68	0	0	0	- 1	0	0	0	0	51	
T	8	0	6	0	0	1	0	0	0	0	0	0	9	43	0	0	172	0	6	0	0	0	0	
U	10	0	0	0	0	0	0	0	0	2	0	0	0	53	0	0	0	174	0	0	0	0	0	
V	14	0	2	0	0	0	0	0	0	1	0	0	0	20	0	0	10	60	132	2	0	0	0	
W	5	0	4	0	0	0	0	0	0	3	0	0	0	28	0	0	0	89	12	93	0	0	0	
×	50	0	0	0	0	0	0	0	0	0	9	0	0	188	0	0	0	1	0	0	.0	0	0	
Y	33	0	9	0	0	18	0	0	0	1	0	0	0	19	0	0	83	4	62	1	0	0	0	
			6	0	0	0	0	0	0	0	1	0	- 1	39	0	0	- 1	.0	0	0	0	0	153	
Z	21 ntage 17.2%	1.0%	3.1%	0.0%	0.0%	5.7%	3.0%	0.0%	2.9%	3.2%	1.5%	0.0%	2.2%	29.5%	0.0%	0.0%	5.5%	11.0%	4.6%	1.8%	0.0%	0.0%	4.6%	

Model Summary #2

	woder Summ	ary #Z
Specifications	Growing Method	CRT
	Dependent Variable	alphabet
	Independent Variables	horizonal, vertical, width, height,
		onpix, meanXpixels, meanYpixels,
		meanXvariance, meanYvariance,
		xybarmean, x2ybrMeanXXY,
		xy2brMeanXYY, xege, xegvy,
		edgeCount, yegvx
	Validation	Split Sample
	Maximum Tree Depth	7
	Minimum Cases in Parent	75
	Node	
	Minimum Cases in Child	25
	Node	
Results	Independent Variables	x2ybrMeanXXY, meanYpixels,
	Included	xybarmean, meanXpixels, xegvy,
		meanYvariance, xege,
		xy2brMeanXYY, meanXvariance,
		edgeCount, yegvx, height, vertical,
		width, horizonal, onpix
	Number of Nodes	85
	Number of Terminal Nodes	43
	Depth	7

Training Sample #2





Risk

Sample	Estimate	Std. Error
Training	.450	.004
Test	.451	.006

Growing Method: CRT

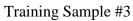
Dependent Variable: alphabet

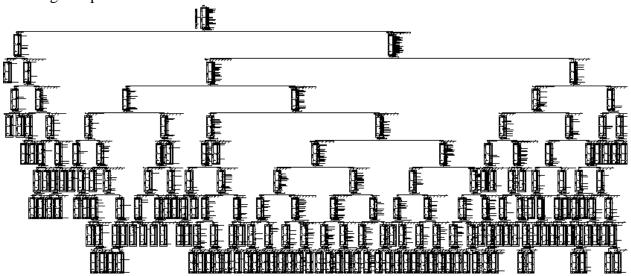
Classification #2

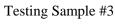
						Classific Predicted																			
nte	Observed	D	E	E.	6	н	1	- 3	K.	L	м	N	0	P	0	R	8	т	U	v	w	×	Y	z	Percer
10	A	3	- 5	0	4	0	0	1	51	. 9	- 5	0	17	- 0	2	9	0	0	0	0	0	20	0	0	7
	B	19	0	0	7	0	1	0	2	0	0	0	83	- 1	9	0	4	0	1	0	0	162	0	36	
	G	0	1	6	58	0	0	0	89	1	0	0	7	0	8	0	0	0	8	0	0	- 5	6	0	-
	D	357	0	0	11	0	0	0	0	0	0	1	3	0	0	11	0	0	42	0	0	92	0	0	
	6	0	275	0	109	0	3	0	53	4	0	0	0	0	29	0	2	0	0	0	0	88	0	0	
		41	0		109		- 1	0		0	0	2				1	0		9	1	1	47	67	0	
	I.		-	230		0			0			7	0	23	14			65		0	-				
	G	2	0	0	287	0	0	0	31	- 6	0		24	0	81	2	0	0	0		.0	47	0	2	
	H	18	- 1	0	23	0	0	0	43	0	0	0	17	- 1	18	11	0	0	17	0	135	228	- 1	0	
	1	7	0	- 4	2	0	418	7	16	0	0	0	0	2	3	5	0	0	0	0	0	34	0	4	
	J	7	1	13	0	0	6	378	2	0	1	0	5	3	6	0	0	0	6	0	0	44	0	0	
	K	2	9	0	35	0	0	0	264	6	0	22	0	0	0	10	0	0	21	0	46	90	0	0	
	L.	0	23	0	9	0	9	20	46	392	0	0	- 5	0	- 1	14	0	0	- 1	0	0	28	0	0	
	M	10	4	0	1	0	0	0	20	2	343	25	10	0	0	6	0	0	14	0	2	87	0	0	
	N	20	0	0	4	0	0	0	9	1	0	395	8	1	14	30	0	0	4	2	9	39	7	0	
	0	32	0	0	64	0	0	0	5	0	0	3	230	0	46	1	0	0	35	0	11	79	0	0	
	Р	75	0	27	9	0	30	0	0	0	0	0	5	283	9	5	0	14	0	2	4	31	2	0	
	0	- 1	14	0	43	0	0	0	30	3	0	3	83	- 1	311	4	0	2	0	1	7	53	8	0	
	R	40	0	0	20	0	0	0	32	4	0	0	62	2	6	102	0	7	0	0	- 1	213	0	0	
	5	4	2	0	39	0	12	0	29	8	0	0	58	- 1	22	24	137	0	2	0	- 1	190	0	2	
	T	5	0	9	12	0	- 1	0	34	0	0	0	14	0	3	0	1	384	0	3	0	28	46	0	
	U	2	0	0	44	0	0	0	0	3	5	41	3	0	24	0	0	0	393	0	2	56	7	0	
	v	13	0	2	4	0	0	0	3	0	0	14	1	3	4	0	0	8	1	272	132	47	20	0	
	W	- 6	0	0	0	0	0	0	0	0	0	29	3	0	9	0	0	0	3	12	363	67	8	0	
	×		22		0	0	0	0			0	0	0	0			0	0	6	0		365		0	
		5		0				151	86	0				100	0	21					0		1		
	Y.	36	0	0	0	0	9	0	23	0	0	5	10	16	15	2	- 6	21	- 6	- 5	5	43	334	0	
	Z	0	66	3	33 5.9%	0	0	0	9	0	0	0	0	2.4%	11	10	19	0	0	0	0	79	3.6%	277	- 3
	A	3	4	0	4	0	0	1	16	5	2	0	4	0	8	7	0	0	0	0	0	9	0	0	
	В	5	0	0	1	0	0	0	- 1	0	0	0	47	0	6	0	1	0	1	0	0	81	0	10	
	B C	5	0	0 2	1 23	0	0	0	1 40	0	0	0	47	0	6 8	0	1 0	0	1 3	0	0	81 2	0	10	
	B C D	5 0 144	0 0	0 2 0	1 23 2	0	0	0 0 0	1 40 1	0 1 0	0	0 0	47 4 2	0 0	6 8 0	0 0 6	0 0	0 1 0	1 3 19	0 0	0 0	81 2 40	0	10 1 0	
	B C	5 0 144 0	0 0 0 91	0 2 0	1 23 2 31	0 0 0	0 0 0	0 0 0	1 40 1 29	0 1 0 2	0 0	0 0 1	47 4 2 0	0 0 0	6 8 0 15	0 0 6	1 0 0	0 1 0	1 3 19	0 0 0	0 0	81 2 40 31	0 0 0	10 1 0	
	B C D E	5 0 144 0 21	0 0 0 91	0 2 0 0	1 23 2 31 1	0 0 0 0	0 0 0 1	0 0 0 0	1 40 1 29 0	0 1 0 2	0 0 0	0 0	47 4 2 0	0 0 0 0	6 8 0 15	0 0 6 1	0 0 0	0 1 0 0	1 3 19 0 8	0 0 0 0	0 0 0	81 2 40 31 21	0 0 0 3 27	10 1 0 0	
	B C D E F	5 0 144 0 21	0 0 0 91 0	0 2 0 0 96	1 23 2 31 1 143	0 0 0 0	0 0 0 1 1	0 0 0 0 0 0	1 40 1 29 0	0 1 0 2 0	0 0 0 0	0 0 1 0	47 4 2 0 0 7	0 0 0 0 6	6 8 0 15 2	0 0 5 1	0 0 0 0	0 1 0 0 29	1 3 19 0 8	0 0 0 0 0 2	0 0 0 0 1 0	81 2 40 31 21 19	0 0 0 3 27	10 1 0 0	
	B C D E	5 0 144 0 21 1	0 0 0 91	0 2 0 0 96 0	1 23 2 31 1 143 13	0 0 0 0	0 0 0 1 1	0 0 0 0	1 40 1 29 0	0 1 0 2 0	0 0 0	0 0 1 0 0 1 0	47 4 2 0	0 0 0 0	6 8 0 15 2 27	0 0 6 1	0 0 0 0 0	0 1 0 0	1 3 19 0 8 0	0 0 0 0 0 2	0 0 0	81 2 40 31 21 19	0 0 0 3 27	10 1 0 0 0	
	B C D E F	5 0 144 0 21 1 11	0 0 91 0 1 0	0 2 0 0 96 0	1 23 2 31 1 143 13	0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0	0 0 0 0 0 0	1 40 1 29 0 15 14 8	0 1 0 2 0 1	0 0 0 0 0 0 0	0 0 1 0 0 1 1 0	47 4 2 0 0 7 7 3	0 0 0 0 6 0	6 8 0 15 2 27 11 3	0 0 6 1 0 1 3	1 0 0 0 0 0	0 1 0 0 29 0	1 3 19 0 8 0	0 0 0 0 2 0 0	0 0 0 0 1 0 50	81 2 40 31 21 19 89	0 0 0 3 27 0 0	10 1 0 0 0 1 1 0	
	B C D E F	5 0 144 0 21 1	0 0 0 91 0	0 2 0 0 96 0	1 23 2 31 1 143 13	0 0 0 0 0 0 0 0	0 0 0 1 1	0 0 0 0 0 0 0	1 40 1 29 0 15	0 1 0 2 0	0 0 0 0 0 0 0	0 0 1 0 0 1 0	47 4 2 0 0 7 3	0 0 0 0 6	6 8 0 15 2 27	0 0 6 1 0	0 0 0 0 0	0 1 0 0 29 0	1 3 19 0 8 0	0 0 0 0 0 2	0 0 0 0 1	81 2 40 31 21 19	0 0 0 3 27 0	10 1 0 0 0	
	B C D E F	5 0 144 0 21 1 11 3 1 5	0 0 91 0 1 0 0 0	0 2 0 0 96 0	1 23 2 31 1 143 13	0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0	0 0 0 0 0 0 0 1 165	1 40 1 29 0 15 14 8 1	0 1 0 2 0 1 0 0	0 0 0 0 0 0 0	0 0 1 0 0 1 1 0	47 4 2 0 0 7 7 3	0 0 0 0 6 0	6 8 0 15 2 27 11 3	0 0 6 1 0 1 3	1 0 0 0 0 0	0 1 0 0 29 0	1 3 19 0 8 0	0 0 0 0 2 0 0	0 0 0 0 1 0 50	81 2 40 31 21 19 89 13 25 39	0 0 0 3 27 0 0	10 1 0 0 0 1 1 0	
	B C D E F G H I I J	5 0 144 0 21 1 11 3	0 0 91 0 1 0 0	0 2 0 0 96 0 0 2	1 23 2 31 1 143 13 0	0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0 162 4	0 0 0 0 0 0 0 0	1 40 1 29 0 15 14 8	0 1 0 2 0 1 0	0 0 0 0 0 0	0 0 1 0 0 1 0 0	47 4 2 0 0 7 3 0	0 0 0 0 6 0 1	6 8 0 15 2 27 11 3	0 0 6 1 0 1 3	0 0 0 0 0 0	0 1 0 0 29 0 0 0	1 3 19 0 8 0 11 0	0 0 0 0 2 0 0 0	0 0 0 0 1 0 50	81 2 40 31 21 19 89 13	0 0 0 3 27 0 0	10 1 0 0 0 1 1 0 2	
	B C D E F G H I J K	5 0 144 0 21 1 11 3 1 5	0 0 91 0 1 0 0 0	0 2 0 96 0 0 2 2	1 23 2 31 1 143 13 0 0	0 0 0 0 0 0 0	0 0 0 1 1 0 0 162 4	0 0 0 0 0 0 0 1 165	1 40 1 29 0 15 14 8 1	0 1 0 2 0 1 0 0	0 0 0 0 0 0 0	0 0 1 0 0 1 0 0 1	47 4 2 0 0 7 3 0 2	0 0 0 0 6 0 1	6 8 0 15 2 27 11 3 1	0 0 6 1 0 1 3 1 2 6	0 0 0 0 0 0 0	0 1 0 0 29 0 0 0	1 3 19 0 8 0 11 0 2	0 0 0 0 2 0 0 0	0 0 0 0 1 0 50 0	81 2 40 31 21 19 89 13 25 39	0 0 0 3 27 0 0 0	10 1 0 0 0 1 0 2 1	
	8 C D E F G H I J K L L L L L L L L L L L L L L L L L L	5 0 144 0 21 1 11 3 1 5	0 0 0 91 0 1 0 0 0 0 2	0 2 0 96 0 0 2 3	1 23 2 31 1 143 13 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 1 0 0 162 4 0	0 0 0 0 0 0 0 0 1 165	1 40 1 29 0 15 14 8 1 111 17	0 1 0 2 0 1 0 0 0 4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 0 0 1 0 0 1 1 0	47 4 2 0 0 7 3 0 2 0 4	0 0 0 0 6 0 1 0	6 8 0 15 2 27 11 3 1	0 0 6 1 0 1 3 1 2 6	0 0 0 0 0 0 0	0 1 0 0 29 0 0 0	1 3 19 0 8 0 11 0 2	0 0 0 0 0 2 0 0 0 0	0 0 0 0 1 1 0 50 0 0	81 2 40 31 21 19 89 13 25 39	0 0 0 3 27 0 0 0	10 1 0 0 0 1 0 2 1 0	
	8 C C C C C C C C C C C C C C C C C C C	5 0 144 0 21 1 11 3 1 5 0	0 0 0 91 0 1 0 0 0 2	0 2 0 0 96 0 0 2 2 3	1 23 2 31 1 143 13 0 0 18 4 2	0 0 0 0 0 0 0	0 0 0 1 1 0 0 162 4 0 3	0 0 0 0 0 0 0 0 1 165 0	1 40 1 29 0 15 14 8 1 111 17 12	0 1 0 2 0 1 0 0 0 0 4 143	0 0 0 0 0 0 0 0 0 0	0 0 1 1 0 0 1 0 0 1 1 0 0 1 1 3 0 0 7	47 4 2 0 0 7 3 0 2 0 4	0 0 0 0 6 0 1 0 1 0	6 8 0 15 2 27 11 3 1 0	0 0 6 1 0 1 3 1 2 6	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 0 29 0 0 0	1 3 3 19 0 8 0 11 0 2 12 0 10	0 0 0 0 0 2 0 0 0 0	0 0 0 0 1 0 50 0 0 0	81 2 40 31 21 19 89 13 25 39 5	0 0 3 27 0 0 0 0	10 0 0 0 1 0 2 1 0 0	
	8 C D E F G H L J K L M N N	5 0 144 0 21 1 11 3 1 5 0 5	0 0 0 91 0 1 0 0 0 2	0 2 0 0 96 0 0 2 3 0	1 23 2 31 1 143 13 0 0 18 4 2 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 1 0 0 162 4 0 3	0 0 0 0 0 0 0 0 1 165 0	1 40 1 29 0 15 14 8 1 111 17 12 2	0 1 0 2 0 1 0 0 0 0 4 143 3	0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 0 0 1 0 0 1 1 3 0 7	47 4 2 0 0 7 3 0 2 0 4 1 5	0 0 0 0 0 6 0 1 0 1 0	6 8 0 15 2 27 11 3 1 0 0 5	0 0 5 1 0 1 3 1 2 6 10	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 29 0 0 0 0	1 3 19 0 8 0 11 0 2 12 0	0 0 0 0 0 2 2 0 0 0 0 0	0 0 0 0 1 1 0 50 0 0 0 0 0 0 0 0 0 0 0 0	81 2 40 31 21 19 89 13 25 39 5	0 0 0 3 27 0 0 0 0	10 0 0 0 1 1 0 2 2 1 0 0	
	8 C D E F F G H I J K L M M N O O	5 0 144 0 21 1 11 3 1 5 0 5	0 0 0 91 0 1 0 0 0 2 11 3	0 2 0 0 96 0 0 2 2 3 0 0	1 23 2 31 1 1 143 13 0 0 18 4 2 0 27	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 1 0 0 162 4 0 3	0 0 0 0 0 0 0 0 1 165 0	1 40 1 29 0 15 14 8 1 111 17 12 2 2	0 1 0 2 0 1 0 0 0 4 143 3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 0 0 1 0 0 1 1 3 0 7 7	47 4 2 0 0 7 3 0 2 2 0 4 1 5	0 0 0 0 0 6 6 0 1 0 1 0 0 0	6 8 0 15 2 27 11 3 1 1 0 0 5 23	0 0 5 1 0 1 3 1 2 6 10 1	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 29 0 0 0 0	1 3 19 0 8 0 11 0 2 12 0 10 5	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 1 1 0 50 0 0 0 0 0 0 0 0 0 0 0	81 2 40 31 21 19 89 13 25 39 5 39 5 32	0 0 0 3 27 0 0 0 0 0	10 0 0 0 1 1 0 2 1 0 0 0 0 0 0 0 0 0 0 0	
	8 C C D E F F G G H I J K L M N N O P P	5 0 144 0 21 1 1 1 3 1 5 0 5 5 1 3 9	0 0 0 91 0 1 0 0 0 2 11 3 0	0 2 0 0 96 0 0 2 2 3 0 0 0 0	1 23 2 31 1 143 13 0 0 18 4 2 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 1 0 0 162 4 0 3 0 0	0 0 0 0 0 0 0 0 1 165 0 0	1 40 1 29 0 15 14 8 1 111 17 12 2 2 0 0	0 1 0 2 0 1 0 0 0 4 143 3 1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 0 0 1 0 0 1 1 3 0 7 7	47 4 2 0 0 7 3 0 2 2 0 4 1 5 114 6	0 0 0 0 6 0 1 0 0 0 0 1 2 0 0	6 8 0 15 2 27 11 3 1 1 0 0 5 23 4	0 0 6 1 0 1 3 1 2 2 6 10 1 10 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 29 0 0 0 0 0	1 3 19 0 8 0 11 0 2 2 2 0 10 5 14	0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 0 50 0 0 0 20 0 0 3 4 7	81 2 40 31 21 19 89 13 25 39 5 32 19 28	0 0 0 3 27 0 0 0 0 0 0 0	10 0 0 0 1 1 0 2 1 1 0 0 0 0 0 0 0 0 0 0	
	8 C C D E F F G H I L L M M N O D P O O	5 0 144 0 21 1 11 3 1 5 0 0 5 13 9	0 0 0 91 0 1 1 0 0 0 2 111 3 0 0	0 2 0 96 0 0 2 2 3 0 0 0	1 23 2 31 1 1 143 1 3 0 0 1 8 4 2 2 0 2 7 9 9 4 4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 1 0 0 162 4 0 3 0 0	0 0 0 0 0 0 0 0 1 165 0 111 0	1 40 1 29 0 15 14 8 1 111 17 12 2 2 0 18	0 1 0 2 0 1 0 0 0 0 4 143 3 1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 0 0 0 1 1 0 0 0 1 1 13 0 7 7 151 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	47 4 2 0 0 7 7 3 0 2 0 4 1 1 5 114 6 26 23	0 0 0 0 6 0 1 1 0 0 0 0 1 2 1 2 3 0 0 3	6 8 0 15 2 27 11 3 1 0 0 5 23 4 111 3	0 0 6 1 0 1 1 3 3 1 1 2 6 10 1 1 10 0 2 1 10 10 10 10 10 10 10 10 10 10 10 10 1	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 29 0 0 0 0 0	1 3 19 0 8 0 11 11 10 0 2 12 0 10 10 5 14 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	81 2 40 31 11 19 89 13 25 39 5 39 5 32 19 28	0 0 0 3 27 0 0 0 0 0 0	10 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0	
	8 C C D E F P D D D D D D D D D D D D D D D D D D	5 0 144 0 21 1 1 1 3 3 1 5 0 5 0 5 1 3 9 26 0	0 0 0 91 0 1 1 0 0 0 2 11 3 0 0	0 2 0 96 0 0 2 2 3 0 0 0 0	1 23 2 31 1 1 143 13 0 0 18 4 2 0 0 27 9 9 4 111	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0 0 162 4 0 0 0 0 2 1 1 1 0 0 0 0 1 1 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1 1 165 0 111 0 0	1 40 1 29 0 15 14 8 1 111 17 12 2 2 0 18 16 6	0 1 0 2 0 1 0 0 0 4 4 143 3 1 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 0 0 0 1 0 0 1 1 1 3 0 7 7 151 2 0	47 4 2 0 0 7 7 3 0 2 0 4 1 1 5 114 6	0 0 0 0 0 0 1 1 0 0 0 0 0 1 1 2 2 1 30 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	6 8 0 15 2 27 11 3 1 0 0 1 5 23 4 111	0 0 6 1 0 1 3 1 2 6 10 10 0 10 0 10 10 10 10 10 10 10 10 10	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 3 3 19 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	81 2 40 31 19 89 13 25 39 5 5 32 19 28 10 28	0 0 0 3 27 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 0 0 0 1 1 0 2 1 1 0 0 0 0 0 0 0 0 0 0	
	8 C C D E F F G H I L L M M N O D P O R R S T T	5 0 144 0 21 1 11 3 1 5 5 13 9 26 0 0 14 4	0 0 0 91 0 0 0 0 2 11 3 0 0 0 0 0 8	0 2 0 0 96 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 23 2 31 1 1 143 13 0 0 18 4 2 0 0 27 9 9 4 11 6	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0 0 162 4 0 0 0 0 0 162 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 1 1655 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 40 1 29 0 15 14 8 1 111 17 12 2 2 0 18 6 6 12	0 1 0 2 0 1 0 0 0 4 143 3 1 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 0 0 1 1 0 0 0 1 1 3 3 0 7 7 151 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	47 4 4 2 0 0 0 7 7 3 0 0 2 2 0 4 4 1 1 5 114 6 28 23 17 7	0 0 0 0 0 1 1 0 0 0 0 1 1 2 130 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	6 8 0 15 2 27 11 3 1 0 0 5 23 4 111 3 10 1	0 0 5 1 1 3 1 2 6 10 10 10 2 10 10 10 10 10 10 10 10 10 10 10 10 10	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 3 3 19 0 0 0 111 0 0 0 10 10 10 0 0 0 0 1 1 1 0 0 0 0 1 1 1 4 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 1 1 0 50 0 0 0 20 0 3 3 4 7 7	81 2 40 31 31 11 19 89 13 25 39 5 39 5 39 28 10 28	0 0 0 3 27 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 0 0 0 1 1 0 2 1 1 0 0 0 0 0 0 0 0 0 0	
	8 C C D E F F O O H I J K L M N N O P O R R S T U U	5 0 144 0 21 1 1 1 5 0 5 1 3 9 26 0 0 14 4 4	0 0 0 91 1 0 0 0 2 111 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 2 0 96 0 0 2 2 3 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 23 2 31 1 1 143 13 0 0 18 4 2 2 7 9 9 4 11 6 2 2 3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 1 0 0 162 4 0 3 0 0 21 0 0	000000000000000000000000000000000000000	1 40 1 29 0 0 15 14 8 1 111 17 12 2 2 0 18 16 6 6 12 2 2	0 1 0 2 0 1 0 0 0 4 143 3 1 0 0 0 1 1 5 0 0 0 1 1 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 0 0 0 1 1 0 0 1 1 13 0 7 7 151 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	47 4 4 2 0 0 0 7 7 3 0 2 2 0 4 4 1 5 5 114 6 28 23 17 7	0 0 0 6 0 1 1 0 0 0 0 1 1 2 1 30 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	6 8 0 15 5 2 27 11 3 3 1 0 0 5 5 3 4 4 111 3 1 0 1 6	0 0 6 1 1 3 1 1 2 6 6 10 1 1 0 0 2 2 1 1 0 0 1 1 0 0 0 1 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 29 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 3 19 0 8 0 0 111 0 0 12 12 0 0 145	0 0 0 0 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 1 0 50 0 0 0 20 0 3 4 4 7 0 2	81 2 40 31 31 21 19 89 13 25 39 5 5 32 19 28 10 28 110 28	0 0 0 3 27 0 0 0 0 0 0 0 0 2 5 6 0 0	10 0 0 0 1 1 0 0 2 2 1 1 0 0 0 0 0 0 0 0	
	8 C C D E F F G G H I I J K L M M N O C P P O C R S T U V V	5 0 144 0 21 1 1 1 1 5 0 5 1 3 9 26 0 1 14 4 4 4 7	0 0 0 91 0 0 0 0 2 11 3 0 0 0 0 0 2 11 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 2 0 96 0 0 2 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 23 2 31 1 1 143 13 0 0 0 18 4 2 0 27 9 9 4 11 6 6 23 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0 162 4 0 0 0 21 0 0	000000000000000000000000000000000000000	1 40 1 29 0 0 15 14 8 8 1 111 17 12 2 2 1 1 16 6 6 12 2 1	0 1 0 2 0 1 0 0 0 0 4 143 3 1 1 0 0 0 1 1 5 1 0 1 1 0 0 1 1 1 0 0 1 1 1 1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 0 0 1 1 0 0 1 1 13 0 7 7 151 2 0 0 0 0 1 1 1 0 0 0 1 1 1 0 0 0 0 0	47 4 4 2 0 0 0 7 7 3 0 2 2 0 0 4 1 1 5 114 6 6 28 23 17 7 7	0 0 0 0 6 6 0 0 1 1 0 0 0 0 1 2 2 1 30 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	6 8 0 0 15 2 27 11 0 0 1 1 0 0 5 23 4 1 1 1 1 0 1 1 6 6 1 1	0 0 5 1 1 0 0 1 1 3 1 1 2 2 6 10 1 1 10 0 0 1 1 10 0 0 1 1 10 0 0 1	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 29 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 3 3 19 8 8 0 0 11 1 1 0 0 0 0 0 0 0 0 1 1 4 5 0 0 0 1 1 4 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 1 0 50 0 0 0 2 0 0 3 3 4 7 7 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	81 2 40 31 21 19 89 13 25 39 5 5 22 19 28 10 58 110 58	0 0 0 3 27 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 0 0 0 1 1 0 0 2 1 1 0 0 0 0 0 0 0 0 0	
	8 C C D E F F G H I I J K L M N O P O R S T U V W	5 0 144 0 21 1 1 1 1 5 0 0 5 5 1 3 9 26 0 0 1 4 4 4 4 4 4 4 4 4 7 7 7 8 7 8 7 8 8 7 8 8 7 8 8 8 8	0 0 0 1 0 1 0 0 0 0 2 11 1 0 0 0 0 0 0 0	0 2 0 96 0 0 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 23 2 31 1 1 1 43 13 0 0 18 4 2 2 7 9 9 9 4 11 6 6 23 0 1 1	000000000000000000000000000000000000000	0 0 0 1 1 1 0 0 0 162 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	000000000000000000000000000000000000000	1 40 1 29 0 15 14 8 8 1 1111 17 12 2 2 0 18 16 6 12 2 2 1 1 0 0	0 1 0 2 0 1 0 0 0 4 143 3 1 0 0 0 0 1 1 5 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 1 1 0 0 1 1 3 0 0 7 7 151 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	47 4 4 2 0 0 0 7 7 3 0 2 2 0 4 1 1 1 5 114 6 6 28 2 3 17 7 1 0 0 2 2	0 0 0 0 6 0 1 1 0 0 0 1 1 2 1 2 1 3 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	6 8 0 0 15 2 27 11 0 0 1 1 0 0 5 23 4 111 1 1 0 1 1 6 5 1 1 2 2	0 0 0 6 1 1 2 6 10 1 10 0 2 2 1 10 1 1 1 0 0 1 1 0 0 0 1 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 29 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 3 3 19 0 8 0 0 11 1 0 0 0 145 1 1 0 0 0 145 1 0 7 7	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 1 0 50 0 0 0 0 20 0 3 3 4 7 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	81 2 40 31 21 19 89 13 25 39 5 5 32 19 28 10 28 110 5 9	0 0 0 3 27 0 0 0 0 0 0 0 0 0 2 5 5 0 0 0 0 0 0 0 0	10 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0	
	8 C C D E F F G G H I I J K L M M N O C P P O C R S T U V V	5 0 144 0 21 1 1 1 3 1 5 0 0 5 1 1 3 9 9 0 1 1 4 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 1 0 0 0 0 2 1 1 1 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 2 0 96 0 0 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 23 2 31 1 1 143 13 0 0 188 4 2 2 0 27 9 9 9 4 11 6 23 0 0 1 1 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 1 0 0 162 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 1 1 165 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 40 1 29 0 155 14 8 1 1 17 12 2 2 1 1 0 0 44 4	0 1 0 2 0 0 1 0 0 0 0 4 4 143 3 1 0 0 1 1 0 0 0 1 1 0 0 0 0 0 1 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0 0 0 1 1 1 3 3 0 7 7 1 5 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	47 4 4 2 2 0 0 7 7 3 3 0 2 2 0 4 4 1 1 5 5 1114 6 28 23 17 7 7 1 1 0 2 2	0 0 0 0 0 0 0 1 1 0 0 0 0 1 1 2 2 1 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	6 8 0 0 15 2 27 11 3 3 1 0 0 5 5 23 3 1 1 0 1 1 1 5 6 1 1 1 5 6 1 1 2 2 0 0	0 0 6 1 1 0 1 1 2 6 6 10 1 1 10 0 2 1 1 5 5 1 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 29 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 3 3 19 9 0 0 0 11 11 10 0 0 10 10 10 10 10 10 10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	81 2 40 31 21 19 8 8 13 25 39 19 28 10 28 110 28 28 28 28 28 28 28 28 28 28 28 28 28	0 0 0 3 27 0 0 0 0 0 0 0 0 0 0 2 5 5 0 0 0 0 0 0 0	10 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	
	8 C C D E F F G H I I J K L M N O P O R S T U V W	5 0 144 0 21 1 1 1 3 3 1 5 5 0 0 14 4 4 4 7 7	0 0 0 91 0 0 0 0 2 11 3 0 0 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 2 0 96 0 0 0 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 23 2 3 1 1 1 1 4 3 1 3 0 0 0 1 8 4 2 0 0 27 9 9 4 1 1 1 6 6 2 3 0 0 1 1 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 1 0 0 162 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 40 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 1 0 2 0 0 1 1 0 0 0 0 4 1 143 3 1 1 0 0 1 1 1 0 0 1 1 1 0 0 1 1 1 0 0 0 1 1 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0 0 1 1 133 0 7 7 151 2 0 0 0 0 1 1 1 2 0 0 0 0 0 0 0 0 0 0	47 4 2 0 0 7 3 0 2 0 4 1 1 5 114 6 23 17 7 7	0 0 0 0 0 0 1 1 0 0 0 0 1 1 2 1 3 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0	6 8 8 0 15 2 27 11 3 1 1 0 0 5 23 4 4 111 3 1 0 6 1 1 2 0 0 6 6	0 0 6 1 1 0 1 1 2 6 6 1 1 10 0 0 1 1 10 0 0 1 1 1 0 0 1 1 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 3 3 19 0 0 0 0 11 1 1 0 0 0 0 0 0 1 1 4 5 0 0 0 1 1 4 5 0 0 0 0 1 1 4 5 0 0 0 0 1 1 4 5 0 0 0 1 1 4 5 0 0 0 1 1 4 5 0 0 0 0 0 1 1 4 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	81 2 40 31 19 88 13 25 39 5 32 19 28 10 28 10 28 110 28 110 28 110 28 110 28 110 28 110 28 110 28 28 28 28 28 28 28 28 28 28 28 28 28	0 0 0 3 27 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 0 0 0 1 1 0 0 2 2 1 1 0 0 0 0 0 0 0 0	
	8 C C D E F F G H I I J K L M N O P O R S T U V W	5 0 144 0 21 1 1 1 3 1 5 0 0 5 1 1 3 9 9 0 1 1 4 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 1 0 0 0 0 2 2 1 1 1 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 2 0 96 0 0 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 23 2 31 1 1 143 13 0 0 188 4 2 2 0 27 9 9 9 4 11 6 23 0 0 1 1 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 1 0 0 162 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 1 1 165 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 40 1 29 0 155 14 8 1 1 17 12 2 2 1 1 0 0 44 4	0 1 0 2 0 0 1 0 0 0 0 4 4 143 3 1 0 0 1 1 0 0 0 1 1 0 0 0 0 0 1 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0 0 0 1 1 1 3 3 0 7 7 1 5 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	47 4 4 2 2 0 0 7 7 3 3 0 2 2 0 4 4 1 1 5 5 1114 6 28 23 17 7 7 1 1 0 2 2	0 0 0 0 0 0 0 1 1 0 0 0 0 1 1 2 2 1 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	6 8 0 0 15 2 27 11 3 3 1 0 0 5 5 23 3 1 1 0 1 1 1 5 6 1 1 1 5 6 1 1 2 2 0 0	0 0 6 1 1 0 1 1 2 6 6 10 1 1 10 0 2 1 1 5 5 1 1 0 0 1 1 0 0 0 0 1 1 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 29 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 3 3 19 9 0 0 0 11 11 10 0 0 10 10 10 10 10 10 10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	81 2 40 31 21 19 8 8 13 25 39 19 28 10 28 110 28 28 28 28 28 28 28 28 28 28 28 28 28	0 0 0 3 27 0 0 0 0 0 0 0 0 0 0 2 5 5 0 0 0 0 0 0 0	10 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	

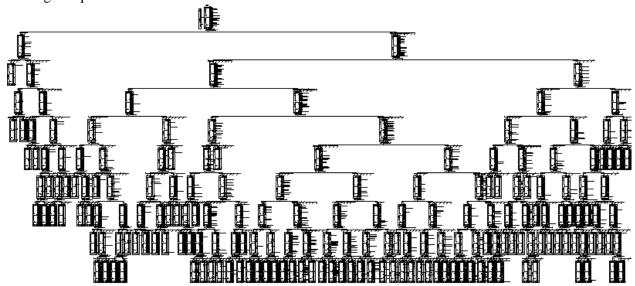
Model Summary #3

	Model Summ	ary #3
Specifications	Growing Method	CRT
	Dependent Variable	alphabet
	Independent Variables	horizonal, vertical, width, height,
		onpix, meanXpixels, meanYpixels,
		meanXvariance, meanYvariance,
		xybarmean, x2ybrMeanXXY,
		xy2brMeanXYY, xege, xegvy,
		edgeCount, yegvx
	Validation	Split Sample
	Maximum Tree Depth	9
	Minimum Cases in Parent	50
	Node	
	Minimum Cases in Child	15
	Node	
Results	Independent Variables	x2ybrMeanXXY, meanYpixels,
	Included	xybarmean, meanXpixels, horizonal,
		meanYvariance, xege,
		xy2brMeanXYY, meanXvariance,
		xegvy, edgeCount, yegvx, width,
		height, vertical, onpix
	Number of Nodes	191
	Number of Terminal Nodes	96
	Depth	9









Risk

Sample	Estimate	Std. Error
Training	.339	.004
Test	.356	.006

Growing Method: CRT

Dependent Variable: alphabet

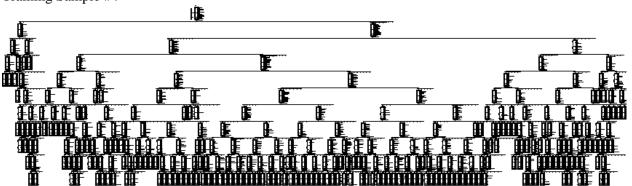
Classification #3

						lassificat	Predicted																			
		6	D	9		6	Н	2	4		65	М	N	0		a	R	5	147	U	v	W	×		z	Percen
ple ting	Observed	0	7	- 6	0	10	- 0	0	0	0	. 0	m 5	. 0	2	0	13	64	12	0	0	0	91	3	2	- 0	Collect 77
ung	n p	0	67	3	3	11	0	0	0	0	0	0	0	2	6	13	35	33	0	0	0	0	0	0	0	7
	C	278	4	8	7	139	1	0	5	0	3	0	0		0	4	69	5	0	7	0	0	4	0	0	5
	0	0	477	6	2	8	2	0	0	1	0	3	1		2	0	18	4	0	0	0	0	0	0	6	8
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	A B C C D E F G H I J K L M M N O P G R R S S T U V V	0 0 1111 0 1 1 0 3 2 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 29 2 185 0 22 15 27 12 14 5 0 15 21 26 31 9 9 4 4 8 8 8	4 0 2 2 126 0 1 1 4 3 3 14 0 0 0 1 2 5 5 7 1 8 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1	0 0 4 0 3 148 0 8 10 0 0 0 0 0 0 4 9 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1	2 6 38 5 5 0 144 15 3 0 23 3 0 1 1 29 4 7 7 9	0 1 0 0 0 1 1 0 0 0 1 2 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 166 0 0 0 0 0	0 0 0 2 0 1 1 0 0 1 1 163 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 1 0 8 0 0 0 0 2 4 175 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 0 0 0 0 0 0 0 1 1 2 1 1 7 9 0 0 0 0 0 0 1 1 2 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 4 157 0 2 2 4 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 4 7 0 0 3 3 49 2 2 6 6 1 7 7 3 118 1 7 0 0 3 1 1 1 0 0 0 1 1 1 0 0 0 1 1 0 0 0 0	0 1 0 0 7 1 1 1 1 0 0 0 0 0 0 0 1 1 1 1	4 0 2 0 3 3 0 20 0 0 2 0 0 0 0 0 0 0 0 0	20 11 25 11 17 6 26 23 1 1 1 3 3 3 17 6 14 25 6 1 1 1 7 6 1 1 1 7 6 6 1 1 1 7 1 7 6 6 1 7 1 7	5 15 2 3 12 4 8 0 7 5 0 0 9 0 0 12 4 17 7 7	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 2 6 2 6 2 5 5 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 0 0 0 0 5 0 0 1 3 4 7 7 7 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
	A B G O D E F G H I J K L L M M N O D P O O	0 0 1111 0 1 1 0 1 1 0 0 1 1 0 0 0 1 1 0	3 29 2 185 0 0 22 15 27 12 14 5 0 15 21 21 26 31 9 34 28 4	4 0 0 2 2 126 0 1 1 0 0 1 1 4 4 0 0 0 1 2 5 20 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 4 0 3 148 0 8 10 12 0 0 0 6 6 0 23 5 5	2 6 38 5 5 0 144 15 3 3 0 2 3 3 0 1 1 2 9 4 17 9 4 17 9	0 1 0 0 0 1 0 0 0 3 1 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 2 0 1 1 163 0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 68 0 0 0 0 0 0 0 0 0	1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 4 7 0 0 0 3 49 2 2 6 1 1 7 3 118 1 7 0 0 0 0 3 4 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 1 0 0 7 1 1 1 0 0 0 0 0 5 5 1 1 156 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 0 2 0 3 3 0 20 0 0 0 0 0 0 0 0 0 0 0 0	20 11 25 11 17 6 26 23 1 1 1 1 33 3 1 7 6 1 4 25 1 1 7 6 6 1 7 7 6 7 6 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8	5 15 2 3 12 4 8 0 7 5 0 0 0 12 4 17 7 7 6 10 10 10 10 10 10 10 10 10 10 10 10 10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 2 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 0 0 0 0 0 1 3 4 7 7 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0 0 1 3 0 0 0 0 0 0 0 0 0 0	
	A B C C D E F G H I J K L M M N O P G R R S S T U V V	0 0 1111 0 1 1 0 3 2 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 29 2 186 0 22 15 27 12 14 5 0 15 21 26 31 28 4 8 8 3 3 3	4 0 0 2 2 2 126 0 0 1 1 4 4 0 0 0 0 1 2 2 5 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 4 0 3 148 0 8 10 12 0 0 0 6 6 0 23 23 5 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 6 38 5 0 0 144 15 3 0 0 1 1 1 23 3 0 0 1 1 1 1 7 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9	0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 2 0 1 1 1 163 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 1 1 0 0 0 0 0 0 0 1 1	4 0 0 0 1 0 0 0 0 0 1 1 1 79 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 4 7 7 0 0 0 1 1 8 1 1 7 7 0 0 1 2 1 1 9 9 9	0 1 0 0 7 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	4 0 2 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20 11 25 11 17 6 26 23 1 1 1 1 1 2 3 3 3 1 17 6 6 14 25 6 14 12 25 11 11 17 6 17 17 17 17 17 17 17 17 17 17 17 17 17	5 15 2 3 12 4 8 0 7 7 5 0 0 0 0 0 12 4 4 17 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 2 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 0 0 0 5 0 0 1 1 3 4 4 7 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
	A B C C D E F G H I J K L M M N O P G R R S S T U V V	0 0 1111 0 1 0 1 0 0 1 1 0 0 0 0 0 0 0	3 29 2 185 0 22 12 15 27 12 14 5 0 0 15 21 21 26 31 9 34 8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4 0 0 2 2 126 0 1 1 0 0 1 1 4 0 0 0 0 1 1 2 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 4 4 0 3 3 148 0 8 8 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 6 38 5 0 0 144 15 3 0 23 3 0 1 1 7 9 4 7 7 9 4 7 7 9	0 1 0 0 0 1 1 0 0 0 3 1 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 2 0 0 1 1 0 1 1 6 3 0 1 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 8 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 0 0 0 0 0 0 0 0 0 0 1 1 2 1 1 179 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 4 7 0 0 3 49 2 2 6 1 1 7 7 3 118 1 1 7 7 0 0 0 0 1 7 7 7 7 7 7 7 7 7 7 7	0 1 0 0 7 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	4 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20 11 25 6 23 1 1 33 17 6 14 25 5 6 11 12 119 7 7 7 7 7 7 7 11 11 11 11 11 11 11 11 1	5 15 2 3 12 4 8 0 7 5 0 0 0 0 0 12 4 17 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 2 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 0 0 0 0 5 0 0 1 1 3 4 4 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 1 3 3 0 0 0 0 0 0 0 0 0 0 0 0	
	A B C C D E F G H I J K L M M N O P G R R S S T U V V	0 0 1111 0 1 1 0 3 2 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 29 2 186 0 22 15 27 12 14 5 0 15 21 26 31 28 4 8 8 3 3 3	4 0 0 2 2 2 126 0 0 1 1 4 4 0 0 0 0 1 2 2 5 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 4 0 3 148 0 8 10 12 0 0 0 6 6 0 23 23 5 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 6 38 5 0 0 144 15 3 0 0 1 1 1 23 3 0 0 1 1 1 1 7 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9	0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 2 0 1 1 1 163 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 1 1 0 0 0 0 0 0 0 1 1	4 0 0 0 1 0 0 0 0 0 1 1 1 79 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 4 7 7 0 0 0 1 1 8 1 1 7 7 0 0 1 2 1 1 9 9 9	0 1 0 0 7 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	4 0 2 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20 11 25 11 17 6 26 23 1 1 1 1 1 2 3 3 3 1 17 6 6 14 25 6 14 12 25 11 11 17 6 17 17 17 17 17 17 17 17 17 17 17 17 17	5 15 2 3 12 4 8 0 7 7 5 0 0 0 0 0 12 4 4 17 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 2 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 0 0 0 5 0 0 1 1 3 4 4 7 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	

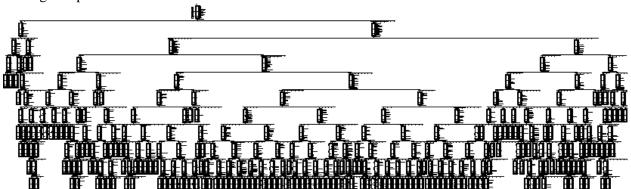
Model Summary #4

	Model Summa	ary #4
Specifications	Growing Method	CRT
	Dependent Variable	alphabet
	Independent Variables	horizonal, vertical, width, height,
		onpix, meanXpixels, meanYpixels,
		meanXvariance, meanYvariance,
		xybarmean, x2ybrMeanXXY,
		xy2brMeanXYY, xege, xegvy,
		edgeCount, yegvx
	Validation	Split Sample
	Maximum Tree Depth	10
	Minimum Cases in Parent	25
	Node	
	Minimum Cases in Child	7
	Node	
Results	Independent Variables	x2ybrMeanXXY, meanYpixels,
	Included	xybarmean, meanXpixels, horizonal,
		width, meanYvariance, xege,
		xy2brMeanXYY, meanXvariance,
		edgeCount, xegvy, yegvx, onpix,
		vertical, height
	Number of Nodes	317
	Number of Terminal Nodes	159
	Depth	10

Training Sample #4



Testing Sample #4



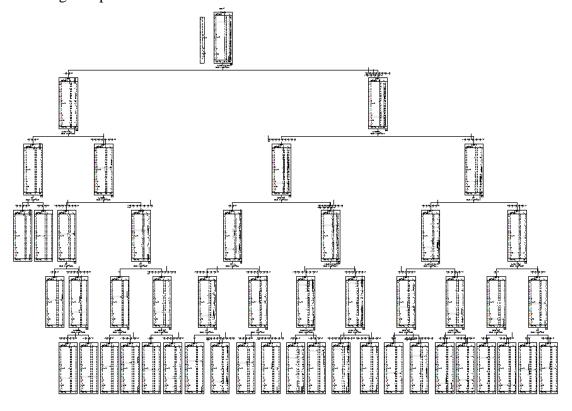
Classification #4

						Classificat																				
							Predicted																			Perce
	Observed	c	D	E	r	G.	н	ř.	J.	K	E.	м	N	0	P	0	R	8	T	U	V	w	×	Y	Z	Con
0	Α.	0	0	1	1	14	4	0	0	1	3	0	2	15	6	5	65	7	0	0	0	0	0	0	0	
	В	0	13	2	3	0	24	0	0	1	0	0	2	48	7	20	33	10	0	0	0	0	10	1	0	
	C .	371	0	2	7	13	12	- 1	4	3	0	0	0	37	2	3	68	5	0	- 1	0	0	0	0	0	
	D	0	425	0	0	0	21	0	0	10	0	0	6	46	.1	1	21	19	0	0	0	1	25	0	0	
	E	- 1	0	324	2	33	18	.4	0	29	.0	0	0	24	- 1	. 24	49	12	2	0	0	0	6	5	9	
	F	0	6	0	393	3	19	0	- 1	- 1	0	0	2	12	24	2	2	15	4	0	1	3	33	18	0	
	0	12	5	0	0	327	69	0	0	- 1	1		2	39	4	36	30	13	0	0	0	0	3	1	0	
	н	- 1	41	0	2	0	310	0	0	39	0	- 1	0	36	. 5	1	53	.11	0	0	0	0	20	0	0	
	()	0	0	1		2	4	411	- 1	2	0	0	0	17	8	6	4	6	0	0	0	0	13	1	4	
	1	0	6	0	6	2	0	6	392	11	7	1	2	37	- 11	9	14	4	0	0	0	0	-11	1	0	
	K	0	2	23	0	0	50	0	0	322	0	2	0	1	0	0	60	5	1	1	- 1	0	27	0	0	
	Ž.	0	1	0	0	6	13	2	3	20	399	0	0	9	0	4	70	5	0	0	0	0	4	0	0	
	M	-1	2	0	0	6	28	.0	0	11	- 4	441	. 4	10	1	6	- 11	0	0	2	0	4	0	0	0	
	N	0	7	0	2	0	10	0	0	0	- 1	- 5	399	37		- 1	10	- 1	0	15	1	7	2	13	0	
	0	0	27	0	0	8	47	0	0	15	0	0	1	364	. 1	33	14	2	0	0	0	0	3	0	0	
	Р	3	- 1	0	23	0	11	- 1	5	0	0	- 1	5	38	452	0	1	0	0	0	4	3	4	1	0	
	0	2	5	1	0	8	37	0	1	35	0	. 0	9	27	3	370	40	6	0	0	2	1	11	0	0	
	R	0	26	1	0	8	43	0	0	13	0	- 1	6	59	1	13	344	6	0	0	1	0	0	0	0	
	5	0	4	20	0	7	19	0	0	10	0	0	6	10	3	4	48	327	0	1	0	0	30	4	7	
	t	0	1	4	4	0	6	0	- 1	22	1	0	0	22	7	3	9	2	433	0	2	1	24	10	0	
	U	0	4	24	- 1	10	29	0	0	8	0	22	7	35	0	3	8	0	0	400	1	0	0	6	0	
	v .	- 1	1	0	6	1	21	0	0	0	0	0	- 1	7	. 5	11	12	0	2	1	438	18	0	7	0	
	W	0	2	0	6	- 5	42	0	0	4	0	- 6	5	4	6	9	1	0	0	0	6	427	0	0	0	
	×	0	7	34	3	0	38	0	0	14	0	0	- 1	16	3	0	64	7	0	0	0	0	373	0	0	
	Y	0	5	0	1	13	3	0	0	3	2	0	3	10	15	17	21	10	13	0	10	0	0	429	0	
																	13	44	- 1	0	0	0	8	6	388	
	Z.	0	1	7	1	2	2	0	- 1	- 5	1	.0	3	23	7	6										
	Z Overali Percentage	2.8%	4.2%	3.2%	3.3%	3.3%	6.3%	3.0%	2.9%	4.2%	3.0%	3.4%	3.3%	7.0%	4.1%	4.2%	7.6%	3.7%	3.2%	3.0%	3.3%	3.3%	4.3%	3.6%	2.9%	
	Overall Percentage	2.8%	4.2%	3.2%	3.3%	3.3%	6.3%	3.0%	2.9%	4.2%	3.0%	3.4%	3.3%	7.0%	4.1%	4.2%	7.6%	3.7%	3.2%	3.0%	3.3%	3.3%	4.3%	3.6%	2.9%	
		2.8%	4.2%	3.2%	3.3%	3.3% 6 1	6.3%	3.0%	2.9%	4.2%	3.0%	3.4%	3.3%	7.0%	4.1%	4.2% 7 7	7.6% 27 7	3.7%	3.2%	3.0%	3.3%	3.3%	4.3% 0 5	3.6%	2.9%	
	Overáll Percentage A B C	2.8% 0 0 125	4.2% 0 9	3.2% 0 0 3	3.3% 0 2	3,3% 6 1 8	6.3% 1 9	3.0% 0 0	0 0 3	1 2 1	0 0	3.4% 1 0	3.3% 0 2 0	7.0% 2 19 9	4.1% 0 4	7 7 7 3	7.6% 27 7 34	3.7% 3 6 4	0 0	0 0 2	0 0 0	0 0	4.3% 0 5	3.6% 0 0	2.9% 0 0	
	Overall Percentage A	2.8% 0 0 125	0 9 1 152	3.2% 0 0 3 3	3.3% 0 2 1	3.3% 6 1 8	6.3% 1 9 9	0 0 0	2.9% 0 0 3	1 2 1 3	0 0 0	3.4% 1 0 0	3.3% 0 2 0 8	7.0% 2 19 9	4.1% 0 4 1	4.2% 7 7 7 3	7.6% 27 7 34	3.7% 3 6 4 6	3.2% 0 0 0	30% 0 0 2	0 0 0	3.3% 0 0	4.3% 0 5 0	3.6% 0 0 1	2.9% 0 0	
	Overáll Percentage A B C	2.8% 0 0 125 0	4.2% 0 9 1 152	3.2% 0 0 3 3	3,3%	3.3% 6 1 8 0	63% 1 9 9	3.0% 0 0 0	2.9%	4.2% 1 2 1 3	3.0% 0 0 0	3.4% 1 0 0	3.3% 0 2 0 8	7.0% 2 19 9 23	41% 0 4 1 0	4.2% 7 7 7 3 1	7.6% 27 7 34 7 25	3.7% 3 6 4 6	3.2% 0 0 0	3.0% 0 0 2 0	3.3% 0 0 0 0	3.3% 0 0 0	4.3% 0 5 0 8	3.6% 0 0 1	2.9% 0 0 0 0	
	Overall Percentage A B C D	2.8% 0 0 125 0	4 2% 0 9 1 152 0	3.2% 0 0 3 3 125	3.3% 0 2 1 0 1 156	3.3% 6 1 8 0	63% 1 9 9 4 13	3.0% 0 0 0 0	2.9%	1 2 1 3 12 0	3.0% 0 0 0	3.4% 1 0 0 0	3.3% 0 2 0 8 0	7.0% 2 19 9 23 10	4.1% 0 4 1 0 0	4.2% 7 7 7 3 1 11	7.6% 27 7 34 7 25	3.7% 3 6 4 6 11	3.2% 0 0 0 0	3.0% 0 0 2 0 0	3.3% 0 0 0 0	3.3%	4.3% 0 5 0 8 4	3.6% 0 0 1 0	2.9% 0 0 0 0 2	
	Overall Percentage A B C C D G	2.8% 0 0 125 0 1	4 2% 0 9 1 152 0 3	3.2% 0 0 3 3 125 0	3.3% 0 2 1 0 1 156	3.3% 6 1 8 0 10 0	6.3% 1 9 9 4 13 13	3.0% 0 0 0 0 1	2.9%	1 2 1 3 12 0 0	3.0% 0 0 0 0	3.4% 1 0 0 0 1	3.3% 0 2 0 8 0 0	7.0% 2 19 9 23 10 6	41% 0 4 1 0 0 15	4.2% 7 7 7 3 1 11 2	7.6% 27 7 34 7 25 0 14	3.7% 3 6 4 6 11 5	3.2% 0 0 0 0 0	3.0% 0 0 2 0 0	3.3% 0 0 0 0 0	3.3% 0 0 0 0	4.3% 0 5 0 8 4 15	3.6% 0 0 1 0 1 4	2.9% 0 0 0 0 2	
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	Overall Percentage A B B C D B F F D H I I I I I I I I I I I I I I I I I I	28% 0 0 125 0 1 1 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 9 1 152 0 0 3 1 1 1 2 2 0 0 1 1 1 1 4 4 4 4 4 4 1 2 2 2 2 2	3.2% 0 0 0 3 3 125 0 1 1 0 0 0 1 1 1 7 2 7	3.3% 0 2 1 1 156 0 1 1 0 0 1 1 157 0 0 0 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1	3.3% 6 1 9 0 10 0 131 0 0 2 1 1 0 0 4 3 1 4 3 14	6 3% 6 3% 6 3% 6 3% 6 3% 6 3% 6 3% 6 3%	3.0% 0 0 0 0 1 0 0 191 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.9% 0 0 0 2 0 0 170 0 0 170 0 0 1 0 0 0 0 0 0 0 0 0	1 2 1 3 1 2 0 0 0 1 7 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0	3.0% 0 0 0 0 0 0 0 0 0 0 165 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3.4% 1 0 0 0 0 1 1 1 0 0 0 0 1 1 1 0 0 0 0	33% 0 2 0 8 0 0 0 0 0 0 0 1 178 0 3 3 4 4	7.0% 2 19 9 9 10 6 17 13 10 13 10 13 10 15 14 153 15 11 23 4 10 10 11 10 11 10 11 10 11 11 11 11 11	41% 0 4 1 0 0 15 3 6 5 0 0 11 8 0 184 0 0 1 5	7 7 3 1 11 2 9 0 4 4 1 0 0 2 1 1 3 0 1 2 3 6 6 0 0 1 1	7.6% 27 7 34 4 13 8 6 24 24 10 0 18 132 19 0 11 16 11 16 11	3.7% 3 6 4 6 6 11 5 6 7 2 1 1 3 2 2 0 0 0 1 1 0 0 4 4 5 5 137 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3.2% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	30% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 1 1 1 0 1	3.3% 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 1 1 0 0 0 1	3.3% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4.3% 0 5 0 8 4 15 7 12 7 1 1 2 0 0 0 1 2 7 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3.6% 0 0 1 1 0 1 1 4 1 1 0 0 0 4 0 0 4 0 0 2 5 5	2.9% 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0	
	Overall Percentage A B B C D B F F D H I I I I I I I I I I I I I I I I I I	2.8% 0 0 125 0 11 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 9 9 1 1 152 0 0 3 1 1 1 2 2 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1	3.2% 0 0 3 3 125 0 11 1 0 0 12 0 0 1 1 7 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3.3% 0 2 1 0 0 1 156 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 1 1 1	3.3% 6 1 8 0 10 0 131 0 0 2 1 1 0 0 6 4 3 3 14 0 9	63% 1 9 9 4 13 33 121 2 0 30 5 9 4 4 21 5 15 16 14	3.0% 0 0 0 0 1 1 0 0 191 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.9% 0 0 0 2 0 0 0 170 0 0 0 170 0 0 0 0 0 0 0 0 0 0	1 2 1 3 1 2 0 0 1 5 0 0 1 5 0 0 1 5 0 1 5 0 1 5 0 1 5 0 1 5 0 0 0 0	3.0% 0 0 0 0 0 0 0 0 0 0 10 10 10 0 0 0 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3.4% 1 0 0 0 1 1 1 1 0 0 221 1 0 0 0 7 0	3.3% 0 2 0 8 0 0 0 0 0 0 0 1 178 0 3 8 3 4 4 4	7.0% 2 19 9 23 10 6 17 13 10 0 5 4 14 15 11 23 4 10 10 10 10 11 2	41% 4 1 1 0 0 0 1 5 3 3 3 6 5 0 0 0 1 1 8 4 0 0 1 1 8 4 0 0 1 1 8 4 0 0 5 5 4 4	42% 7 7 7 3 1 11 2 9 0 4 1 0 2 1 0 13 0 123 6 6 0 1 1 1 2	7.6% 27 7 34 7 25 0 14 13 8 6 17 10 10 18 132 19 0 11 16	3,7% 3 6 4 6 11 5 6 7 7 2 1 1 3 2 2 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3.2% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	30% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0	3.3% 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 1 0 0 0 1 1 1 0 0 1 1 1 0 0 0 1 1 1 1 2 1 1 1 2 1 1 2 1 1 2 1 1 2 1 2 1 2 2 2 2 2 2 3 3 4 2 2 2 3 4 2 3 4 2 3 4 2 3 4 3 4	3.3% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4.3% 0 5 0 8 4 15 0 12 7 8 7 1 2 0 0 1 1 2 0 0 1 1 1 2 0 0 0 0 0 0 0	3.6% 0 0 1 1 1 4 1 0 1 1 0 0 3 1 1 0 0 0 4 0 0 2 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1	2.9% 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0	
	Overall Percentage A B B C D B F F D H I I I I I I I I I I I I I I I I I I	28% 0 0 125 0 115 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 2% 0 0 9 1 1 152 0 0 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3.2% 0 0 3 3 125 0 1 1 1 0 0 0 12 0 0 1 1 1 1 7 2 7 0 0 14	3.3% 0 0 2 1 1 1 1 1 1 1 1 2 2 0 0 0 1 1 1 1	3.3% 6 1 9 0 10 0 131 0 0 2 1 1 0 0 4 3 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	63% 1 9 9 4 13 33 121 2 0 5 5 9 4 13 13 13 13 10 10 10 10 10 10 10 10 10 10	3.0% 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0	2.9% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4.2% 1 2 2 1 3 3 12 0 0 17 7 17 0 0 0 7 7	3.0% 0 0 0 0 0 0 0 0 0 0 1055 1 1 1 0 0 0 0	3.4% 1 0 0 0 0 1 1 1 0 0 0 0 1 1 1 0 0 0 0	3.3% 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0	7.0% 2 16 9 23 10 6 17 12 10 0 5 4 14 153 15 11 22 4 10 10 10 10 10 10 10 10 10 10 10 10 10	4.1% 0 4 1 1 0 0 1 1 1 1 1 0 0 1 1 1 1 1 1 1	7 7 3 1 1 1 1 2 9 0 0 4 1 1 0 0 1 2 3 6 6 6 0 0 1 1 1 2 2 1 1	7.6% 27 7 34 7 25 0 14 13 8 6 24 1 7 10 0 18 132 19 0 11 16 1 16 1 1 25	3 7% 3 6 4 4 6 111 5 6 7 7 2 1 1 0 0 4 5 5 127 1 0 0 4 4 5 5 7	3.2% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	30% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 1 1 0 0 1 1 0	3.3% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3.3% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4.3% 0 5 0 8 4 4 15 7 7 1 2 0 0 17 7 0 0 17 17 9 0 0 147 147	3.6% 0 0 1 1 0 1 1 0 1 1 0 0 1 1 4 1 0 0 0 0	2.9% 0 0 0 0 0 2 0 0 0 0 0 0 4 0 0 0 0 0 0 0	

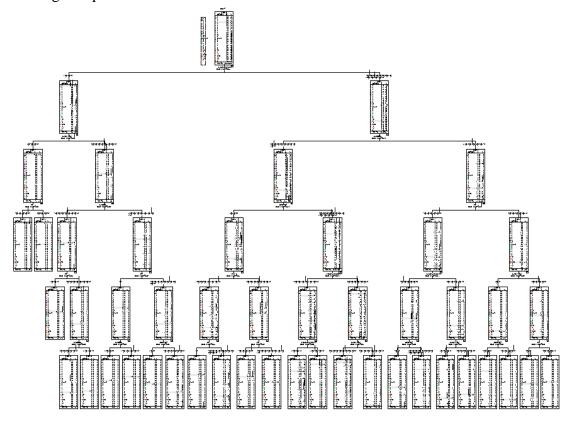
Model Summary #5

	Model Summa	ary #5
Specifications	Growing Method	CRT
	Dependent Variable	alphabet
	Independent Variables	horizonal, vertical, width, height,
		onpix, meanXpixels, meanYpixels,
		meanXvariance, meanYvariance,
		xybarmean, x2ybrMeanXXY,
		xy2brMeanXYY, xege, xegvy,
		edgeCount, yegvx
	Validation	Split Sample
	Maximum Tree Depth	5
	Minimum Cases in Parent	15
	Node	
	Minimum Cases in Child	4
	Node	
Results	Independent Variables	x2ybrMeanXXY, meanYpixels,
	Included	xybarmean, meanXpixels, horizonal,
		width, meanYvariance, xege,
		xy2brMeanXYY, meanXvariance,
		edgeCount, xegvy, yegvx, vertical,
		height, onpix
	Number of Nodes	49
	Number of Terminal Nodes	25
	Depth	5

Training Sample #5



Testing Sample #5



Classification #5

							Predicted																			
mp/le	Observed	C	D	E	F	G	н	7	J	к	1	м	N	0	р	0	R	8	т	U	v	w	×	v	z	Percer
bing	A	20	0	0	0	51	0	0	4	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	7
	В	0	0	0	- 1	18	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	
	C	309	0	0	6	136	0		0	0	0	0	0	0	0	0	0	0	5	43	0	0	0	0	0	
	D	0	0	0	0	12	0	0	1	0	0	0	2	0	0	0	0	12	0	41	0	0	0	0	49	
	E	138	0	0	5	302	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	12	
	F	0	0	0	138	6	0	0	0	0	0	0	1	0	9	0	0	0	126	24	103	0	0	0	0	
	G	46	. 0	0	2	398	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
	н	0	0	0	15	78	0	0	2	0	0	0	0	0	- 1	0	0	8	- 1	153	0	0	0	0	0	
	7	3	0	0	5	23	0	335	5	0	0	0	0	0	- 1	0	0	3	0	- 1	0	0	0	0	3	
	3	0	0	0	11	- 5	0	8	383	0	0	0	0	0	0	0	0	- 1	0	5	0	.0	0	0	0	
	K	40	0	0	0	280	0	0	6	0	0	1	0	0	0	0	0	12	0	83	0	0	0	0	0	
		28	0	0	0	78	0	4	16	0	369	0	0	0	0	0	0	21	0	0	0	0	0	0	0	
	M	0	0	0	0	27	0	0	1	0	0	403	2	0	0	0	0	11	0	8	0	3	0	0	0	
	N	0	0	0	12	11	0	0	- 1	0	0	11	40	0	1	0	0	9	0	362	9	3	0	0	0	
	0	0	0	0	1	123	0		0	0	0	0	0	0	0	0	0	0	0	46	0	1	0	0	5	
	D	0	0	0	44	11	0	0	0	0	0	0	3	0	263	0	0	0	18	16	3	0	0	0	0	
	0	4	0	0	19	379	0		0	0	0	0	5	0	3	0	0	1	1	6	10	0	0	0	0	
		0			81	51	0	0	2	0	0			0			7			0	0	0		0	0	
	R	0	0	0	4		0	0		0	1	0	1 0		15	0	0	28	0		0		0	0		
	3		0			80			0			0		0	. 0	0		38	0	3		0	0		55 8	
	T	0	0	0	8	52	0	0	0	0	0	0	. 0	0	23	0	0		389	0	26	0	0	0		
	U	4	0	0	0	65	0	0	1	0	0	13	0	0	0	0	0	0	7	408	0	0	0	0	2	
	V	0	0	0	2	9	0	0	0	0	0	0	2	0	4	0	0	0	20	146	311	4	0	0	0	
	W	0	0	0	7	2	0	0	0	0	0	1	2	0	0	Ò	0	0	0	173	17	228	0	0	0	
	×	0	0	0	0	105	0	0	- 1	0	0	0	0	0	0	0	0	18	3	2	.0	.0	0	0	82	
	Y	0	0	0	17	24	0	0	0	0	0	0	- 1	0	0	0	0	0	197	29	146	0	0	0	8	
	Z	0	0	0	18	126	0	0	0	0	0	0	0	0	0	0	0	9	2	0	0	0	0	0	294	
	Overall Percentage	4.2%	0.0%	0.0%	2.8%	17.5%	0.0%	2.5%	3.0%	0.0%	2.6%	3.1%	0.4%	0.0%	2.3%	0.0%	0.0%	1.3%	5.5%	11.0%	4.4%	1.7%	0.0%	0.0%	3.7%	
	A	8	0	0	0	21	0	0	5	0	0	1	0	0	0	0	0	7	0	0	0	0	0	0	0	
	В	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	c	129	0	0	. 6	60	0	0	0	0	. 0	0	0	0	0	0	0	0	2	21	0	0	0	0	0	
	D	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	4	0	19	0	0	0	0	16	
	F.	66	0	0	2	127	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	5	
	7	0	0	0	61	0	0	0	0	0	. 0	0	3	.0	- 5	0	0	0	62	8	44	0	0	0	0	
	G	23	0	0	-	169	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	
	н	0	0	0	- 6	25	0	0	0	0	0	0	0	0	1	0	0	5	0	58	0	0	0	0	0	
	7	2	0	0	3	7	0	137	3	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	2	
		0	0	0	8	3	0	2	164	0	0	0	0	0	0	0	0	1	0	5	0	0	0	0	0	
	V	22	0	0	0	109	0	0	2	0	0	0	0	0	0	0	0	4	0	42	0	0	0	0	0	
	-	8	0	0	0	32	0		10	0	135	0	0	0	0	0	0	10	0	0	0	0	0	0	0	
	M	0	0	0	0	16	0	0	10	0	135	167	0	0	0	0	0	10	0	3	0	0	0	0	0	
	N			0	7			0				7								160	6	1			0	
		0	0			4	0		0	0	.0		16	0	1	0	0	1	0				0	0		
	0	0	0	0	0	47	0	0	0	0	0	0	0	0	2	0	.0	0	0	21	0	1	0	0	0	
	P	0	0	0	20	7	0	- 1	0	0	0	0	- 1	0	120	0	0	0	. 4	14	- 1	0	0	0	0	
	0	2	0	0	5	143	0	0	0	0	0	0	- 1	0	0	0	0	2	0	- 1	5	1	0	0	0	
	R	0	0	0	29	30	0	0	0	0	0	0	0	0	3	0	2	14	0	0	0	0	0	0	0	
	5	0	0	0	4	32	0	0	0	. 0	- 1	0	0	0	- 1	0	0	9	0	2	0	0	0	0	27	
	T	0	0	0	10	15	0	0	0	. 0	. 0	0	0	.0	10	. 0	0	0	159	0	13		0	0	4	
	8	1	0	0	0	33	0	0	3	0	0	- 6	0	0	0	0	0	0	2	178	0	0	0	0	0	
	V	0	0	0	- 2	- 6	0	0	0	0	.0	0	4	0	0	0	0	0	7	51	108	2	0	0	0	
	W	0	0	0	2	1	0	0	0	0	0	1	2	0	0	0	0	0	0	85	8	113	0	0	0	
	×	0	0	0	0	54	0	0	0	0	0	0	0	0	0	0	0	. 10	0	4	0	0	0	0	39	
		0	0	0	5	8	0	0	0	0	0	0	0	0	0	0	0	0	91	10	65	4	0	0	- 1	
	- Y																									
	2	0	0	0	3	31	0	0	0	0	0	0	0	0	0	.0	0	4	0	0	0	0	0	0	116	

For this problem, the best configuration was #4. The Classification matrix indicates that this configuration has the best overall percent of correct predictions for both Training and Test data.

Problem 2.b.)

For this problem, the best configuration was #4. The classification is found above. In the Test sample, the smallest number of correct predictions was 55% and the largest was 85%. In the Training sample, the smallest was 58.5% and the largest was 82%. Accuracy is indeed a good indicator of the performance of a model. However, it can be misleading. To correct this, it would ideal to adjust the algorithms and execute multiple tests until the ideal model is found.

Problem 2.c.)

The most important attributes were "x2ybr mean of x*x*x", "y-bar mean y of pixels in box", and "y2bar mean y variance. In my models, they were named "x2ybr Mean XXY", "mean Yvariance" and "Mean Ypixels".

Problem 3. 1.)

For this data set, the data was standardized because the original numeric values were of various units, from "x-box horizontal position of box" to means and variances. The z-scores of each transformed variable to be used.

Problem 3.2.)

<u>K=1</u>

Initial Cluster Centers

	Cluster		
	1	2	
Zscore(horizonal)	-2.10303	3.64638	
Zscore(vertical)	-2.12896	2.41027	
Zscore(width)	-2.04613	3.91050	
Zscore(height)	-2.37561	1.60409	
Zscore(onpix)	-1.60059	1.59507	
Zscore(meanXpixels)	.05065	3.01214	
Zscore(meanYpixels)	1.07510	-2.36564	
Zscore(meanXvariance)	-1.34405	.50787	
Zscore(meanYvariance)	91505	-1.33506	
Zscore(xybarmean)	51518	1.49421	
Zscore(x2ybrMeanXXY)	1.72788	-2.07300	
Zscore(xy2brMeanXYY)	.03415	.51476	
Zscore(xege)	87728	2.12373	
Zscore(xegvy)	1.72041	-4.74457	
Zscore(edgeCount)	-1.43819	-1.04864	
Zscore(yegvx)	.12298	.12298	

Iteration History^a

			_
Change	in	Cluetor	Contore
CHAILUE	- 11 1	CHUSTEL	Cemers

Iteration	1	2
1	5.422	7.028
2	.426	.778
3	.288	.408
4	.194	.242
5	.130	.149
6	.089	.096

Keiland Pullen DSC 441 – Fall 2021

.059	.061
.040	.041
.029	.028
.018	.018
.014	.013
.010	.010
.005	.005
.002	.002
.001	.001
.002	.002
.001	.001
.001	.001
.001	.001
.001	.001
.001	.001
.001	.001
.000	.000
	.040 .029 .018 .014 .010 .005 .002 .001 .001 .001 .001 .001

a. Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is .000. The current iteration is 23. The minimum distance between initial centers is 14.459.

Final Cluster Centers

	Cluster		
	1	2	
Zscore(horizonal)	73007	.69584	
Zscore(vertical)	70460	.67157	
Zscore(width)	73195	.69764	
Zscore(height)	70029	.66746	
Zscore(onpix)	72202	.68818	
Zscore(meanXpixels)	11580	.11037	
Zscore(meanYpixels)	.03295	03140	
Zscore(meanXvariance)	00245	.00234	
Zscore(meanYvariance)	.00815	00777	
Zscore(xybarmean)	04329	.04126	
Zscore(x2ybrMeanXXY)	.06167	05878	
Zscore(xy2brMeanXYY)	.03420	03260	
Zscore(xege)	47848	.45605	

Zscore(xegvy)	01876	.01788
Zscore(edgeCount)	38039	.36255
Zscore(yegvx)	.04924	04693

Number of Cases in each Cluster

Cluster	1	9759.000
	2	10239.000
Valid		19998.000
Missing		.000

K=3

Initial Cluster Centers

	Cluster				
	1	2	3		
Zscore(horizonal)	1.03301	3.64638	-1.58036		
Zscore(vertical)	01065	2.41027	-2.12896		
Zscore(width)	1.42857	3.91050	-2.04613		
Zscore(height)	2.48847	1.60409	-2.37561		
Zscore(onpix)	2.05159	1.59507	-1.60059		
Zscore(meanXpixels)	1.53139	3.01214	-2.41727		
Zscore(meanYpixels)	2.79548	-2.36564	-2.79573		
Zscore(meanXvariance)	.13748	.50787	.50787		
Zscore(meanYvariance)	-1.75506	-1.33506	49505		
Zscore(xybarmean)	-2.12269	1.49421	-3.32832		
Zscore(x2ybrMeanXXY)	.58762	-2.07300	-1.31282		
Zscore(xy2brMeanXYY)	1.95657	.51476	-1.88827		
Zscore(xege)	.83758	2.12373	-1.30600		
Zscore(xegvy)	4.30640	-4.74457	21909		
Zscore(edgeCount)	.50956	-1.04864	-1.43819		
Zscore(yegvx)	1.35948	.12298	.12298		

Iteration History^a

Change in Cluster Centers

			1	
Iteration	1	2	3	

DDC TTI	1 411 2021		
1	6.546	6.714	6.254
2	.289	.550	.307
3	.141	.296	.101
4	.117	.208	.049
5	.157	.215	.026
6	.216	.242	.032
7	.263	.216	.043
8	.276	.176	.053
9	.349	.170	.062
10	.303	.121	.077
11	.239	.090	.079
12	.204	.076	.075
13	.153	.063	.073
14	.125	.051	.056
15	.083	.039	.043
16	.079	.034	.043
17	.062	.027	.034
18	.049	.026	.031
19	.040	.024	.026
20	.029	.018	.020
21	.023	.013	.017
22	.025	.015	.017
23	.016	.014	.016
24	.018	.009	.010
25	.013	.005	.008
26	.019	.007	.010
27	.014	.005	.006
28	.012	.006	.006
29	.016	.007	.008
30	.018	.009	.011
31	.018	.007	.012
32	.016	.009	.009
33	.016	.008	.009
34	.018	.010	.008
35	.023	.009	.011
36	.018	.006	.009
37	.019	.009	.010
38	.011	.008	.010
39	.009	.007	.006

40	.009	.004	.004
41	.007	.005	.003
42	.013	.003	.006
43	.014	.006	.008
44	.009	.005	.005
45	.008	.004	.004
46	.004	.002	.002
47	.005	.001	.002
48	.003	.002	.002
49	.003	.002	.001
50	.001	.001	.001
51	.000	.001	.001
52	.002	.000	.001
53	.002	.001	.000
54	.001	.000	.000
55	.002	.001	.000
56	.000	.001	.001
57	.000	.000	.000

a. Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is .000. The current iteration is 57. The minimum distance between initial centers is 12.600.

Final Cluster Centers

		Cluster	
	1	2	3
Zscore(horizonal)	05201	.74306	75618
Zscore(vertical)	09098	.70945	69947
Zscore(width)	06983	.77114	77612
Zscore(height)	16773	.71928	66804
Zscore(onpix)	40354	.84829	67579
Zscore(meanXpixels)	72195	.29674	.07998
Zscore(meanYpixels)	1.23086	20882	45002
Zscore(meanXvariance)	49727	.06490	.20236
Zscore(meanYvariance)	16107	01643	.10509
Zscore(xybarmean)	.49954	05242	21677
Zscore(x2ybrMeanXXY)	1.12767	23239	36893
Zscore(xv2brMeanXYY)	49636	.02805	.24077

Keiland Pullen DSC 441 – Fall 2021

Zscore(xege)	31921	.58534	44411
Zscore(xegvy)	.97529	15156	37125
Zscore(edgeCount)	69294	.53787	19041
Zscore(yegvx)	61629	.07927	.25202

Number of Cases in each Cluster

Cluster	1	4189.000
	2	8119.000
	3	7690.000
Valid		19998.000
Missing		.000

K = 5

Initial Cluster Centers

	Cluster								
	1	2	3	4	5				
Zscore(horizonal)	.51034	-1.58036	01234	2.07836	3.64638				
Zscore(vertical)	01065	-2.12896	.59458	1.19981	2.41027				
Zscore(width)	.93218	-2.04613	55698	1.42857	3.91050				
Zscore(height)	2.04628	-2.37561	.71971	1.16190	1.60409				
Zscore(onpix)	3.42116	-1.60059	-1.14407	.68202	1.59507				
Zscore(meanXpixels)	.54423	2.51856	-3.40443	.05065	3.01214				
Zscore(meanYpixels)	64527	-1.50546	-3.22583	1.50520	-2.36564				
Zscore(meanXvariance)	.13748	.50787	.50787	23290	.50787				
Zscore(meanYvariance)	-1.33506	91505	.34496	1.18498	-1.33506				
Zscore(xybarmean)	91705	1.89608	-3.32832	1.49421	1.49421				
Zscore(x2ybrMeanXXY)	17256	55265	-2.45309	.96771	-2.07300				
Zscore(xy2brMeanXYY)	.03415	1.47597	-1.40767	-1.88827	.51476				
Zscore(xege)	3.40988	-1.30600	-1.30600	44857	2.12373				
Zscore(xegvy)	2.36690	86559	21909	2.36690	-4.74457				
Zscore(edgeCount)	2.45731	-1.43819	-1.43819	.12001	-1.04864				
Zscore(yegvx)	4.45071	.12298	.12298	-2.35001	.12298				

Change in Cluster Centers

Iteration	1	2	e in Cluster C	4	5
1	5.180	4.643	4.830	4.458	5.478
2	.761	.457	.643	.385	1.108
3	.479	.257	.550	.513	.765
4	.295	.198	.315	.494	.475
5	.199	.123	.146	.303	.297
6	.157	.087	.080	.207	.187
7	.114	.073	.053	.154	.134
8	.100	.055	.036	.121	.086
9	.076	.044	.031	.092	.068
10	.060	.032	.027	.071	.054
11	.053	.021	.021	.048	.052
12	.041	.019	.018	.038	.040
13	.029	.018	.016	.029	.029
14	.020	.013	.013	.025	.018
15	.016	.009	.010	.015	.018
16	.013	.015	.015	.011	.017
17	.012	.019	.017	.016	.015
18	.009	.008	.007	.011	.010
19	.006	.007	.006	.011	.007
20	.005	.003	.002	.005	.006
21	.004	.003	.002	.004	.006
22	.002	.003	.002	.002	.005
23	.002	.006	.005	.002	.004
24	.001	.004	.003	.003	.002
25	.002	.002	.001	.002	.002
26	.002	.003	.002	.002	.003
27	.003	.003	.002	.003	.004
28	.004	.002	.002	.004	.004
29	.003	.001	.001	.002	.000
30	.001	.001	.000	.002	.000
31	.002	.002	.002	.002	.000
32	.001	.003	.001	.003	.000
33	.000	.002	.001	.002	.000
34	.000	.001	.001	.001	.000
35	.000	.001	.000	.001	.000
36	.000	.000	.000	.000	.000

Keiland Pullen DSC 441 – Fall 2021

a. Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is .000. The current iteration is 36. The minimum distance between initial centers is 9.947.

Final Cluster Centers

	Cluster							
	1	2	3	4	5			
Zscore(horizonal)	1.05025	-1.14934	07985	.03358	.20958			
Zscore(vertical)	.78617	-1.30366	.10069	.02075	.49377			
Zscore(width)	1.14130	-1.18117	16600	.01830	.28719			
Zscore(height)	.84468	-1.33603	.25816	05700	.29459			
Zscore(onpix)	1.33549	99071	04453	35596	.01641			
Zscore(meanXpixels)	.14154	.02415	18899	79046	1.01764			
Zscore(meanYpixels)	.02731	23325	21320	1.27250	88312			
Zscore(meanXvariance)	09069	14402	.93713	49643	61902			
Zscore(meanYvariance)	22650	05974	.25107	11263	.11078			
Zscore(xybarmean)	16728	16650	62037	.54274	.81272			
Zscore(x2ybrMeanXXY)	.03807	19370	07756	1.15092	-1.02680			
Zscore(xy2brMeanXYY)	05818	.03812	.36974	52508	.04818			
Zscore(xege)	1.11087	54270	12118	33159	18366			
Zscore(xegvy)	.18151	21485	19323	.98038	80268			
Zscore(edgeCount)	.65182	41960	.30922	65887	04096			
Zscore(yegvx)	35819	.12764	.40509	67482	.45246			

Number of Cases in each Cluster

Cluster	1	4154.000
	2	4117.000
	3	5001.000
	4	3643.000
	5	3083.000
Valid		19998.000
Missing		.000

K = 7

Initial Cluster Centers

	Cluster							
	1	2	3	4	5	6	7	
Zscore(horizonal)	5.73707	.51034	-1.05768	.51034	3.64638	-1.58036	.51034	
Zscore(vertical)	2.41027	01065	-1.22111	01065	2.41027	-2.12896	1.19981	
Zscore(width)	4.90327	.93218	-1.05336	.93218	3.91050	-2.04613	06059	
Zscore(height)	1.16190	2.04628	16467	16467	1.60409	-2.37561	1.16190	
Zscore(onpix)	1.59507	3.42116	-1.14407	23102	1.59507	-1.60059	23102	
Zscore(meanXpixels)	1.03781	.54423	3.50573	44294	3.01214	-2.41727	-1.92368	
Zscore(meanYpixels)	1.50520	64527	-2.79573	2.79548	-2.36564	-2.79573	.21492	
Zscore(meanXvariance)	.50787	.13748	.87825	.13748	.50787	.50787	.50787	
Zscore(meanYvariance)	49505	-1.33506	07504	-1.33506	-1.33506	49505	2.86500	
Zscore(xybarmean)	-1.72081	91705	2.29796	1.49421	1.49421	-3.32832	51518	
Zscore(x2ybrMeanXXY)	17256	17256	-1.69291	93273	-2.07300	-1.31282	17256	
Zscore(xy2brMeanXYY)	.99536	.03415	1.47597	-3.33009	.51476	-1.88827	3.39839	
Zscore(xege)	3.40988	3.40988	-1.30600	-1.30600	2.12373	-1.30600	-1.30600	
Zscore(xegvy)	3.01340	2.36690	86559	1.07391	-4.74457	21909	21909	
Zscore(edgeCount)	65909	2.45731	-1.43819	26954	-1.04864	-1.43819	1.28866	
Zscore(yegvx)	-1.11351	4.45071	.12298	.12298	.12298	.12298	-1.11351	

Iteration History^a

	Change in Cluster Centers									
Iteration	1	2	3	4	5	6	7			
1	5.126	5.045	4.421	4.397	5.410	4.622	4.457			
2	1.296	.792	.525	.734	1.085	.729	.338			
3	.658	.392	.233	.620	.586	.248	.341			
4	.470	.277	.138	.310	.429	.068	.252			
5	.286	.184	.101	.182	.298	.057	.155			
6	.192	.111	.070	.126	.154	.064	.102			
7	.156	.072	.040	.096	.075	.076	.075			
8	.123	.036	.021	.082	.051	.062	.058			
9	.097	.029	.032	.065	.025	.065	.051			
10	.085	.024	.011	.066	.019	.046	.033			
11	.073	.019	.009	.055	.011	.034	.028			
12	.071	.021	.008	.053	.009	.026	.017			

DSC 441	- Fall 2021						
13	.069	.024	.016	.046	.006	.017	.011
14	.069	.021	.017	.051	.009	.026	.009
15	.070	.026	.014	.048	.007	.026	.007
16	.081	.033	.012	.062	.014	.033	.005
17	.072	.026	.015	.055	.017	.027	.009
18	.067	.026	.008	.055	.015	.027	.005
19	.067	.025	.009	.057	.016	.026	.006
20	.059	.020	.004	.039	.012	.021	.007
21	.040	.017	.006	.033	.010	.021	.007
22	.035	.012	.006	.028	.012	.011	.004
23	.031	.007	.004	.023	.010	.004	.003
24	.017	.006	.003	.012	.009	.007	.004
25	.013	.005	.001	.009	.005	.004	.002
26	.008	.005	.002	.006	.004	.002	.003
27	.010	.003	.000	.009	.002	.003	.002
28	.008	.003	.001	.006	.003	.002	.000
29	.009	.002	.001	.009	.002	.002	.001
30	.006	.001	.002	.005	.003	.002	.001
31	.003	.002	.002	.004	.002	.002	.002
32	.003	.002	.001	.003	.002	.002	.002
33	.003	.001	.003	.004	.000	.003	.002
34	.004	.001	.002	.004	.000	.003	.001
35	.004	.001	.002	.003	.000	.002	.000
36	.001	.000	.002	.002	.001	.001	.000
37	.002	.000	.002	.000	.001	.001	.001
38	.000	.001	.000	.000	.000	.000	.001

a. Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is .000. The current iteration is 39. The minimum distance between initial centers is 9.084.

.000 .000 .000

Final Cluster Centers

.000

.000

.000

		Cluster							
	1	2	3	4	5	6	7		
Zscore(horizonal)	.98747	.67096	74320	61123	1.01679	-1.14133	07864		
Zscore(vertical)	.75615	.51225	33156	63764	.98220	-1.42631	.11961		
Zscore(width)	.76537	.92732	50173	50811	.90013	-1.30091	16932		
Zscore(height)	.55100	.76795	44117	68164	.67040	-1.37439	.26798		
Zscore(onpix)	.23059	1.50815	59562	77650	.53482	-1.00169	07639		

Zscore(meanXpixels)	97613	.25988	.77027	50726	.90371	15876	20325
Zscore(meanYpixels)	.92023	03229	80195	1.35551	64292	33586	20149
Zscore(meanXvariance)	40236	.08486	77810	54549	47470	.28029	.94501
Zscore(meanYvariance)	.17913	48517	.15749	37375	.21394	14366	.31942
Zscore(xybarmean)	.85586	55744	.83830	.20387	.69163	65801	60198
Zscore(x2ybrMeanXXY)	.91257	.02965	84220	1.22855	87903	24739	07836
Zscore(xy2brMeanXYY)	41056	.04843	.18037	46491	17018	.05454	.38256
Zscore(xege)	.05485	1.30844	66361	45277	.26901	44713	17618
Zscore(xegvy)	.86165	.13963	72609	.97672	63464	25253	17879
Zscore(edgeCount)	28308	.76769	51297	89126	.44488	28635	.32268
Zscore(yegvx)	99491	36342	.02151	36672	.68135	.26103	.42469

Number of Cases in each Cluster

Cluster	1	2330.000
	2	3062.000
	3	2498.000
	4	2448.000
	5	2385.000
	6	2687.000
	7	4588.000
Valid		19998.000
Missing		.000

Problem 3.3.)

To analyze the results, a "crosstabs" Bar Chart was used to display the results of the Clusters. A visual comparison between the crosstabs and decision trees proves a bit difficult to determine, however, it seems that the Cluster may be more accurate.

