Table 1: Dataset Description

Dataset	**Rows**	**Features**	**Classes**	**Type**
NBA	1340	19	2	Numerical
Wi-Fi	2000	7	4	Numerical
Statlog	58000	9	7	Numerical
Forest	54000	54	6	Mixed
Abalone	4177	8	29	Mixed
Character	6000	7	10	Categorical
Car	1728	6	4	Categorical
Chess	28056	6	17	Categorical
Mushroom	8124	21	2	Categorical
Tic-Tac-Toe	958	9	2	Categorical

Table 2: Simulated User Study for different number of rules

Dataset	Approach	Set Score	Fraction Overlap	Fraction Uncovered	Rule Length	Set Score	Fraction Overlap	Fraction Uncovered	Rule Length
		5 Rules				10 Rules			
NBA	Magix	72.76	0.41	8.95	**1.0**	**81.72**	0.45	2.23	1.3
	Apriori+SLS	**75.81**	0.27	**1.11**	1.2	75.90	0.40	**0.37**	**1.2**
	DT	45.15	**0.00**	57.46	7.0	51.68	**0.00**	36.56	6.7
	Anchors	37.78	0.02	49.39	2.6	50.00	0.03	40.96	2.8
		15 Rules				20 Rules			
NBA	Magix	**81.72**	0.47	0.74	1.5	**81.72**	0.47	**0.37**	1.6
	Apriori+SLS	76.12	0.40	**0.37**	**1.2**	76.12	0.40	0.37	**1.2**
	DT	56.71	**0.00**	27.61	6.7	57.46	**0.00**	25.00	6.7
	Anchors	58.52	0.04	38.55	2.8	61.48	0.08	33.73	2.8
		5 Rules				10 Rules			
Wi-Fi	Magix	**78.25**	0.12	**18.00**	**1.0**	**92.75**	0.28	**2.50**	1.3
	Apriori+SLS	60.50	0.01	20.25	1.0	66.00	0.57	5.25	**1.2**
	DT	44.00	**0.00**	53.5	6.8	44.25	**0.00**	30.00	6.1
	Anchors	63.43	0.00	34.78	2.2	80.59	0.00	15.52	2.4
		15 Rules				20 Rules			
Wi-Fi	Magix	**95.25**	0.37	**0.25**	1.5	**95.00**	0.45	**0.25**	1.6
	Apriori+SLS	66.20	0.80	1.25	**1.1**	66.80	0.80	1.25	**1.1**
	DT	45.25	**0.00**	29.20	5.7	69.75	**0.00**	28.00	5.8
	Anchors	85.82	0.00	8.07	2.3	89.05	0.00	5.59	2.5
		5 Rules				10 Rules			
Shuttle	Magix	**95.77**	0.14	2.59	**1.2**	**99.51**	0.15	0.16	1.4
	Apriori+SLS	62.72	0.83	5.35	1.4	62.85	0.85	4.36	**1.3**
	DT	94.15	**0.06**	**0.00**	2.0	94.15	**0.06**	**0.00**	2.0
	Anchors	53.33	0.06	26.66	2.6	60.00	0.26	0.00	2.5
		15 Rules				20 Rules			
Shuttle	Magix	**99.64**	0.15	0.06	1.7	**99.65**	0.15	0.06	1.95
	Apriori+SLS	62.95	0.85	4.36	**1.3**	63.22	0.85	4.36	**1.3**
	DT	94.15	**0.06**	**0.00**	2.0	94.15	**0.06**	**0.00**	2.0
	Anchors	73.33	0.26	0.00	2.6	73.33	0.26	0.00	3.0
		5 Rules				10 Rules			
Forest	Magix	**70.26**	0.41	13.98	2.0	**71.76**	0.53	5.37	2.1
	Apriori+SLS	18.53	**0.00**	**0.00**	**1.0**	18.53	**0.00**	**0.00**	**1.0**
	DT	32.05	0.00	65.57	7.0	32.88	0.00	64.74	6.4
	Anchors	22.73	0.00	80.05	3.6	31.90	0.00	70.61	4.8
		15 Rules				20 Rules			
Forest	Magix	**71.76**	0.53	5.37	2.1	**71.76**	0.53	5.37	2.1
	Apriori+SLS	19.61	**0.00**	**0.00**	**1.0**	19.83	**0.00**	**0.00**	**1.0**
	DT	32.99	0.00	64.60	6.5	33.09	0.00	64.15	6.5
	Anchors	38.72	0.00	63.38	5.3	43.44	0.00	57.48	5.5
		5 Rules				10 Rules			
Abalone	Magix	**84.81**	0.16	25.95	1.2	**89.71**	0.63	3.94	1.3
	Apriori+SLS	14.47	0.32	**0.00**	**1.0**	16.57	0.32	**0.00**	**1.0**
	DT	23.20	**0.00**	79.78	5.0	30.86	**0.00**	64.35	5.0
	Anchors	33.88	0.28	28.57	3.0	34.72	0.28	0.00	3.2
		15 Rules				20 Rules			
Abalone	Magix	**89.95**	0.82	0.35	1.5	**90.07**	0.84	0.23	1.7
	Apriori+SLS	18.77	0.32	**0.00**	**1.0**	19.47	0.32	**0.00**	**1.0**
	DT	42.58	**0.00**	41.26	5.0	49.04	**0.00**	12.20	5.0
	Anchors	41.62	0.28	0.00	3.1	42.81	0.28	0.00	3.1

Table 3: Simulated User Study for different number of rules contd.

Dataset	Approach	Set Score	Fraction Overlap	Fraction Uncovered	Rule Length	Set Score	Fraction Overlap	Fraction Uncovered	Rule Length
		5 Rules				10 Rules			
Character	Magix	**26.91**	0.36	**5.41**	**1.0**	**35.02**	0.64	**2.60**	1.3
	Apriori+SLS	18.78	0.52	8.57	1.0	19.18	0.52	8.57	**1.0**
	DT	16.79	**0.00**	74.01	5.0	20.32	**0.00**	68.14	5.0
	Anchors	7.41	0.00	91.92	5.2	11.08	0.00	85.35	5.4
		15 Rules				20 Rules			
Character	Magix	**39.29**	0.71	**1.77**	1.8	**41.98**	0.75	**1.20**	2.0
	Apriori+SLS	19.48	0.52	8.57	**1.0**	18.78	0.52	8.57	**1.0**
	DT	23.60	**0.00**	63.31	5.0	30.63	**0.00**	51.39	5.0
	Anchors	13.02	0.00	79.79	5.4	13.96	0.00	75.45	5.3
		5 Rules				10 Rules			
Car	Magix	**88.43**	0.18	5.78	1.4	**92.77**	0.2716	1.15	2.2
	Apriori+SLS	84.97	0.17	**0.00**	**1.0**	86.99	0.17	**0.00**	**1.0**
	DT	61.85	**0.00**	0.00	1.7	71.09	**0.00**	0.00	1.7
	Anchors	28.30	0.00	79.05	2.6	39.62	0.04	33.96	2.6
		15 Rules				20 Rules			
Car	Magix	**92.77**	0.28	1.15	2.36	**92.77**	0.28	1.15	2.4
	Apriori+SLS	86.99	0.17	**0.00**	**1.0**	86.99	0.17	**0.00**	**1.0**
	DT	74.85	**0.00**	0.00	1.67	77.74	**0.00**	0.00	1.7
	Anchors	47.16	0.06	24.52	2.86	50.94	0.09	18.86	2.9
		5 Rules				10 Rules			
Chess	Magix	**67.76**	0.06	3.06	1.6	**74.96**	0.14	**0.00**	1.9
	SLS	24.87	0.48	**0.00**	**1.0**	25.47	0.48	0.00	**1.0**
	DT	49.41	**0.00**	36.79	3.4	56.95	**0.00**	20.45	3.3
	Anchors	9.18	0.01	87.75	3.6	9.18	0.01	81.63	3.4
		15 Rules				20 Rules			
Chess	Magix	**76.46**	0.15	**0.00**	2.33	**76.47**	0.16	**0.00**	2.4
	SLS	26.19	0.48	0.00	**1.0**	28.12	0.48	0.00	**1.0**
	DT	62.86	**0.00**	10.21	3.46	65.11	**0.00**	4.02	3.6
	Anchors	11.22	0.02	81.63	3.6	14.28	0.02	80.61	3.7
		5 Rules				10 Rules			
Mush room	Magix	**96.86**	0.19	**0.00**	**1.7**	**98.03**	0.19	**0.00**	**1.75**
	SLS	75.81	0.82	0.0	2.0	76.11	0.82	0.00	2.0
	DT	91.56	**0.00**	0.0	2.0	91.56	**0.00**	0.00	2.0
	Anchors	77.95	0.00	18.85	2.4	91.93	0.00	4.63	2.2
		15 Rules				20 Rules			
Mush room	Magix	**98.03**	0.19	**0.00**	**1.75**	98.03	0.19	**0.00**	**1.7**
	SLS	76.23	0.82	0.00	2.0	76.47	0.82	0.00	2.0
	DT	91.56	**0.00**	0.00	2.0	91.56	**0.00**	0.00	2.0
	Anchors	97.26	0.01	1.46	2.3	**99.04**	0.01	0.00	2.3
		5 Rules				10 Rules			
Tic Tac Toe	Magix	**91.14**	0.15	**0.00**	1.8	**92.18**	0.15	**0.00**	2.2
	SLS	80.21	**0.00**	2.60	**1.0**	89.06	**0.00**	0.52	**1.1**
	DT	51.56	0.00	53.64	3.8	65.10	0.00	41.66	4.7
	Anchors	33.58	0.00	61.94	3.0	50.75	0.02	44.02	3.1
		15 Rules				20 Rules			
Tic Tac Toe	Magix	**92.18**	0.15	**0.00**	2.2	**92.18**	0.15	**0.00**	2.2
	SLS	89.06	**0.00**	0.52	**1.1**	89.06	**0.00**	0.52	**1.1**
	DT	74.48	0.00	29.16	5.0	77.60	0.00	22.91	5.3
	Anchors	61.19	0.05	32.83	3.2	68.65	0.05	23.88	3.3

Table 4: Ablation 1: Variations of LIME

Dataset	**Approach**	**20 Rules**			
		Set Score	Fraction Overlap	Fraction Uncovered	Rule Length
NBA	LIME	**81.72**	0.47	**0.37**	**1.6**
	Apriori (1%)	72.01	**0.17**	10.44	2.0
	Apriori (5%)	77.61	0.21	6.71	1.7
Wi-Fi	LIME	95.00	0.45	**0.25**	1.6
	Apriori (1%)	93.75	0.54	2.00	1.6
	Apriori (5%)	**96.00**	**0.36**	0.25	**1.5**
Statlog	LIME	**99.65**	0.15	**0.06**	**1.95**
	Apriori (1%)	87.34	**0.10**	7.11	2.55
	Apriori (5%)	93.13	0.84	0.36	2.4
Forest	LIME	71.76	**0.53**	5.37	**2.1**
	Apriori (1%)	80.63	0.73	**0.00**	4.5
	Apriori (5%)	**80.78**	0.83	0.00	4.5
Abalone	LIME	**90.07**	**0.84**	0.23	**1.7**
	Apriori (1%)	57.41	0.85	**0.00**	2.3
	Apriori (5%)	50.00	0.72	0.00	2.8
Character	LIME	**41.98**	0.75	**1.2**	**2.0**
	Apriori (1%)	39.97	0.57	7.74	2.8
	Apriori (5%)	41.54	**0.54**	8.74	3.0
Car	LIME	**93.77**	0.28	1.15	**2.3**
	Apriori (1%)	93.06	**0.01**	**0.00**	4.6
	Apriori (5%)	91.04	0.21	5.20	4.9
Chess	LIME	**78.62**	**0.16**	**0.00**	**2.4**
	Apriori (1%)	78.59	0.40	0.00	3.0
	Apriori (5%)	78.28	0.47	0.00	2.9
Mush room	LIME	**98.03**	0.18	**0.0**	**1.7**
	Apriori (1%)	94.40	0.003	5.54	3.5
	Apriori (5%)	98.01	**0.00**	0.49	3.5
Tic Tac Toe	LIME	**92.18**	**0.14**	**0.00**	**2.1**
	Apriori (1%)	92.17	0.14	0.00	3.0
	Apriori (5%)	92.12	0.36	0.00	3.7

Table 5: Ablation 2: Variations of the Rule Fitness Function

Dataset	**Approach**	**20 Rules**			
		Set Score	Fraction Overlap	Fraction Uncovered	Rule Length
NBA	MI	81.72	**0.47**	**0.37**	**1.6**
	F_1	**82.08**	0.58	0.37	1.6
Wi-Fi	MI	**95.00**	**0.45**	**0.25**	1.6
	F_1	95.00	0.58	0.50	**1.4**
Statlog	MI	**99.65**	**0.15**	0.06	1.95
	F_1	99.48	0.72	**0.02**	**1.75**
Forest	MI	**71.76**	**0.53**	5.37	2.1
	F_1	46.45	0.99	**0.00**	**1.5**
Abalone	MI	**90.07**	0.84	0.23	1.7
	F_1	89.47	**0.07**	**0.00**	**1.6**
Character	MI	**41.98**	**0.75**	**1.20**	2.0
	F_1	41.98	0.81	3.21	**1.7**
Car	MI	**93.77**	**0.28**	1.15	2.3
	F_1	93.35	0.45	**0.00**	**1.7**
Chess	MI	**78.62**	**0.16**	**0.00**	**2.4**
	F_1	74.34	0.19	0.00	2.7
Mush room	MI	98.03	**0.18**	**0.00**	1.7
	F_1	**98.89**	0.62	0.00	**1.6**
Tic Tac Toe	MI	**92.18**	**0.14**	**0.00**	2.1
	F_1	89.58	0.26	0.00	**1.2**

Table 6: Ablation 3: Variations of the Genetic Algorithm

Dataset	**Approach**	**20 Rules**			
		Set Score	Fraction Overlap	Fraction Uncovered	Rule Length
NBA	GA	**81.72**	**0.47**	**0.37**	1.6
	Apriori+SLS	69.77	0.72	2.61	**1.1**
Wi-Fi	GA	**95.00**	**0.45**	**0.25**	1.6
	Apriori+SLS	61.50	0.66	3.50	**1.2**
Statlog	GA	**99.65**	**0.15**	**0.06**	1.9
	Apriori+SLS	78.62	0.91	0.94	**1.0**
Forest	GA	**71.76**	**0.53**	5.37	2.1
	Apriori+SLS	18.19	0.99	**0.00**	**1.0**
Abalone	GA	**90.07**	0.84	**0.23**	1.7
	Apriori+SLS	67.10	**0.68**	24.40	**1.3**
Character	GA	**41.98**	0.75	**1.20**	2.0
	Apriori+SLS	20.89	**0.73**	5.01	**1.0**
Car	GA	**93.77**	0.28	**1.15**	2.3
	Apriori+SLS	92.77	**0.00**	2.31	**1.1**
Chess	GA	**78.62**	**0.16**	**0.00**	2.4
	Apriori+SLS	17.83	0.16	4.95	**1.0**
Mush room	GA	**98.03**	**0.18**	**0.00**	1.7
	Apriori+SLS	75.75	0.59	0.18	**1.5**
Tic-Tac Toe	GA	**92.18**	**0.14**	**0.00**	2.1
	Apriori+SLS	81.77	0.38	6.25	**1.4**