TABLE III

THE ACCURACY OF RSMOTE TO PREDICT THE SEVERITY OF *ECLIPSE*.

		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
Eclipse_JDT_Debug	Original	70.78	**71.08**	68.37	70.78	71.08	70.25
	RUS	**67.77**	66.87	60.24	54.52	67.77	62.35
	ROS	67.77	**71.08**	70.08	68.67	71.08	69.40
	CMA	**70.78**	63.27	68.56	65.37	70.78	67.00
	SMOTE	**71.39**	65.06	63.25	**71.39**	71.39	67.77
	RSMOTE	**71.59**	68.37	70.08	67.87	**71.59**	**69.48**
Eclipse_CDT-core		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
	Original	68.06	**80.63**	73.82	80.10	80.63	75.65
	RUS	55.50	**72.77**	62.30	52.88	72.77	60.86
	ROS	66.49	**80.63**	76.96	73.82	80.63	74.48
	CMA	79.25	74.36	**80.00**	76.96	80.00	77.64
	SMOTE	79.58	73.82	**80.17**	75.92	80.17	77.37
	RSMOTE	80.80	73.65	**81.15**	79.58	**81.15**	**78.80**
Eclipse_JDT_Core		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
	Original	68.97	72.58	75.21	**77.67**	77.67	73.61
	RUS	69.46	**69.95**	62.73	54.68	69.95	64.21
	ROS	66.83	72.58	69.29	**76.35**	76.35	71.26
	CMA	77.01	66.67	71.76	**78.28**	78.28	73.43
	SMOTE	75.37	66.67	70.77	**76.19**	76.19	72.25
	RSMOTE	74.06	75.18	71.76	**78.54**	**78.54**	**74.89**
Eclipse_PDE_UI		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
	Original	70.52	71.90	66.67	**71.90**	71.90	70.25
	RUS	**69.70**	68.04	60.06	63.36	69.70	65.29
	ROS	68.87	**71.90**	68.60	64.74	71.90	68.53
	CMA	58.63	56.16	71.28	**73.16**	73.16	64.81
	SMOTE	**73.55**	65.01	72.45	69.42	73.55	70.11
	RSMOTE	70.52	74.10	72.91	**74.75**	**74.75**	**73.07**
Eclipse_Platform_Debug		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
	Original	**62.97**	52.36	58.96	58.96	62.97	58.31
	RUS	**64.62**	51.89	54.72	53.77	64.62	56.25
	ROS	66.51	52.36	**67.45**	61.79	67.45	62.03
	CMA	**71.70**	43.38	70.16	63.68	71.70	62.23
	SMOTE	**69.81**	52.36	68.40	58.02	69.81	62.15
	RSMOTE	**72.48**	53.46	67.30	63.21	**72.48**	**64.11**
Eclipse_Platform_UI		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
	Original	60.43	69.60	65.78	**73.57**	73.57	67.35
	RUS	61.30	58.70	62.02	**67.73**	67.73	62.44
	ROS	60.72	69.60	67.29	**70.11**	70.11	66.93
	CMA	58.63	55.79	70.13	**73.25**	73.25	64.45
	SMOTE	59.13	63.97	67.08	**73.94**	73.94	66.03
	RSMOTE	61.40	64.28	70.30	**74.83**	**74.83**	**67.70**
Eclipse_ALL		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
	AVG.	**68.42**	**66.11**	**68.84**	**69.16**	**73.15**	**68.13**

TABLE V
THE ACCURACY OF RSMOTE TO PREDICT THE SEVERITY OF *GNOME*.

		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
GNOME_Panel_Panel	Original	77.57	79.04	82.72	**83.64**	83.64	80.74
	RUS	77.39	**78.49**	75.92	78.13	78.49	77.48
	ROS	77.21	78.86	81.99	**84.19**	84.19	80.56
	CMA	80.33	**86.03**	82.54	84.56	86.03	83.37
	SMOTE	79.78	80.70	81.80	**83.09**	83.09	81.34
	RSMOTE	79.47	**86.52**	83.09	84.80	**86.52**	**83.47**
		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
GNOME_Terminal_General	Original	86.70	93.10	92.60	**93.60**	93.60	91.50
	RUS	83.54	**92.93**	89.11	92.02	92.93	89.40
	ROS	92.02	93.10	93.02	**93.10**	93.10	92.81
	CMA	92.85	**94.43**	93.18	94.10	94.43	93.64
	SMOTE	92.69	87.61	92.19	**93.85**	93.85	91.59
	RSMOTE	93.52	**95.15**	92.38	94.02	**95.15**	**93.77**
		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
GNOME_Ekiga_General	Original	**91.21**	90.66	91.03	91.01	91.21	90.98
	RUS	91.76	**95.24**	91.21	90.48	95.24	92.17
	ROS	**91.39**	90.66	89.56	91.03	91.39	90.66
	CMA	91.39	91.39	**93.04**	91.76	93.04	91.90
	SMOTE	91.58	**93.77**	92.86	91.94	93.77	92.54
	RSMOTE	91.70	**95.54**	92.49	91.76	**95.54**	**92.87**
		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
GNOME_Evolution_Calendar	Original	79.30	81.78	**82.28**	81.73	82.28	81.27
	RUS	77.09	**79.56**	70.36	72.83	79.56	74.96
	ROS	79.13	81.18	**81.94**	76.75	81.94	79.75
	CMA	82.37	79.56	81.00	**83.39**	83.39	81.58
	SMOTE	**81.77**	79.05	79.90	81.18	81.77	80.48
	RSMOTE	81.40	**83.28**	80.64	82.57	**83.28**	**81.97**
		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
GNOME_Evolution_Contacts	Original	73.86	73.49	72.26	**74.97**	74.97	73.65
	RUS	71.52	**73.61**	68.43	66.72	73.61	70.07
	ROS	72.63	73.12	71.76	**74.48**	74.48	73.00
	CMA	73.61	**79.65**	76.57	71.39	79.65	75.31
	SMOTE	73.37	**77.07**	72.50	71.52	77.07	73.62
	RSMOTE	71.80	**82.16**	75.50	73.28	**82.16**	**75.69**
		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
GNOME_Evolution_Shell	Original	76.76	**76.94**	73.94	76.76	76.94	76.10
	RUS	**75.35**	75.00	70.25	73.24	75.35	73.46
	ROS	**76.41**	76.06	75.53	76.06	76.41	76.02
	CMA	77.46	**81.51**	75.00	76.06	81.51	77.51
	SMOTE	77.11	76.06	75.35	**77.82**	77.82	76.59
	RSMOTE	77.17	**82.63**	76.17	76.23	**82.63**	**78.05**
GNOME_ALL		NB	KNN	RT	J48	MAX_ACC	AVG_ACC
	AVG.	**81.67**	**83.75**	**81.95**	**82.61**	**84.72**	**82.50**

TABLE VI
THE *F-MEASURE* OF RSMOTE TO PREDICT THE SEVERITY OF *ECLIPSE*.

		NB	KNN	RT	J48	MAX_F	AVG_F
Eclipse_JDT_Debug	Original	**0.71**	0.69	0.68	0.65	0.71	0.68
	RUS	**0.69**	0.67	0.62	0.56	0.69	0.64
	ROS	0.69	0.69	**0.70**	0.66	0.70	0.69
	CMA	**0.72**	0.63	0.68	0.66	**0.72**	0.67
	SMOTE	**0.70**	0.67	0.64	0.68	0.70	0.67
	RSMOTE	**0.72**	0.69	0.70	0.66	**0.72**	**0.69**
		NB	KNN	RT	J48	MAX_F	AVG_F
Eclipse_CDT_cdt-core	Original	0.70	**0.74**	**0.74**	0.71	0.74	0.72
	RUS	0.60	**0.70**	0.64	0.57	0.70	0.63
	ROS	0.70	0.74	**0.75**	0.73	0.75	0.73
	CMA	0.78	0.74	**0.80**	0.77	0.80	0.77
	SMOTE	**0.78**	0.74	0.71	0.74	0.78	0.74
	RSMOTE	**0.81**	0.76	0.80	0.77	**0.81**	**0.79**
		NB	KNN	RT	J48	MAX_F	AVG_F
Eclipse_JDT_Core	Original	0.70	0.71	0.73	**0.75**	0.75	0.72
	RUS	**0.70**	**0.70**	0.64	0.57	0.70	0.65
	ROS	0.69	0.71	0.69	**0.76**	0.76	0.71
	CMA	0.77	0.66	0.72	**0.78**	0.78	0.73
	SMOTE	0.74	0.68	0.71	**0.75**	0.75	0.72
	RSMOTE	0.74	0.70	0.72	**0.78**	**0.78**	**0.74**
		NB	KNN	RT	J48	MAX_F	AVG_F
Eclipse_PDE_UI	Original	**0.71**	0.70	0.67	0.68	0.71	0.69
	RUS	**0.71**	0.70	0.62	0.64	0.71	0.67
	ROS	**0.70**	**0.70**	0.68	0.66	0.70	0.69
	CMA	0.61	0.56	0.71	**0.72**	0.72	0.65
	SMOTE	**0.72**	0.67	**0.72**	0.70	0.72	0.70
	RSMOTE	0.71	**0.75**	0.73	0.73	**0.75**	**0.73**
		NB	KNN	RT	J48	MAX_F	AVG_F
Eclipse_Platform_Debug	Original	**0.68**	0.53	0.59	0.59	0.68	0.60
	RUS	**0.65**	0.52	0.55	0.54	0.65	0.57
	ROS	**0.67**	0.53	**0.67**	0.61	0.67	0.62
	CMA	**0.70**	0.43	**0.70**	0.63	0.70	0.62
	SMOTE	**0.68**	0.51	**0.68**	0.59	0.68	0.62
	RSMOTE	**0.71**	0.50	0.68	0.63	**0.71**	**0.63**
		NB	KNN	RT	J48	MAX_F	AVG_F
Eclipse_Platform_UI	Original	0.62	0.69	0.66	**0.70**	0.70	0.67
	RUS	0.63	0.61	0.63	**0.68**	0.68	0.64
	ROS	0.63	0.69	0.66	**0.70**	0.70	0.67
	CMA	0.61	0.56	0.71	**0.73**	0.73	0.65
	SMOTE	0.61	0.66	0.68	**0.72**	0.72	0.67
	RSMOTE	0.63	0.65	0.71	**0.74**	**0.74**	**0.68**
Eclipse_ALL		NB	KNN	RT	J48	MAX_F	AVG_F
	AVG.	**0.69**	**0.66**	**0.69**	**0.68**	**0.69**	**0.68**

TABLE VIII
THE *F-MEASURE* OF RSMOTE TO PREDICT THE SEVERITY OF *GNOME*.

		NB	KNN	RT	J48	MAX_F	AVG_F
GNOME_Panel_Panel	Original	0.79	0.74	**0.82**	**0.82**	0.82	0.79
	RUS	0.79	0.75	0.78	**0.80**	0.80	0.78
	ROS	0.79	0.74	0.81	**0.84**	0.84	0.80
	CMA	0.80	**0.85**	0.83	0.84	0.85	0.83
	SMOTE	0.80	0.81	0.81	**0.83**	0.83	0.81
	RSMOTE	0.80	**0.87**	0.83	0.84	**0.87**	**0.84**
		NB	KNN	RT	J48	MAX_F	AVG_F
GNOME_Terminal_General	Original	0.89	0.91	**0.92**	**0.92**	0.92	0.91
	RUS	0.87	0.92	0.91	**0.93**	0.93	0.91
	ROS	**0.93**	0.91	**0.93**	0.92	0.93	0.92
	CMA	0.91	**0.95**	0.94	0.94	0.95	**0.94**
	SMOTE	0.91	0.89	0.93	**0.94**	0.94	0.92
	RSMOTE	0.92	**0.95**	0.93	0.94	**0.95**	**0.94**
		NB	KNN	RT	J48	MAX_F	AVG_F
GNOME_Ekiga_General	Original	**0.91**	0.87	0.90	0.88	0.91	0.89
	RUS	0.93	**0.95**	0.92	0.92	**0.95**	0.93
	ROS	**0.92**	0.87	0.88	**0.92**	0.92	0.90
	CMA	0.91	0.91	**0.93**	**0.93**	0.93	0.92
	SMOTE	0.90	**0.93**	**0.93**	**0.93**	0.93	0.92
	RSMOTE	0.91	**0.95**	0.92	0.92	**0.95**	**0.93**
		NB	KNN	RT	J48	MAX_F	AVG_F
GNOME_Evolution_Calendar	Original	0.81	0.79	**0.82**	0.81	0.82	0.81
	RUS	**0.79**	**0.79**	0.74	0.76	0.79	0.77
	ROS	**0.81**	0.79	**0.81**	0.79	0.81	0.80
	CMA	0.82	0.82	0.82	**0.83**	0.83	0.82
	SMOTE	0.81	0.80	0.81	**0.82**	0.82	0.81
	RSMOTE	0.81	**0.85**	0.82	0.83	**0.85**	**0.83**
		NB	KNN	RT	J48	MAX_F	AVG_F
GNOME_Evolution_Contacts	Original	0.74	0.69	0.71	**0.76**	0.76	0.73
	RUS	0.72	**0.73**	0.70	0.68	0.73	0.71
	ROS	0.73	0.68	0.70	**0.76**	0.76	0.72
	CMA	0.72	**0.81**	0.77	0.72	0.81	0.76
	SMOTE	0.71	**0.77**	0.72	0.72	0.77	0.73
	RSMOTE	0.71	0.76	0.72	**0.83**	0.83	**0.76**
		NB	KNN	RT	J48	MAX_F	AVG_F
GNOME_Evolution_Shell	Original	**0.78**	0.75	0.73	**0.78**	0.78	0.76
	RUS	**0.76**	**0.76**	0.71	0.74	0.76	0.74
	ROS	**0.77**	0.75	0.76	**0.77**	0.77	0.76
	CMA	0.78	**0.82**	0.75	0.76	0.82	0.78
	SMOTE	**0.77**	**0.77**	0.76	**0.77**	0.77	0.77
	RSMOTE	0.77	**0.83**	0.77	0.76	**0.83**	**0.78**
GNOME_ALL		NB	KNN	RT	J48	MAX_F	AVG_F
	AVG.	**0.82**	**0.83**	**0.82**	**0.83**	**0.85**	**0.82**

TABLE IX

THE DETAIL OF FMR-FI (SAME CLASSIFIERS) AND FMR-FI (DIFFERENT CLASSIFIERS) IN EXPERIMENTAL.

Project	Product-Component	Same Classifier	Different Classifiers
Eclipse	Platform-UI	J48	KNN, RT, J48
	JDT-Core	J48	NB, KNN, J48
	JDT-Debug	RT	NB, KNN, RT
	Platform-Debug	NB	NB, RT, J48
	CDT-Core	NB	NB, KNN, RT
	PDE-UI	KNN	NB, KNN, RT
Mozilla	Core-Layout	J48	NB, KNN, J48
	Core-XPCOM	J48	NB, KNN, J48
	Core-XUL	RT	NB, KNN, RT
	Core-XPConnect	J48	NB, RT, J48
GNOME	Evolution-Calendar	KNN	NB, KNN, J48
	Terminal-General	J48	NB, RT, J48
	Ekiga-General	KNN	NB, KNN, RT
	Evolution-Contacts	KNN	KNN, RT, J48
	Evolution-Shell	KNN	NB, KNN, RT
	Panel-Panel	KNN	KNN, RT, J48