Additional material for: Heuristics for Constrained Role Mining in the Post-Processing Framework

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Contents

1 Testbed

Dataset	$\|\mathcal{U}\|$	$\|\mathcal{P}\|$	$\|\mathcal{UPA}\|$	min#P	max#P	min#U	max#U	Density
Americas Large	3485	10127	185294	1	733	1	2812	0.53%
Americas Small	3477	1587	105205	1	310	1	2866	1.61%
Apj	2044	1164	6841	1	58	1	291	0.29%
Customer	10021	277	45427	1	25	1	4184	1.64%
Domino	79	231	730	1	209	1	52	4.00%
Emea	35	3046	7220	9	554	1	32	6.77%
Firewall 1	365	709	31951	1	617	1	251	12.35%
Firewall 2	325	590	36428	6	590	46	298	19.00%
Healthcare	46	46	1486	7	46	3	45	70.23%

Table 1: Characteristics of the real-world datasets considered in this paper

Dataset	$\|\mathcal{R}\|$	$\frac{min}{ppr}$	$\frac{max}{ppr}$	$\frac{min}{rpu}$	$\frac{max}{rpu}$
Americas large	398	1	733	1	4
Americas small	178	1	263	1	12
Apj	453	1	52	1	8
Customer	**-**	**1**	**25**	**1**	**25**
Domino	20	1	201	1	9
Emea	34	9	554	1	1
Firewall 1	66	1	395	1	9
Firewall 2	10	2	307	1	3
Healthcare	14	1	32	1	6

Table 2: Characteristics of optimal decomposition (in boldface *not optimal* data)

Dataset	*mpr* values	*mru* values
Americas Large	73, 220, 367, 586, 733	2, 3, 4, 5
Americas Small	26, 79, 132, 210, 263	2, 6, 10, 12, 14
Apj	5, 16, 26, 42, 52	2, 4, 6, 8, 10
Customer	3, 8, 13, 20, 25	2, 4, 6, 8, 10
Domino	20, 60, 101, 161, 201	2, 4, 7, 9, 11
Emea	55, 166, 277, 443, 554	1, 2, 3, 4, 5
Firewall 1	40, 119, 198, 316, 395	2, 4, 7, 9, 11
Firewall 2	31, 92, 154, 246, 307	2, 3, 4
Healthcare	3, 10, 16, 26, 32	2, 4, 6, 7

Table 3: *mpr* and *mru* values used in the experiments

2 PUCC

2.1 Americas Large

Decomposition	10%	30%	50%	80%	100%	
Optimal	1366	653	525	414	398	$\|\mathcal{R}\|$
	91947	95625	95236	95441	95407	WSC
SMA_R	1481	706	571	453	430	$\|\mathcal{R}\|$
	101413	106160	106466	107672	107624	WSC
SMAU_R	1328	650	539	429	415	$\|\mathcal{R}\|$
	88527	92509	92707	93167	93138	WSC
SMA_C	1460	816	700	625	612	$\|\mathcal{R}\|$
	90086	91609	91452	91265	91237	WSC
SMAU_C	1371	661	542	433	416	$\|\mathcal{R}\|$
	91946	95008	94989	95211	95176	WSC
FastMiner	11973	7951	7057	6555	6528	$\|\mathcal{R}\|$
	771217	960189	1014021	1017804	1017743	WSC
OBMD	1800	872	704	581	564	$\|\mathcal{R}\|$
	123488	126286	126696	126475	126433	WSC
Biclique	1435	688	558	440	423	$\|\mathcal{R}\|$
	96886	101320	101197	101527	101494	WSC

Table 4: $|\mathcal{R}|$ and WSC for the *Americas Large* dataset

Dataset	$\|\mathcal{R}\|$						WSC					
	10%	30%	50%	80%	100%	*avg*	10%	30%	50%	80%	100%	*avg*
Optimal	2.0	2.0	1.0	1.0	1.0	1.4	4.0	4.0	4.0	4.0	4.0	4.0
SMA_R	6.0	5.0	5.0	5.0	5.0	5.2	6.0	6.0	6.0	6.0	6.0	6.0
SMAU_R	1.0	1.0	2.0	2.0	2.0	1.6	1.0	2.0	2.0	2.0	2.0	1.8
SMA_C	5.0	6.0	6.0	7.0	7.0	6.2	2.0	1.0	1.0	1.0	1.0	1.2
SMAU_C	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
FastMiner	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
OBMD	7.0	7.0	7.0	6.0	6.0	6.6	7.0	7.0	7.0	7.0	7.0	7.0
Biclique	4.0	4.0	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0

Table 5: Rank for the *Americas Large* dataset

2.2 Americas Small

Decomposition	10%	30%	50%	80%	100%	
Optimal	324	206	184	181	178	$\|\mathcal{R}\|$
	12443	11391	11269	11223	11217	WSC
SMA$_R$	656	328	274	231	228	$\|\mathcal{R}\|$
	22598	22382	22852	22963	22957	WSC
SMAU$_R$	258	213	207	207	207	$\|\mathcal{R}\|$
	12142	11677	11656	11656	11656	WSC
SMA$_C$	432	234	219	208	206	$\|\mathcal{R}\|$
	17573	15457	15334	15260	15256	WSC
SMAU$_C$	457	238	218	202	201	$\|\mathcal{R}\|$
	17632	15997	16053	15986	15984	WSC
FastMiner	2627	1971	1881	1787	1781	$\|\mathcal{R}\|$
	130242	152811	166089	168111	168093	WSC
OBMD	478	244	221	206	204	$\|\mathcal{R}\|$
	24321	21495	21136	20957	20952	WSC
Biclique	492	258	236	217	216	$\|\mathcal{R}\|$
	22876	22207	22259	22181	22179	WSC

Table 6: $|\mathcal{R}|$ and WSC for the *Americas Small* dataset

Dataset	$\|\mathcal{R}\|$						WSC					
	10%	30%	50%	80%	100%	*avg*	10%	30%	50%	80%	100%	*avg*
Optimal	2.0	1.0	1.0	1.0	1.0	1.2	2.0	1.0	1.0	1.0	1.0	1.2
SMA$_R$	7.0	7.0	7.0	7.0	7.0	7.0	5.0	7.0	7.0	7.0	7.0	6.6
SMAU$_R$	1.0	2.0	2.0	4.0	5.0	2.8	1.0	2.0	2.0	2.0	2.0	1.8
SMA$_C$	3.0	3.0	4.0	5.0	4.0	3.8	3.0	3.0	3.0	3.0	3.0	3.0
SMAU$_C$	4.0	4.0	3.0	2.0	2.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
FastMiner	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
OBMD	5.0	5.0	5.0	3.0	3.0	4.2	7.0	5.0	5.0	5.0	5.0	5.4
Biclique	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Table 7: Rank for the *Americas Small* dataset

2.3 Apj

Decomposition	10%	30%	50%	80%	100%	
Optimal	564	467	458	454	453	$\|\mathcal{R}\|$
	5233	4898	4878	4870	4867	WSC
$\texttt{SMA}_R$	644	518	489	478	476	$\|\mathcal{R}\|$
	6407	6365	6395	6398	6394	WSC
$\texttt{SMAU}_R$	537	467	459	455	455	$\|\mathcal{R}\|$
	5329	5141	5124	5115	5115	WSC
$\texttt{SMA}_C$	618	506	479	468	466	$\|\mathcal{R}\|$
	5629	5556	5554	5531	5527	WSC
$\texttt{SMAU}_C$	604	492	467	456	454	$\|\mathcal{R}\|$
	5350	5282	5276	5278	5274	WSC
FastMiner	1026	821	795	784	782	$\|\mathcal{R}\|$
	12239	12242	12785	12814	12810	WSC
OBMD	619	509	480	469	467	$\|\mathcal{R}\|$
	6686	6383	6378	6380	6376	WSC
Biclique	600	492	469	459	457	$\|\mathcal{R}\|$
	5795	5783	5773	5777	5773	WSC

Table 8: $|\mathcal{R}|$ and WSC for the *Apj* dataset

Dataset	$\|\mathcal{R}\|$						WSC					
	10%	30%	50%	80%	100%	*avg*	10%	30%	50%	80%	100%	*avg*
Optimal	2.0	1.5	1.0	1.0	1.0	1.3	1.0	1.0	1.0	1.0	1.0	1.0
$\texttt{SMA}_R$	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0	7.0	7.0	7.0	6.6
$\texttt{SMAU}_R$	1.0	1.5	2.0	2.0	3.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0
$\texttt{SMA}_C$	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
$\texttt{SMAU}_C$	4.0	3.5	3.0	3.0	2.0	3.1	3.0	3.0	3.0	3.0	3.0	3.0
FastMiner	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
OBMD	6.0	6.0	6.0	6.0	6.0	6.0	7.0	7.0	6.0	6.0	6.0	6.4
Biclique	3.0	3.5	4.0	4.0	4.0	3.7	5.0	5.0	5.0	5.0	5.0	5.0

Table 9: Rank for the *Apj* dataset

2.4 Customer

Decomposition	10%	30%	50%	80%	100%	
SMA$_R$	2075	1403	1205	1161	1154	$\|\mathcal{R}\|$
	56806	55623	55279	55195	55184	WSC
SMAU$_R$	276	276	276	276	276	$\|\mathcal{R}\|$
	45978	45978	45978	45978	45978	WSC
SMA$_C$	323	287	278	276	276	$\|\mathcal{R}\|$
	45999	45872	45849	45845	45845	WSC
SMAU$_C$	330	289	279	277	276	$\|\mathcal{R}\|$
	46047	45924	45899	45895	45893	WSC
FastMiner	13429	40529	40687	40621	40616	$\|\mathcal{R}\|$
	366496	810422	819325	819513	819509	WSC
OBMD	357	311	300	297	297	$\|\mathcal{R}\|$
	48842	48687	48658	48652	48652	WSC
Biclique	276	276	276	276	276	$\|\mathcal{R}\|$
	45978	45978	45978	45978	45978	WSC

Table 10: $|\mathcal{R}|$ and WSC for the *Customer* dataset

Dataset	$\|\mathcal{R}\|$						WSC					
	10%	30%	50%	80%	100%	*avg*	10%	30%	50%	80%	100%	*avg*
SMA$_R$	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SMAU$_R$	1.5	1.5	1.5	2.0	2.5	1.8	1.5	3.5	3.5	3.5	3.5	3.1
SMA$_C$	3.0	3.0	3.0	2.0	2.5	2.7	3.0	1.0	1.0	1.0	1.0	1.4
SMAU$_C$	4.0	4.0	4.0	4.0	2.5	3.7	4.0	2.0	2.0	2.0	2.0	2.4
FastMiner	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
OBMD	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Biclique	1.5	1.5	1.5	2.0	2.5	1.8	1.5	3.5	3.5	3.5	3.5	3.1

Table 11: Rank for the *Customer* dataset

2.5 Domino

Decomposition	10%	30%	50%	80%	100%	
Optimal	45	26	23	21	20	$\|\mathcal{R}\|$
	804	766	760	756	754	WSC
SMA$_R$	46	26	25	21	21	$\|\mathcal{R}\|$
	841	801	799	791	791	WSC
SMAU$_R$	39	26	22	21	20	$\|\mathcal{R}\|$
	723	773	765	763	761	WSC
SMA$_C$	43	27	25	23	23	$\|\mathcal{R}\|$
	722	726	681	777	777	WSC
SMAU$_C$	46	26	25	21	21	$\|\mathcal{R}\|$
	810	770	768	760	760	WSC
FastMiner	101	72	70	65	65	$\|\mathcal{R}\|$
	1611	1646	1657	1847	1847	WSC
OBMD	51	28	26	22	22	$\|\mathcal{R}\|$
	971	916	909	901	901	WSC
Biclique	39	26	22	21	20	$\|\mathcal{R}\|$
	724	774	766	764	762	WSC

Table 12: $|\mathcal{R}|$ and WSC for the *Domino* dataset

Dataset	$\|\mathcal{R}\|$						WSC					
	10%	30%	50%	80%	100%	*avg*	10%	30%	50%	80%	100%	*avg*
Optimal	4.0	3.0	3.0	3.0	2.0	3.0	4.0	2.0	2.0	1.0	1.0	2.0
SMA$_R$	5.5	3.0	5.0	3.0	4.5	4.2	6.0	6.0	6.0	6.0	6.0	6.0
SMAU$_R$	1.5	3.0	1.5	3.0	2.0	2.2	2.0	4.0	3.0	3.0	3.0	3.0
SMA$_C$	3.0	6.0	5.0	7.0	7.0	5.6	1.0	1.0	1.0	5.0	5.0	2.6
SMAU$_C$	5.5	3.0	5.0	3.0	4.5	4.2	5.0	3.0	5.0	2.0	2.0	3.4
FastMiner	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
OBMD	7.0	7.0	7.0	6.0	6.0	6.6	7.0	7.0	7.0	7.0	7.0	7.0
Biclique	1.5	3.0	1.5	3.0	2.0	2.2	3.0	5.0	4.0	4.0	4.0	4.0

Table 13: Rank for the *Domino* dataset

2.6 Emea

Decomposition	10%	30%	50%	80%	100%	
Optimal	148	65	47	37	34	$\|\mathcal{R}\|$
	7400	7342	7306	7286	7280	WSC
SMA$_R$	148	65	47	37	34	$\|\mathcal{R}\|$
	7400	7342	7306	7286	7280	WSC
SMAU$_R$	148	65	47	37	34	$\|\mathcal{R}\|$
	7400	7342	7306	7286	7280	WSC
SMA$_C$	155	69	53	43	40	$\|\mathcal{R}\|$
	7717	7653	7621	7601	7595	WSC
SMAU$_C$	148	65	47	37	34	$\|\mathcal{R}\|$
	7400	7342	7306	7286	7280	WSC
FastMiner	502	294	261	245	242	$\|\mathcal{R}\|$
	22003	22828	23071	23032	23026	WSC
OBMD	181	80	59	46	43	$\|\mathcal{R}\|$
	9134	9170	9122	9092	9086	WSC
Biclique	148	65	47	37	34	$\|\mathcal{R}\|$
	7400	7342	7306	7286	7280	WSC

Table 14: $|\mathcal{R}|$ and WSC for the *Emea* dataset

Dataset	$\|\mathcal{R}\|$						WSC					
	10%	30%	50%	80%	100%	*avg*	10%	30%	50%	80%	100%	*avg*
Optimal	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
SMA$_R$	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
SMAU$_R$	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
SMA$_C$	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SMAU$_C$	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
FastMiner	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
OBMD	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Biclique	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Table 15: Rank for the *Emea* dataset

2.7 Firewall 1

Decomposition	10%	30%	50%	80%	100%	
Optimal	83	69	67	67	66	$\|\mathcal{R}\|$
	2602	2025	2021	2021	2019	WSC
$\texttt{SMA}_R$	128	83	77	72	72	$\|\mathcal{R}\|$
	6512	6446	6559	6519	6519	WSC
$\texttt{SMAU}_R$	80	70	69	69	68	$\|\mathcal{R}\|$
	3587	3277	3275	3275	3273	WSC
$\texttt{SMA}_C$	118	82	79	75	75	$\|\mathcal{R}\|$
	5367	4978	5045	5022	5022	WSC
$\texttt{SMAU}_C$	115	75	70	66	66	$\|\mathcal{R}\|$
	5548	5268	5255	5233	5233	WSC
FastMiner	414	299	285	267	267	$\|\mathcal{R}\|$
	22475	26026	26373	26682	26682	WSC
OBMD	117	76	72	67	67	$\|\mathcal{R}\|$
	6225	5526	5488	5447	5447	WSC
Biclique	119	80	73	70	70	$\|\mathcal{R}\|$
	5311	5325	5539	5533	5533	WSC

Table 16: $|\mathcal{R}|$ and WSC for the *Firewall 1* dataset

Dataset	$\|\mathcal{R}\|$						WSC					
	10%	30%	50%	80%	100%	*avg*	10%	30%	50%	80%	100%	*avg*
Optimal	2.0	1.0	1.0	2.5	1.5	1.6	1.0	1.0	1.0	1.0	1.0	1.0
$\texttt{SMA}_R$	7.0	7.0	6.0	6.0	6.0	6.4	7.0	7.0	7.0	7.0	7.0	7.0
$\texttt{SMAU}_R$	1.0	2.0	2.0	4.0	4.0	2.6	2.0	2.0	2.0	2.0	2.0	2.0
$\texttt{SMA}_C$	5.0	6.0	7.0	7.0	7.0	6.4	4.0	3.0	3.0	3.0	3.0	3.2
$\texttt{SMAU}_C$	3.0	3.0	3.0	1.0	1.5	2.3	5.0	4.0	4.0	4.0	4.0	4.2
FastMiner	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
OBMD	4.0	4.0	4.0	2.5	3.0	3.5	6.0	6.0	5.0	5.0	5.0	5.4
Biclique	6.0	5.0	5.0	5.0	5.0	5.2	3.0	5.0	6.0	6.0	6.0	5.2

Table 17: Rank for the *Firewall 1* dataset

2.8 Firewall 2

Decomposition	10%	30%	50%	80%	100%	
Optimal	28	16	12	12	10	$\|\mathcal{R}\|$
	2083	1441	1227	1227	1120	WSC
$\texttt{SMA}_R$	42	19	14	13	11	$\|\mathcal{R}\|$
	3636	2427	2166	2119	2012	WSC
$\texttt{SMAU}_R$	26	14	12	12	10	$\|\mathcal{R}\|$
	2420	1778	1671	1671	1564	WSC
$\texttt{SMA}_C$	39	19	14	13	11	$\|\mathcal{R}\|$
	2495	1793	1624	1577	1516	WSC
$\texttt{SMAU}_C$	42	19	14	13	11	$\|\mathcal{R}\|$
	2541	1790	1621	1574	1513	WSC
FastMiner	52	29	24	23	21	$\|\mathcal{R}\|$
	4811	3609	3348	3301	3194	WSC
OBMD	42	19	14	13	11	$\|\mathcal{R}\|$
	3660	2439	2178	2131	2024	WSC
Biclique	36	18	14	13	11	$\|\mathcal{R}\|$
	2697	2049	1927	1880	1819	WSC

Table 18: $|\mathcal{R}|$ and WSC for the *Firewall 2* dataset

Dataset	$\|\mathcal{R}\|$						WSC					
	10%	30%	50%	80%	100%	*avg*	10%	30%	50%	80%	100%	*avg*
Optimal	2.0	2.0	1.5	1.5	1.5	1.7	1.0	1.0	1.0	1.0	1.0	1.0
$\texttt{SMA}_R$	6.0	5.5	5.0	5.0	5.0	5.3	6.0	6.0	6.0	6.0	6.0	6.0
$\texttt{SMAU}_R$	1.0	1.0	1.5	1.5	1.5	1.3	2.0	2.0	4.0	4.0	4.0	3.2
$\texttt{SMA}_C$	4.0	5.5	5.0	5.0	5.0	4.9	3.0	4.0	3.0	3.0	3.0	3.2
$\texttt{SMAU}_C$	6.0	5.5	5.0	5.0	5.0	5.3	4.0	3.0	2.0	2.0	2.0	2.6
FastMiner	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
OBMD	6.0	5.5	5.0	5.0	5.0	5.3	7.0	7.0	7.0	7.0	7.0	7.0
Biclique	3.0	3.0	5.0	5.0	5.0	4.2	5.0	5.0	5.0	5.0	5.0	5.0

Table 19: Rank for the *Firewall 2* dataset

2.9 Healthcare

Decomposition	10%	30%	50%	80%	100%	
Optimal	37	20	17	15	14	$\|\mathcal{R}\|$
	674	378	320	289	268	WSC
$\texttt{SMA}_R$	56	31	24	19	18	$\|\mathcal{R}\|$
	1579	974	844	780	803	WSC
$\texttt{SMAU}_R$	24	16	15	14	14	$\|\mathcal{R}\|$
	706	461	415	369	369	WSC
$\texttt{SMA}_C$	52	29	22	17	16	$\|\mathcal{R}\|$
	728	427	388	376	414	WSC
$\texttt{SMAU}_C$	48	27	21	17	15	$\|\mathcal{R}\|$
	1239	759	650	577	561	WSC
FastMiner	66	44	38	32	32	$\|\mathcal{R}\|$
	1854	1328	1256	1197	1308	WSC
OBMD	53	29	22	17	16	$\|\mathcal{R}\|$
	1512	922	780	668	691	WSC
Biclique	52	28	21	18	16	$\|\mathcal{R}\|$
	792	482	442	454	446	WSC

Table 20: $|\mathcal{R}|$ and WSC for the *Healthcare* dataset

Dataset	$\|\mathcal{R}\|$						WSC					
	10%	30%	50%	80%	100%	*avg*	10%	30%	50%	80%	100%	*avg*
Optimal	2.0	2.0	2.0	2.0	1.5	1.9	1.0	1.0	1.0	1.0	1.0	1.0
$\texttt{SMA}_R$	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
$\texttt{SMAU}_R$	1.0	1.0	1.0	1.0	1.5	1.1	2.0	3.0	3.0	2.0	2.0	2.4
$\texttt{SMA}_C$	4.5	5.5	5.5	4.0	5.0	4.9	3.0	2.0	2.0	3.0	3.0	2.6
$\texttt{SMAU}_C$	3.0	3.0	3.5	4.0	3.0	3.3	5.0	5.0	5.0	5.0	5.0	5.0
FastMiner	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
OBMD	6.0	5.5	5.5	4.0	5.0	5.2	6.0	6.0	6.0	6.0	6.0	6.0
Biclique	4.5	4.0	3.5	6.0	5.0	4.6	4.0	4.0	4.0	4.0	4.0	4.0

Table 21: Rank for the *Healthcare* dataset

2.10 Case $mpr = 2$

Dataset	Optimal	$\texttt{SMA}_R$	$\texttt{SMAU}_R$	$\texttt{SMA}_C$	$\texttt{SMAU}_C$	FastMiner	OBMD	Biclique	
Americas Large	11343	11524	10956	11322	11274	20237	12352	11294	$\|\mathcal{R}\|$
	124029	129149	121079	145979	123729	305323	177006	131942	WSC
	28.5	26.8	26.4	18.5	27.1	3.1	21.9	26.7	gf $\|\mathcal{R}\|$
	1.3	1.2	1.3	1.6	1.3	0.3	1.4	1.3	gf WSC
Americas Small	1638	2025	1242	1693	1822	2845	1737	1811	$\|\mathcal{R}\|$
	63937	71145	59446	68630	68705	117660	79599	62084	WSC
	9.2	9.0	6.0	8.3	9.2	1.6	8.6	8.5	gf $\|\mathcal{R}\|$
	5.7	3.1	5.1	4.5	4.3	0.7	3.8	2.8	gf WSC
Apj	861	950	819	930	906	1093	932	866	$\|\mathcal{R}\|$
	6814	7669	6650	7181	6852	10246	7648	6924	WSC
	1.9	2.0	1.8	2.0	2.0	1.4	2.0	1.9	gf $\|\mathcal{R}\|$
	1.4	1.2	1.3	1.3	1.3	0.8	1.2	1.2	gf WSC
Customer	-	1616	276	359	359	4062	386	276	$\|\mathcal{R}\|$
	-	55184	45978	45845	45893	163902	48652	45978	WSC
	-	1.4	1.0	1.3	1.3	0.1	1.3	1.0	gf $\|\mathcal{R}\|$
	-	1.0	1.0	1.0	1.0	0.2	1.0	1.0	gf WSC
Domino	204	216	176	213	216	250	216	176	$\|\mathcal{R}\|$
	1056	1105	989	1085	1061	1661	1169	991	WSC
	10.2	10.8	8.8	9.7	10.8	3.9	10.3	8.8	gf $\|\mathcal{R}\|$
	1.4	1.4	1.3	1.4	1.4	0.9	1.3	1.3	gf WSC
Emea	2264	2264	2264	2288	2264	3049	2352	2264	$\|\mathcal{R}\|$
	10192	10192	10192	10633	10192	18421	11812	10192	WSC
	66.6	66.6	66.6	57.2	66.6	12.6	54.7	66.6	gf $\|\mathcal{R}\|$
	1.4	1.4	1.4	1.4	1.4	0.8	1.3	1.4	gf WSC
Firewall 1	521	738	415	651	696	931	686	711	$\|\mathcal{R}\|$
	17767	28675	17674	21084	28247	48024	30492	18805	WSC
	7.9	10.4	6.1	8.8	10.7	3.5	10.4	10.3	gf $\|\mathcal{R}\|$
	8.8	4.4	5.4	4.2	5.4	1.8	5.6	3.4	gf WSC
Firewall 2	325	457	297	445	457	470	457	395	$\|\mathcal{R}\|$
	19376	27510	19394	19832	19791	29582	27876	19492	WSC
	32.5	45.7	29.7	44.5	45.7	23.5	45.7	39.5	gf $\|\mathcal{R}\|$
	17.3	14.0	12.4	13.5	13.5	9.4	14.1	11.0	gf WSC
Healthcare	50	61	31	55	52	64	56	56	$\|\mathcal{R}\|$
	938	1753	959	935	1409	1840	1644	977	WSC
	3.6	3.8	2.2	3.9	3.7	2.2	4.0	3.7	gf $\|\mathcal{R}\|$
	3.5	2.2	2.6	2.2	2.6	1.4	2.4	2.2	gf WSC

Table 22: Computed solution vs unconstrained solution

3 PUCC - concurrent vs post-processing

Dataset	Heuristic	Role-set Size			WSC		
		20%	50%	100%	20%	50%	100%
Americas large	$C_{RM}-PUCC_C$	757	659	612	120369	122824	99913
	$C_{RM}-PUCC_R$	617	509	430	62439	79198	107610
	CRM	669	**464**	415	**48429**	74184	**92293**
	$PRUCC_1$-OF	604	494	416	59199	73661	93381
	$PRUCC_1$-OR	780	535	415	85223	90860	93267
	$PRUCC_1$-UF	608	498	415	59542	74312	93138
	$PRUCC_1$-UR	789	539	415	86962	89781	93138
	$PRUCC_2$-OF	603	494	414	59040	73933	93256
	$PRUCC_2$-OR	790	538	415	86827	90956	93256
	$PRUCC_2$-UF	607	499	415	59395	74666	93143
	$PRUCC_2$-UR	801	539	415	88181	90091	93143
	Optimal	823	525	398	94526	95236	95407
	RM1	889	571	430	104206	106466	107624
	RM2	806	539	415	90960	92707	93138
	RM3	961	700	612	91032	91452	91237
	RM4	832	542	416	94249	94989	95176
	FastMiner	9156	7057	6528	903128	1014021	1017743
	OBMD	1100	704	564	125167	126696	126433
	Biclique	868	558	423	99858	101197	101494
Americas small	$C_{RM}-PUCC_C$	248	216	206	24538	24125	23242
	$C_{RM}-PUCC_R$	227	217	226	11814	15740	21650
	CRM	232	209	209	11533	**10550**	**10550**
	$PRUCC_1$-OF	208	196	196	10991	11198	11111
	$PRUCC_1$-OR	212	196	196	11348	11121	11106
	$PRUCC_1$-UF	217	207	207	11621	11674	11669
	$PRUCC_1$-UR	217	207	208	11629	11613	11665
	$PRUCC_2$-OF	208	196	196	11001	11134	11111
	$PRUCC_2$-OR	215	196	196	11428	11112	11112
	$PRUCC_2$-UF	218	207	206	11672	11680	11621
	$PRUCC_2$-UR	217	207	207	11618	11609	11602
	Optimal	226	184	178	11651	11269	11217
	RM1	409	274	228	22246	22852	22957
	RM2	219	207	207	11701	11656	11656
	RM3	278	219	206	16010	15334	15256
	RM4	290	218	201	16619	16053	15984
	FastMiner	2142	1881	1781	138094	166089	168093
	OBMD	302	221	204	22290	21136	20952
	Biclique	312	236	216	22289	22259	22179

Table 23: Role-set size and WSC for the PUCC case

Dataset	Heuristic	Role-set Size			WSC		
		20%	50%	100%	20%	50%	100%
Apj	$\texttt{C}_{\texttt{RM}}-\texttt{PUCC}_{\texttt{C}}$	505	478	466	11019	10980	10683
	$\texttt{C}_{\texttt{RM}}-\texttt{PUCC}_{\texttt{R}}$	492	480	475	5215	5747	5927
	CRM	487	**459**	455	**5146**	**5065**	**5063**
	PRUCC_1-OF	479	459	455	5201	5167	5151
	PRUCC_1-OR	478	458	454	5222	5178	5169
	PRUCC_1-UF	478	459	455	5154	5122	5110
	PRUCC_1-UR	479	459	455	5175	5118	5118
	PRUCC_2-OF	479	459	454	5201	5165	5169
	PRUCC_2-OR	479	458	455	5226	5169	5158
	PRUCC_2-UF	478	459	455	5153	5121	5112
	PRUCC_2-UR	479	459	455	5164	5118	5109
	Optimal	489	458	453	4931	4878	4867
	RM1	539	489	476	6146	6395	6394
	RM2	479	459	455	5170	5124	5115
	RM3	525	479	466	5333	5554	5527
	RM4	513	467	454	5095	5276	5274
	FastMiner	857	795	782	11863	12785	12810
	OBMD	525	480	467	6191	6378	6376
	Biclique	516	469	457	5620	5773	5773
Customer	$\texttt{C}_{\texttt{RM}}-\texttt{PUCC}_{\texttt{C}}$	289	278	**276**	133091	134387	134367
	$\texttt{C}_{\texttt{RM}}-\texttt{PUCC}_{\texttt{R}}$	664	1122	1154	**43256**	**44604**	**45100**
	CRM	**277**	**277**	277	45963	45963	45963
	PRUCC_1-OF	278	278	277	45955	45945	45955
	PRUCC_1-OR	280	280	279	45896	45932	45948
	PRUCC_1-UF	276	276	276	45978	45978	45978
	PRUCC_1-UR	276	276	276	45978	45978	45978
	PRUCC_2-OF	278	278	279	45957	45941	45946
	PRUCC_2-OR	279	281	279	45946	45933	45892
	PRUCC_2-UF	276	276	276	45978	45978	45978
	PRUCC_2-UR	276	276	276	45978	45978	45978
	RM1	1750	1205	1154	56257	55279	55184
	RM2	276	276	276	45978	45978	45978
	RM3	298	278	276	45915	45849	45845
	RM4	301	279	276	45968	45899	45893
	FastMiner	32224	40687	40616	681158	819325	819509
	OBMD	326	300	297	48741	48658	48652
	Biclique	276	276	276	45978	45978	45978

Table 24: Role-set size and WSC for the PUCC case

Dataset	Heuristic	Role-set Size			WSC		
		20%	50%	100%	20%	50%	100%
Domino	C_{RM}−PUCC$_C$	29	26	23	1333	1414	1212
	C_{RM}−PUCC$_R$	**27**	24	**20**	631	667	758
	CRM	30	**22**	**20**	781	**577**	761
	PRUCC$_1$-OF	25	23	20	545	753	761
	PRUCC$_1$-OR	27	23	20	608	767	761
	PRUCC$_1$-UF	27	23	20	594	753	747
	PRUCC$_1$-UR	28	23	20	648	767	761
	PRUCC$_2$-OF	27	23	20	594	753	747
	PRUCC$_2$-OR	27	23	20	606	753	747
	PRUCC$_2$-UF	27	23	20	608	767	761
	PRUCC$_2$-UR	28	23	20	636	757	761
	Optimal	31	23	20	776	760	754
	RM1	31	25	21	811	799	791
	RM2	29	22	20	740	765	761
	RM3	31	25	23	715	681	777
	RM4	31	25	21	780	768	760
	FastMiner	80	70	65	1630	1657	1847
	OBMD	34	26	22	931	909	901
	Biclique	29	22	20	741	766	762
Emea	C_{RM}−PUCC$_C$	88	52	40	11820	11014	7677
	C_{RM}−PUCC$_R$	80	**45**	**34**	6848	6750	7280
	CRM	100	50	**34**	**4900**	**5938**	7280
	PRUCC$_1$-OF	78	45	34	6531	6750	7280
	PRUCC$_1$-OR	85	47	34	7264	7306	7280
	PRUCC$_1$-UF	78	45	34	6531	6750	7280
	PRUCC$_1$-UR	84	47	34	7255	7306	7280
	PRUCC$_2$-OF	78	45	34	6531	6750	7280
	PRUCC$_2$-OR	83	47	34	7048	7181	7280
	PRUCC$_2$-UF	78	45	34	6531	6750	7280
	PRUCC$_2$-UR	83	47	34	7137	7181	7280
	Optimal	83	47	34	7378	7306	7280
	RM1	83	47	34	7378	7306	7280
	RM2	83	47	34	7378	7306	7280
	RM3	88	53	40	7691	7621	7595
	RM4	83	47	34	7378	7306	7280
	FastMiner	341	261	242	22631	23071	23026
	OBMD	103	59	43	9224	9122	9086
	Biclique	83	47	34	7378	7306	7280

Table 25: Role-set size and WSC for the PUCC case

Dataset	Heuristic	Role-set Size			WSC		
		20%	50%	100%	20%	50%	100%
Firewall 1	$\texttt{C}_{\texttt{RM}}-\texttt{PUCC}_{\texttt{C}}$	84	77	75	7181	6696	6510
	$\texttt{C}_{\texttt{RM}}-\texttt{PUCC}_{\texttt{R}}$	77	73	72	**3161**	4745	5233
	CRM	74	69	68	3250	**3192**	**3190**
	PRUCC_1-OF	71	66	65	3354	3301	3299
	PRUCC_1-OR	71	66	65	3358	3301	3299
	PRUCC_1-UF	73	69	68	3317	3278	3276
	PRUCC_1-UR	73	69	68	3315	3275	3278
	PRUCC_2-OF	71	66	65	3349	3301	3299
	PRUCC_2-OR	71	66	65	3358	3296	3299
	PRUCC_2-UF	73	69	68	3312	3275	3273
	PRUCC_2-UR	73	69	68	3312	3278	3273
	Optimal	73	67	66	2282	2021	2019
	RM1	99	77	72	6287	6559	6519
	RM2	73	69	68	3312	3275	3273
	RM3	93	79	75	5307	5045	5022
	RM4	87	70	66	5053	5255	5233
	FastMiner	346	285	267	24266	26373	26682
	OBMD	88	72	67	5739	5488	5447
	Biclique	90	73	70	5185	5539	5533
Firewall 2	$\texttt{C}_{\texttt{RM}}-\texttt{PUCC}_{\texttt{C}}$	21	14	11	2831	2752	2444
	$\texttt{C}_{\texttt{RM}}-\texttt{PUCC}_{\texttt{R}}$	**18**	**12**	**10**	**1793**	**1472**	**1365**
	CRM	22	14	**10**	2219	1942	1564
	PRUCC_1-OF	18	12	10	1970	1649	1542
	PRUCC_1-OR	18	12	10	1970	1649	1542
	PRUCC_1-UF	18	12	10	1992	1671	1564
	PRUCC_1-UR	18	12	10	1992	1671	1564
	PRUCC_2-OF	18	12	10	1970	1649	1542
	PRUCC_2-OR	18	12	10	1970	1649	1542
	PRUCC_2-UF	18	12	10	1992	1671	1564
	PRUCC_2-UR	18	12	10	1992	1671	1564
	Optimal	19	12	10	1595	1227	1120
	RM1	23	14	11	2628	2166	2012
	RM2	18	12	10	1992	1671	1564
	RM3	23	14	11	1948	1624	1516
	RM4	23	14	11	1945	1621	1513
	FastMiner	33	24	21	3810	3348	3194
	OBMD	23	14	11	2640	2178	2024
	Biclique	22	14	11	2204	1927	1819

Table 26: Role-set size and WSC for the PUCC case

Dataset	Heuristic	Role-set Size			WSC		
		20%	50%	100%	20%	50%	100%
Healthcare	C_{RM}−PUCC$_C$	22	19	16	549	636	605
	C_{RM}−PUCC$_R$	**18**	**15**	16	**494**	**383**	499
	CRM	86	39	**14**	858	651	**351**
	PRUCC$_1$-OF	18	15	14	551	431	385
	PRUCC$_1$-OR	18	15	14	544	431	385
	PRUCC$_1$-UF	18	15	14	521	401	369
	PRUCC$_1$-UR	18	15	14	516	401	355
	PRUCC$_2$-OF	18	15	14	551	431	385
	PRUCC$_2$-OR	18	15	14	551	431	385
	PRUCC$_2$-UF	18	15	14	521	401	355
	PRUCC$_2$-UR	18	15	14	528	401	355
	Optimal	26	17	14	466	320	268
	RM1	43	24	18	1253	844	803
	RM2	18	15	14	526	415	369
	RM3	37	22	16	514	388	414
	RM4	36	21	15	955	650	561
	FastMiner	53	38	32	1532	1256	1308
	OBMD	38	22	16	1130	780	691
	Biclique	38	21	16	576	442	446

Table 27: Role-set size and WSC for the PUCC case

4 RUCC

4.1 Americas Large

mru	decomposition	#roles				WSC			
		postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	Optimal	414	415	444	444	95428	98968	95281	95281
	SMA_R	430	434	432	432	107458	108308	107472	107472
	$SMAU_R$	454	470	454	454	93538	98713	93500	93500
	SMA_C	507	788	510	510	86339	135939	83680	83680
	$SMAU_C$	425	445	429	429	95958	99500	95992	95992
	FastMiner	432	6539	432	432	107585	958341	107585	107585
	OBMD	461	762	475	475	97382	181229	92849	92849
	Biclique	427	447	437	437	100442	105834	98110	98110
3	Optimal	403	402	410	410	95258	95443	95322	95551
	SMA_R	430	430	430	430	107458	107624	107458	107458
	$SMAU_R$	428	427	429	429	92682	93225	92645	93207
	SMA_C	548	744	556	568	85669	126531	84917	89640
	$SMAU_C$	419	426	419	420	95100	95871	95100	95132
	FastMiner	432	6557	432	432	107585	965209	107585	107585
	OBMD	470	722	481	476	101044	174039	99335	100928
	Biclique	424	428	426	430	101064	102001	100869	101104
4	Optimal	399	398	401	400	95411	95407	95416	95413
	SMA_R	430	430	430	430	107458	107624	107458	107458
	$SMAU_R$	420	419	420	420	93159	93158	93159	93128
	SMA_C	584	717	592	594	87494	121412	87232	90149
	$SMAU_C$	416	420	416	417	95086	95428	95086	95116
	FastMiner	432	6569	432	432	107585	962700	107585	107585
	OBMD	472	694	479	478	104186	166072	103594	104168
	Biclique	420	424	420	420	101032	101494	101032	101036
5	Optimal	398	398	399	398	95408	95407	95410	95408
	SMA_R	430	430	430	430	107458	107624	107458	107458
	$SMAU_R$	416	416	416	416	93127	93121	93127	93130
	SMA_C	606	704	614	610	88221	118885	88076	90616
	$SMAU_C$	416	416	416	416	95086	95173	95086	95088
	FastMiner	432	6584	432	432	107585	966309	107585	107585
	OBMD	470	661	475	479	104915	157574	104713	105954
	Biclique	420	423	420	420	101032	101494	101032	101036

Table 28: Dataset Americas Large

mru	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	1.25	3.75	2.5	2.5	2.38	4.0	1.81	1.81
3	1.62	2.94	2.5	2.94	1.94	3.88	1.44	2.75
4	1.88	3.06	2.5	2.56	2.19	3.38	2.06	2.38
5	1.94	3.19	2.56	2.31	2.0	3.25	1.94	2.81

Table 29: Ranking for dataset Americas Large

decomposition	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Optimal	1.75	1.5	3.75	3.0	2.12	2.25	2.88	2.75
SMA_R	2.12	2.88	2.5	2.5	1.75	4.0	2.12	2.12
SMAU_R	2.38	2.12	2.75	2.75	2.75	2.75	2.12	2.38
SMA_C	1.0	4.0	2.38	2.62	2.25	4.0	1.12	2.62
SMAU_C	1.62	3.62	2.0	2.75	1.38	4.0	1.75	2.88
FastMiner	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
OBMD	1.0	4.0	2.62	2.38	2.75	4.0	1.12	2.12
Biclique	1.5	3.75	2.12	2.62	2.0	4.0	1.38	2.62

Table 30: Ranking for dataset Americas Large

Dataset	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Americas Large	1.67	3.23	2.52	2.58	2.13	3.63	1.81	2.44

Table 31: Ranking for dataset Americas Large

4.2 Americas Small

mru	decomposition	#roles				WSC			
		postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	Optimal	279	298	294	294	15166	21460	15328	15328
	SMA_R	230	272	248	248	21519	26387	21695	21695
	$SMAU_R$	276	364	280	280	16224	21470	15983	15983
	SMA_C	278	324	295	295	16164	25152	15498	15498
	$SMAU_C$	258	277	272	272	16446	22892	16442	16442
	FastMiner	259	1789	259	259	25488	115653	25488	25488
	OBMD	263	334	294	294	15074	31014	14773	14773
	Biclique	293	341	301	301	20171	26287	20227	20227
6	Optimal	187	202	196	211	10933	12868	10949	11268
	SMA_R	225	235	225	225	21479	23229	21479	21481
	$SMAU_R$	270	275	275	283	9821	14350	9958	10487
	SMA_C	219	262	229	230	13232	19260	13226	13517
	$SMAU_C$	214	238	220	222	13908	18079	13981	14061
	FastMiner	259	1802	259	259	25488	123830	25488	25488
	OBMD	196	264	198	200	14448	24633	14452	14428
	Biclique	249	257	246	257	21120	22789	21091	21414
10	Optimal	178	181	179	178	10905	11213	10907	11033
	SMA_R	225	229	225	225	21479	22904	21479	21481
	$SMAU_R$	246	252	243	242	9631	12627	9584	9832
	SMA_C	205	234	205	205	13416	16888	13410	13362
	$SMAU_C$	198	222	198	198	13946	16262	13946	14003
	FastMiner	259	1811	259	259	25488	126416	25488	25488
	OBMD	196	236	196	195	14448	22041	14448	14409
	Biclique	220	232	218	228	21105	22071	21081	21354
12	Optimal	178	178	178	178	10905	11217	10905	11033
	SMA_R	225	227	225	225	21479	22875	21479	21481
	$SMAU_R$	233	235	236	235	9785	11404	9660	9829
	SMA_C	204	228	204	204	13420	16387	13420	13420
	$SMAU_C$	198	213	198	198	13946	16011	13946	14003
	FastMiner	259	1817	259	259	25488	127695	25488	25488
	OBMD	196	224	196	195	14448	21576	14448	14409
	Biclique	211	225	211	213	21155	21876	21152	21314
14	Optimal	178	178	178	178	10905	11217	10905	11033
	SMA_R	225	226	225	225	21479	22961	21479	21481
	$SMAU_R$	228	229	224	221	9917	11105	9838	9814
	SMA_C	204	220	204	204	13420	15809	13420	13420
	$SMAU_C$	198	209	198	198	13946	15725	13946	14003
	FastMiner	259	1828	259	259	25488	129429	25488	25488
	OBMD	196	214	196	195	14448	18010	14448	14409
	Biclique	211	220	208	212	21207	21923	21193	21361

Table 32: Dataset Americas Small

mru	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	1.12	4.0	2.44	2.44	2.12	4.0	1.94	1.94
6	1.38	3.62	1.94	3.06	1.56	4.0	1.81	2.62
10	2.12	4.0	2.06	1.81	1.94	4.0	1.69	2.38
12	1.94	3.62	2.31	2.12	1.88	4.0	1.62	2.5
14	2.25	3.81	2.0	1.94	2.0	4.0	1.75	2.25

Table 33: Ranking for dataset Americas Small

decomposition	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Optimal	1.7	3.2	2.5	2.6	1.2	4.0	1.9	2.9
SMA_R	1.8	4.0	2.1	2.1	1.4	4.0	1.7	2.9
SMAU_R	1.8	3.4	2.6	2.2	2.2	4.0	1.5	2.3
SMA_C	1.6	4.0	2.1	2.3	2.4	4.0	1.7	1.9
SMAU_C	1.6	4.0	2.1	2.3	1.7	4.0	1.6	2.7
FastMiner	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
OBMD	1.9	4.0	2.4	1.7	2.5	4.0	2.4	1.1
Biclique	1.7	3.9	1.4	3.0	1.8	4.0	1.3	2.9

Table 34: Ranking for dataset Americas Small

Dataset	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Americas Small	1.76	3.81	2.15	2.27	1.9	4.0	1.76	2.34

Table 35: Ranking for dataset Americas Small

4.3 Apj

mru	decomposition	#roles				WSC			
		postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	Optimal	494	497	497	497	4838	4971	4810	4810
	SMA_R	483	535	488	488	5472	6526	5489	5489
	$SMAU_R$	494	530	506	506	4915	5330	5165	5165
	SMA_C	491	512	498	498	5374	5694	5343	5343
	$SMAU_C$	480	483	484	484	5269	5380	5296	5296
	FastMiner	564	854	564	564	6129	9039	6129	6129
	OBMD	471	513	485	485	5222	6206	5211	5211
	Biclique	492	513	505	505	5439	5644	5617	5617
4	Optimal	463	459	471	469	4707	4625	4764	4767
	SMA_R	475	486	475	475	5440	6189	5440	5440
	$SMAU_R$	473	471	482	482	4880	4875	5000	5000
	SMA_C	466	472	470	467	5434	5336	5442	5438
	$SMAU_C$	459	457	458	457	5194	5156	5191	5189
	FastMiner	564	815	564	564	6129	9836	6129	6129
	OBMD	461	481	461	462	5189	6087	5189	5190
	Biclique	467	467	474	474	5657	5476	5714	5714
6	Optimal	458	455	459	458	4817	4788	4820	4832
	SMA_R	475	476	475	475	5440	6126	5440	5440
	$SMAU_R$	469	457	470	470	5031	4863	5045	5045
	SMA_C	466	467	466	466	5473	5508	5473	5473
	$SMAU_C$	453	454	453	453	5212	5244	5212	5212
	FastMiner	564	798	564	564	6129	9922	6129	6129
	OBMD	460	469	461	462	5186	6002	5188	5191
	Biclique	465	459	466	466	5778	5471	5779	5779
8	Optimal	453	453	453	454	4841	4867	4841	4857
	SMA_R	475	475	475	475	5440	6275	5440	5440
	$SMAU_R$	457	456	458	459	5012	4850	5022	5036
	SMA_C	465	465	465	465	5490	5524	5490	5490
	$SMAU_C$	453	453	453	453	5212	5271	5212	5212
	FastMiner	564	797	564	564	6129	10115	6129	6129
	OBMD	460	468	460	461	5186	6197	5186	5189
	Biclique	457	457	457	457	5763	5685	5763	5763
10	Optimal	453	453	453	453	4841	4867	4841	4871
	SMA_R	475	475	475	475	5440	6391	5440	5440
	$SMAU_R$	455	456	455	455	5044	5008	5044	5044
	SMA_C	465	465	465	465	5490	5524	5490	5490
	$SMAU_C$	453	453	453	453	5212	5271	5212	5212
	FastMiner	564	794	564	564	6129	10322	6129	6129
	OBMD	460	466	460	461	5186	6001	5186	5189
	Biclique	455	456	455	455	5762	5770	5762	5762

Table 36: Dataset Apj

mru	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	1.12	3.62	2.62	2.62	1.88	4.0	2.06	2.06
4	2.0	2.62	2.81	2.56	2.19	2.12	2.81	2.88
6	1.94	2.88	2.62	2.56	1.88	2.88	2.5	2.75
8	2.19	2.62	2.31	2.88	2.0	3.25	2.12	2.62
10	2.19	3.25	2.19	2.38	2.0	3.5	2.0	2.5

Table 37: Ranking for dataset Apj

decomposition	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Optimal	2.0	1.9	3.1	3.0	2.0	2.6	2.1	3.3
SMA_R	2.0	3.4	2.3	2.3	1.8	4.0	2.1	2.1
SMAU_R	1.8	2.2	2.9	3.1	2.0	1.6	3.1	3.3
SMA_C	1.8	3.4	2.5	2.3	2.2	3.4	2.3	2.1
SMAU_C	2.4	2.5	2.7	2.4	2.2	3.4	2.3	2.1
FastMiner	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
OBMD	1.3	4.0	1.8	2.9	1.7	4.0	1.6	2.7
Biclique	1.8	2.6	2.8	2.8	2.0	2.2	2.9	2.9

Table 38: Ranking for dataset Apj

Dataset	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Apj	1.89	3.0	2.51	2.6	1.99	3.15	2.3	2.56

Table 39: Ranking for dataset Apj

4.4 Customer

mru	decomposition	#roles				WSC			
		postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	SMA_R	3740	4855	3823	3823	36943	50917	36878	36878
	$SMAU_R$	3866	3968	3844	3844	36466	42754	36192	36192
	SMA_C	3939	3772	3834	3834	36551	41843	36256	36256
	$SMAU_C$	3925	3766	3819	3819	36484	41801	36205	36205
	FastMiner	5655	40616	5655	5655	49761	263612	49761	49761
	OBMD	3897	4029	3883	3883	36516	43666	36342	36342
	Biclique	3866	3968	3844	3844	36466	42754	36192	36192
4	SMA_R	1913	2867	1974	2137	34388	44954	34856	35878
	$SMAU_R$	1853	1912	1859	1967	33953	35877	33801	34330
	SMA_C	1755	1824	1641	1986	32694	35886	31663	34170
	$SMAU_C$	1749	1817	1620	1945	32614	35890	31582	34163
	FastMiner	5655	40625	5655	5655	49761	277293	49761	49761
	OBMD	1804	2075	1835	2027	33455	37736	33380	34983
	Biclique	1853	1912	1859	1967	33953	35877	33801	34330
6	SMA_R	1468	1981	1487	1476	38438	44200	37959	37475
	$SMAU_R$	1122	988	1143	1085	37988	35049	37740	36815
	SMA_C	830	955	827	1013	33889	34957	32959	35314
	$SMAU_C$	841	950	827	1031	33751	35125	33025	35152
	FastMiner	5655	40631	5655	5655	49761	288228	49761	49761
	OBMD	1130	1138	1091	1072	37522	37101	36585	36670
	Biclique	1122	988	1143	1085	37988	35049	37740	36815
8	SMA_R	1262	1572	1265	1268	39872	44937	39696	39844
	$SMAU_R$	804	607	781	722	41994	35970	41083	40079
	SMA_C	518	589	524	575	35835	36253	35224	36930
	$SMAU_C$	525	591	515	557	35593	36140	35087	36526
	FastMiner	5655	40643	5655	5655	49761	300632	49761	49761
	OBMD	714	711	702	660	40070	37735	39521	38459
	Biclique	804	607	781	722	41994	35970	41083	40079
10	SMA_R	1188	1393	1195	1187	40586	46564	40610	40665
	$SMAU_R$	550	431	536	532	43864	38139	43002	42916
	SMA_C	384	422	391	399	38039	38870	37188	37672
	$SMAU_C$	380	421	391	400	37801	38467	36626	38497
	FastMiner	5655	40648	5655	5655	49761	308894	49761	49761
	OBMD	480	516	483	472	41974	40285	41276	41403
	Biclique	550	431	536	532	43864	38139	43002	42916

Table 40: Dataset Customer

mru	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	2.86	3.14	2.0	2.0	2.86	4.0	1.57	1.57
4	1.43	3.43	1.71	3.43	1.86	4.0	1.29	2.86
6	2.29	2.86	2.43	2.43	3.0	2.71	1.86	2.43
8	2.57	3.0	2.14	2.29	3.0	2.43	2.0	2.57
10	2.29	3.14	2.57	2.0	2.86	2.57	2.0	2.57

Table 41: Ranking for dataset Customer

decomposition	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
SMA$_R$	1.2	4.0	2.5	2.3	2.2	4.0	1.7	2.1
SMAU$_R$	3.0	2.0	2.7	2.3	3.4	2.2	2.3	2.1
SMA$_C$	2.0	3.0	1.7	3.3	2.4	3.6	1.1	2.9
SMAU$_C$	2.2	3.0	1.5	3.3	2.2	3.4	1.1	3.3
FastMiner	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
OBMD	2.6	3.8	2.1	1.5	3.4	2.6	1.7	2.3
Biclique	3.0	2.0	2.7	2.3	3.4	2.2	2.3	2.1

Table 42: Ranking for dataset Customer

Dataset	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Customer	2.29	3.11	2.17	2.43	2.72	3.14	1.74	2.4

Table 43: Ranking for dataset Customer

4.5 Domino

mru	decomposition	#roles				WSC			
		postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	Optimal	27	29	27	27	751	747	752	752
	SMA_R	21	26	21	21	749	781	749	749
	$SMAU_R$	29	32	29	29	773	770	773	773
	SMA_C	24	28	23	23	753	877	749	749
	$SMAU_C$	21	22	21	21	756	761	756	756
	FastMiner	23	66	23	23	739	1822	739	739
	OBMD	21	27	21	21	747	992	747	747
	Biclique	29	32	29	29	773	770	773	773
4	Optimal	23	24	23	23	757	739	752	752
	SMA_R	20	23	20	20	747	772	747	747
	$SMAU_R$	26	25	26	26	759	762	759	759
	SMA_C	22	22	22	22	770	775	770	770
	$SMAU_C$	20	20	20	20	754	758	754	754
	FastMiner	23	66	23	23	739	1872	739	739
	OBMD	20	25	20	20	745	990	745	745
	Biclique	26	25	26	26	761	763	761	761
7	Optimal	21	21	21	21	756	754	756	756
	SMA_R	20	21	20	20	747	787	747	747
	$SMAU_R$	23	22	23	23	764	743	764	764
	SMA_C	22	22	22	22	770	775	770	770
	$SMAU_C$	20	20	20	20	754	758	754	754
	FastMiner	23	69	23	23	739	1975	739	739
	OBMD	20	22	20	20	745	896	745	745
	Biclique	23	22	23	23	765	744	765	765
9	Optimal	20	20	20	20	754	754	754	754
	SMA_R	20	21	20	20	747	787	747	747
	$SMAU_R$	21	21	21	21	763	759	763	763
	SMA_C	22	22	22	22	770	775	770	770
	$SMAU_C$	20	20	20	20	754	758	754	754
	FastMiner	23	71	23	23	739	2016	739	739
	OBMD	20	22	20	20	745	899	745	745
	Biclique	21	21	21	21	764	760	764	764
11	Optimal	20	20	20	20	754	754	754	754
	SMA_R	20	20	20	20	747	789	747	747
	$SMAU_R$	20	20	20	20	761	761	761	761
	SMA_C	22	22	22	22	770	775	770	770
	$SMAU_C$	20	20	20	20	754	758	754	754
	FastMiner	23	70	23	23	739	2002	739	739
	OBMD	20	22	20	20	745	881	745	745
	Biclique	20	20	20	20	762	762	762	762

Table 44: Dataset Domino

mru	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	2.12	4.0	1.94	1.94	2.38	2.88	2.38	2.38
4	2.38	2.88	2.38	2.38	2.25	3.62	2.06	2.06
7	2.44	2.69	2.44	2.44	2.38	2.88	2.38	2.38
9	2.31	3.06	2.31	2.31	2.31	3.06	2.31	2.31
11	2.38	2.88	2.38	2.38	2.19	3.44	2.19	2.19

Table 45: Ranking for dataset Domino

decomposition	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Optimal	2.3	3.1	2.3	2.3	2.8	1.6	2.8	2.8
SMA_R	2.1	3.7	2.1	2.1	2.0	4.0	2.0	2.0
SMAU_R	2.6	2.2	2.6	2.6	2.7	1.9	2.7	2.7
SMA_C	2.6	2.8	2.3	2.3	2.2	4.0	1.9	1.9
SMAU_C	2.4	2.8	2.4	2.4	2.0	4.0	2.0	2.0
FastMiner	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
OBMD	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
Biclique	2.6	2.2	2.6	2.6	2.7	1.9	2.7	2.7

Table 46: Ranking for dataset Domino

Dataset	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Domino	2.33	3.1	2.29	2.29	2.3	3.18	2.26	2.26

Table 47: Ranking for dataset Domino

4.6 Emea

mru	decomposition	#roles				WSC			
		postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
1	Optimal	34	34	34	34	7280	7280	7280	7280
	SMA_R	34	34	34	34	7280	7280	7280	7280
	$SMAU_R$	34	34	34	34	7280	7280	7280	7280
	SMA_C	34	42	34	40	7280	8094	7280	7595
	$SMAU_C$	34	34	34	34	7280	7280	7280	7280
	FastMiner	34	242	34	34	7280	22225	7280	7280
	OBMD	34	43	34	34	7280	9057	7280	7280
	Biclique	34	34	34	34	7280	7280	7280	7280
2	Optimal	34	34	34	34	7280	7280	7280	7280
	SMA_R	34	34	34	34	7280	7280	7280	7280
	$SMAU_R$	34	34	34	34	7280	7280	7280	7280
	SMA_C	36	41	36	36	7319	7758	7284	7284
	$SMAU_C$	34	34	34	34	7280	7280	7280	7280
	FastMiner	34	244	34	34	7280	23122	7280	7280
	OBMD	34	44	34	34	7280	9542	7280	7280
	Biclique	34	34	34	34	7280	7280	7280	7280
3	Optimal	34	34	34	34	7280	7280	7280	7280
	SMA_R	34	34	34	34	7280	7280	7280	7280
	$SMAU_R$	34	34	34	34	7280	7280	7280	7280
	SMA_C	37	41	37	37	7364	7756	7364	7373
	$SMAU_C$	34	34	34	34	7280	7280	7280	7280
	FastMiner	34	250	34	34	7280	24157	7280	7280
	OBMD	34	44	34	34	7280	9375	7280	7280
	Biclique	34	34	34	34	7280	7280	7280	7280
4	Optimal	34	34	34	34	7280	7280	7280	7280
	SMA_R	34	34	34	34	7280	7280	7280	7280
	$SMAU_R$	34	34	34	34	7280	7280	7280	7280
	SMA_C	38	41	38	38	7433	7752	7433	7442
	$SMAU_C$	34	34	34	34	7280	7280	7280	7280
	FastMiner	34	255	34	34	7280	25262	7280	7280
	OBMD	34	43	34	34	7280	9086	7280	7280
	Biclique	34	34	34	34	7280	7280	7280	7280
5	Optimal	34	34	34	34	7280	7280	7280	7280
	SMA_R	34	34	34	34	7280	7280	7280	7280
	$SMAU_R$	34	34	34	34	7280	7280	7280	7280
	SMA_C	39	41	39	39	7511	7751	7511	7511
	$SMAU_C$	34	34	34	34	7280	7280	7280	7280
	FastMiner	34	256	34	34	7280	25563	7280	7280
	OBMD	34	43	34	34	7280	9086	7280	7280
	Biclique	34	34	34	34	7280	7280	7280	7280

Table 48: Dataset Emea

mru	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
1	2.25	3.06	2.25	2.44	2.25	3.06	2.25	2.44
2	2.31	3.06	2.31	2.31	2.44	3.06	2.25	2.25
3	2.31	3.06	2.31	2.31	2.25	3.06	2.25	2.44
4	2.31	3.06	2.31	2.31	2.25	3.06	2.25	2.44
5	2.31	3.06	2.31	2.31	2.31	3.06	2.31	2.31

Table 49: Ranking for dataset Emea

decomposition	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Optimal	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
SMA_R	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
SMAU_R	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
SMA_C	1.9	4.0	1.9	2.2	1.9	4.0	1.6	2.5
SMAU_C	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
FastMiner	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
OBMD	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
Biclique	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Table 50: Ranking for dataset Emea

Dataset	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Emea	2.3	3.06	2.3	2.34	2.3	3.06	2.26	2.38

Table 51: Ranking for dataset Emea

4.7 Firewall 1

mru	decomposition	#roles				WSC			
		postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	Optimal	86	86	87	87	3506	4098	3513	3513
	SMA_R	75	85	81	81	5034	6581	5070	5070
	SMAU_R	91	99	90	90	4308	4857	4228	4228
	SMA_C	95	110	98	98	3993	6804	3960	3960
	SMAU_C	86	82	89	89	4613	5769	4617	4617
	FastMiner	90	268	90	90	7190	19816	7190	7190
	OBMD	79	90	84	84	4102	6532	3993	3993
	Biclique	96	101	100	100	5033	6265	5108	5108
4	Optimal	71	70	72	74	2099	2459	2101	2152
	SMA_R	71	77	72	73	5008	6005	5010	5018
	SMAU_R	92	81	91	92	3094	3324	3092	3251
	SMA_C	82	89	83	82	3717	5425	3690	3836
	SMAU_C	67	71	69	72	4448	4791	4452	4486
	FastMiner	90	269	90	90	7190	19985	7190	7190
	OBMD	65	78	66	67	3885	5355	3887	3901
	Biclique	87	79	86	89	4890	5110	4904	4928
7	Optimal	68	67	68	70	2035	2204	2035	2060
	SMA_R	71	76	71	71	5008	5989	5008	5013
	SMAU_R	83	77	84	82	2986	3337	2999	3045
	SMA_C	74	83	74	74	3954	5451	3954	3954
	SMAU_C	65	66	65	65	4448	4704	4448	4469
	FastMiner	90	274	90	90	7190	20983	7190	7190
	OBMD	65	73	65	65	3885	5588	3885	3890
	Biclique	75	71	76	76	5317	4804	5319	5336
9	Optimal	66	66	66	66	2020	2019	2020	2041
	SMA_R	71	75	71	71	5008	6111	5008	5013
	SMAU_R	76	74	76	77	3067	3264	3080	3101
	SMA_C	74	83	74	74	3954	5276	3954	3954
	SMAU_C	65	66	65	65	4448	4999	4448	4469
	FastMiner	90	277	90	90	7190	21445	7190	7190
	OBMD	65	70	65	65	3885	5632	3885	3890
	Biclique	70	70	71	70	5325	5169	5328	5318
11	Optimal	66	66	66	66	2020	2019	2020	2041
	SMA_R	71	73	71	71	5008	6601	5008	5013
	SMAU_R	76	74	74	77	3099	2755	3092	3135
	SMA_C	74	80	74	74	3954	5605	3954	3954
	SMAU_C	65	65	65	65	4448	5231	4448	4469
	FastMiner	90	277	90	90	7190	21484	7190	7190
	OBMD	65	69	65	65	3885	5028	3885	3890
	Biclique	68	69	69	69	5321	5531	5323	5326

Table 52: Dataset Firewall 1

mru	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	1.56	3.31	2.56	2.56	1.88	4.0	2.06	2.06
4	1.88	2.75	2.25	3.12	1.38	4.0	1.75	2.88
7	2.19	2.88	2.5	2.44	1.62	3.62	1.88	2.88
9	2.12	3.19	2.38	2.31	1.88	3.25	2.12	2.75
11	2.12	3.19	2.19	2.5	1.88	3.25	1.88	3.0

Table 53: Ranking for dataset Firewall 1

decomposition	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Optimal	2.2	1.7	2.8	3.3	1.7	2.8	2.2	3.3
$\texttt{SMA}_R$	1.6	4.0	2.1	2.3	1.3	4.0	1.8	2.9
$\texttt{SMAU}_R$	3.0	1.7	2.3	3.0	2.0	3.4	1.7	2.9
$\texttt{SMA}_C$	1.7	4.0	2.3	2.0	2.2	4.0	1.7	2.1
$\texttt{SMAU}_C$	1.9	2.9	2.4	2.8	1.3	4.0	1.8	2.9
FastMiner	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
OBMD	1.6	4.0	2.1	2.3	1.7	4.0	1.6	2.7
Biclique	1.8	2.2	3.0	3.0	1.6	2.8	2.7	2.9

Table 54: Ranking for dataset Firewall 1

Dataset	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Firewall 1	1.97	3.06	2.38	2.59	1.73	3.62	1.94	2.71

Table 55: Ranking for dataset Firewall 1

4.8 Firewall 2

mru	decomposition	#roles				WSC			
		postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	Optimal	11	13	11	11	1160	1181	1160	1160
	SMA_R	10	13	11	11	1466	1931	1479	1479
	$SMAU_R$	12	15	12	12	1195	1719	1195	1195
	SMA_C	11	13	11	11	1417	1478	1417	1417
	$SMAU_C$	10	10	11	11	1466	1466	1479	1479
	FastMiner	11	21	11	11	1510	2242	1510	1510
	OBMD	10	14	11	11	1466	1945	1479	1479
	Biclique	12	14	12	12	1463	1456	1463	1463
3	Optimal	10	10	10	10	1120	1120	1120	1120
	SMA_R	10	13	10	10	1466	2017	1466	1466
	$SMAU_R$	13	16	13	13	1217	1571	1217	1217
	SMA_C	10	12	10	10	1384	1472	1383	1383
	$SMAU_C$	10	10	10	10	1466	1466	1466	1466
	FastMiner	11	21	11	11	1510	2358	1510	1510
	OBMD	10	13	10	10	1466	2017	1466	1466
	Biclique	11	16	11	11	1449	1582	1449	1458
4	Optimal	10	10	10	10	1120	1120	1120	1120
	SMA_R	10	12	10	10	1466	2021	1466	1466
	$SMAU_R$	13	14	13	13	1271	1321	1271	1271
	SMA_C	10	11	10	10	1384	1468	1384	1384
	$SMAU_C$	10	10	10	10	1466	1466	1466	1466
	FastMiner	11	22	11	11	1510	2253	1510	1510
	OBMD	10	12	10	10	1466	2053	1466	1466
	Biclique	12	13	12	12	1507	1512	1507	1512

Table 56: Dataset Firewall 2

mru	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	1.69	3.69	2.31	2.31	1.81	3.31	2.44	2.44
3	2.12	3.62	2.12	2.12	2.19	3.62	2.0	2.19
4	2.12	3.62	2.12	2.12	2.06	3.56	2.06	2.31

Table 57: Ranking for dataset Firewall 2

decomposition	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Optimal	2.33	3.0	2.33	2.33	2.33	3.0	2.33	2.33
SMA_R	1.67	4.0	2.17	2.17	1.67	4.0	2.17	2.17
SMAU_R	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
SMA_C	2.0	4.0	2.0	2.0	2.33	4.0	1.83	1.83
SMAU_C	2.17	2.17	2.83	2.83	2.17	2.17	2.83	2.83
FastMiner	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
OBMD	1.67	4.0	2.17	2.17	1.67	4.0	2.17	2.17
Biclique	2.0	4.0	2.0	2.0	2.0	2.83	2.0	3.17

Table 58: Ranking for dataset Firewall 2

Dataset	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Firewall 2	1.98	3.64	2.18	2.18	2.02	3.5	2.17	2.31

Table 59: Ranking for dataset Firewall 2

4.9 Healthcare

mru	decomposition	#roles				WSC			
		postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	Optimal	17	20	17	17	271	385	271	271
	SMA_R	16	20	18	18	494	631	498	498
	SMAU_R	17	22	17	17	252	388	252	252
	SMA_C	14	14	17	17	425	425	431	431
	SMAU_C	16	16	16	16	364	404	364	364
	FastMiner	18	31	18	18	563	845	563	563
	OBMD	14	18	16	16	425	558	429	429
	Biclique	16	18	16	16	349	431	349	349
4	Optimal	16	16	17	17	259	276	275	275
	SMA_R	16	19	16	16	494	665	494	494
	SMAU_R	16	19	17	17	247	345	252	251
	SMA_C	14	14	14	14	425	425	425	425
	SMAU_C	14	15	15	14	386	416	388	386
	FastMiner	18	35	18	18	563	1001	563	563
	OBMD	14	18	14	14	425	619	425	425
	Biclique	14	16	16	16	370	408	374	379
6	Optimal	14	14	14	14	264	268	264	264
	SMA_R	16	18	16	16	494	675	494	494
	SMAU_R	15	17	15	18	278	318	278	289
	SMA_C	14	14	14	14	425	425	425	425
	SMAU_C	14	15	14	14	386	450	386	386
	FastMiner	18	32	18	18	563	951	563	563
	OBMD	14	15	14	14	425	582	425	425
	Biclique	14	16	14	14	370	429	370	374
7	Optimal	14	14	14	14	264	268	264	264
	SMA_R	16	17	16	16	494	662	494	494
	SMAU_R	17	16	17	17	296	315	296	298
	SMA_C	14	14	14	14	425	425	425	425
	SMAU_C	14	15	14	14	386	464	386	386
	FastMiner	18	31	18	18	563	959	563	563
	OBMD	14	15	14	14	425	598	425	425
	Biclique	14	15	14	14	370	444	370	374

Table 60: Dataset Healthcare

mru	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
2	1.75	3.5	2.38	2.38	1.69	3.69	2.31	2.31
4	1.69	3.31	2.62	2.38	1.62	3.81	2.38	2.19
6	2.06	3.5	2.06	2.38	1.94	3.81	1.94	2.31
7	2.25	3.25	2.25	2.25	1.94	3.81	1.94	2.31

Table 61: Ranking for dataset Healthcare

decomposition	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Optimal	2.12	2.62	2.62	2.62	1.75	4.0	2.12	2.12
$\texttt{SMA}_R$	1.75	4.0	2.12	2.12	1.75	4.0	2.12	2.12
$\texttt{SMAU}_R$	1.88	3.0	2.25	2.88	1.5	4.0	2.0	2.5
$\texttt{SMA}_C$	2.25	2.25	2.75	2.75	2.25	2.25	2.75	2.75
$\texttt{SMAU}_C$	2.0	3.5	2.5	2.0	1.88	4.0	2.25	1.88
FastMiner	2.0	4.0	2.0	2.0	2.0	4.0	2.0	2.0
OBMD	1.75	4.0	2.12	2.12	1.75	4.0	2.12	2.12
Biclique	1.75	3.75	2.25	2.25	1.5	4.0	1.75	2.75

Table 62: Ranking for dataset Healthcare

Dataset	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Healthcare	1.94	3.39	2.33	2.35	1.8	3.78	2.14	2.28

Table 63: Ranking for dataset Healthcare

4.10 Overall ranking

Dataset	#roles				WSC			
	postPUCC	FixRUC	CPA	RPA	postPUCC	FixRUC	CPA	RPA
Americas Large	1.67	3.23	2.52	2.58	2.13	3.63	1.81	2.44
Americas Small	1.76	3.81	2.15	2.27	1.9	4.0	1.76	2.34
Apj	1.89	3.0	2.51	2.6	1.99	3.15	2.3	2.56
Customer	2.29	3.11	2.17	2.43	2.72	3.14	1.74	2.4
Domino	2.33	3.1	2.29	2.29	2.3	3.18	2.26	2.26
Emea	2.3	3.06	2.3	2.34	2.3	3.06	2.26	2.38
Firewall 1	1.97	3.06	2.38	2.59	1.73	3.62	1.94	2.71
Firewall 2	1.98	3.64	2.18	2.18	2.02	3.5	2.17	2.31
Healthcare	1.94	3.39	2.33	2.35	1.8	3.78	2.14	2.28

Table 64: RUCC - Ranking all datasets