

AppTracker1: MAP property State2end_{GPAM}

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State2end_{GPAM} identifies observed states and patterns that lead to the end of the session with a high probability p . This is useful for studying user engagement analysis across different time intervals.

$$P_{\geq 1}[F(x = i \wedge y = j)] \wedge P_{\geq 1}[G((x = i \wedge y = j) \Rightarrow P_{> p}[(x = i) \cup \text{UseStop}])]$$

We are interested in the maximum value of p for which the property is true. In the following table, if p is 0 then that means that the probability is in the interval $(0, 0.01)$ and the property is true. If the cell is $-$ then the property is false for all values of p .

Table 1: Property State2end_{GPAM} for $K = 2$

Time	OverallUsage		StackedBars		PeriodSelector		Stats	
interval	AP1	AP2	AP1	AP2	AP1	AP2	AP1	AP2
[0,1]	0.36	0.00	0.33	0.00	0.29	0.00	0.62	0.00
[0,7]	0.00	0.41	0.10	0.33	0.00	0.33	0.00	0.68
[0,30]	0.41	0.00	0.41	0.08	0.26	0.00	0.70	0.00
[30,60]	0.72	0.67	0.80	0.65	0.67	0.62	0.70	0.66
[60,90]	0.65	0.72	0.72	0.63	0.69	0.81	0.61	0.68

Table 2: Property State2end_{GPAM} for $K = 2$

Time	AppsInPeriod		UBCOverallUsage		UBCStats		UBCAAppsInPeriod	
interval	AP1	AP2	AP1	AP2	AP1	AP2	AP1	AP2
[0,1]	0.16	0.00	0.15	0.00	0.11	—	—	0.00
[0,7]	0.09	0.14	0.00	0.75	—	0.13	0.00	0.44
[0,30]	0.14	0.08	0.84	0.00	0.13	—	0.83	0.00
[30,60]	0.62	0.35	—	0.59	0.66	0.60	0.64	—
[60,90]	0.60	0.45	0.59	0.66	0.56	0.62	0.61	—

Table 3: Property State2end_{GPAM} for $K = 3$

Time	OverallUsage			StackedBars			PeriodSelector			Stats		
interval	AP1	AP2	AP3	AP1	AP2	AP3	AP1	AP2	AP3	AP1	AP2	AP3
[0,1]	0.24	0.41	0.00	0.28	0.43	0.00	—	0.62	0.00	0.63	0.73	0.00
[0,7]	0.34	0.00	0.53	0.33	0.00	0.50	0.19	0.00	0.37	0.62	0.00	0.69
[0,30]	0.56	0.35	0.00	0.55	0.39	0.00	0.36	0.14	0.00	0.68	0.62	0.00
[30,60]	0.36	0.75	0.00	0.28	0.86	0.00	0.03	0.47	0.11	0.46	0.77	0.13
[60,90]	0.74	0.64	0.61	0.63	0.75	0.70	0.43	0.51	0.73	0.68	0.61	0.62

Table 4: Property State2end_{GPAM} for $K = 3$

Time	AppsInPeriod			UBCOverallUsage			UBCStats			UBCApPsInPeriod		
interval	AP1	AP2	AP3	AP1	AP2	AP3	AP1	AP2	AP3	AP1	AP2	AP3
[0,1]	0.08	0.31	0.08	0.10	0.25	0.00	0.00	0.27	—	—	—	0.00
[0,7]	0.18	0.00	0.28	0.04	0.01	0.33	0.00	—	—	0.17	0.00	0.39
[0,30]	0.29	0.11	0.05	0.38	0.07	0.01	—	0.00	—	0.60	0.29	0.00
[30,60]	0.02	0.41	0.00	0.75	0.76	0.01	0.09	0.76	0.18	0.04	0.81	0.00
[60,90]	0.39	0.36	0.65	0.66	0.57	0.58	0.59	—	0.59	—	—	0.66

Table 5: Property State2endGPAM for $K = 4$

Time interval	OverallUsage				StackedBars				PeriodSelector				Stats			
	AP1	AP2	AP3	AP4	AP1	AP2	AP3	AP4	AP1	AP2	AP3	AP4	AP1	AP2	AP3	AP4
[0,1]	0.39	0.16	0.67	0.35	0.19	0.07	0.50	—	0.32	0.45	0.29	0.00	0.21	0.34	0.36	0.00
[0,7]	0.11	0.00	0.45	0.64	0.29	0.00	0.40	0.48	0.33	0.00	0.25	0.27	0.28	0.00	0.18	0.33
[0,30]	0.10	0.48	0.70	0.00	0.03	0.36	0.60	0.00	0.27	0.22	0.28	0.00	0.27	0.18	0.35	0.00
[30,60]	0.00	0.38	0.34	0.37	0.00	0.21	0.04	0.73	0.03	0.13	0.11	0.17	0.16	0.28	0.23	—
[60,90]	0.10	0.02	0.74	0.62	0.02	0.76	0.50	0.71	0.02	—	0.41	0.75	0.32	0.03	0.68	0.63

Table 6: Property State2endGPAM for $K = 4$

Time interval	AppsInPeriod				UBCOverallUsage				UBCStats				UBCAppsInPeriod			
	AP1	AP2	AP3	AP4	AP1	AP2	AP3	AP4	AP1	AP2	AP3	AP4	AP1	AP2	AP3	AP4
[0,1]	0.14	0.17	0.28	0.00	—	0.11	0.81	0.00	—	0.21	0.20	0.00	0.00	0.10	—	0.00
[0,7]	0.17	0.13	0.08	0.14	0.08	0.00	0.05	0.36	0.15	0.00	0.00	—	0.29	0.00	0.18	—
[0,30]	0.16	0.09	0.15	0.14	0.05	0.09	0.43	0.00	0.14	0.00	—	0.00	0.33	—	—	0.00
[30,60]	0.00	0.02	0.00	0.20	0.02	0.03	0.02	—	0.04	—	0.02	0.28	0.00	0.13	0.00	—
[60,90]	0.10	0.03	0.37	0.66	0.03	—	0.64	0.60	0.01	—	0.58	0.61	0.17	—	—	0.67

Table 7: Property State2endGPAM for $K = 5$

Time interval	OverallUsage					StackedBars					PeriodSelector					Stats				
	AP1	AP2	AP3	AP4	AP5	AP1	AP2	AP3	AP4	AP5	AP1	AP2	AP3	AP4	AP5	AP1	AP2	AP3	AP4	AP5
[0,1]	0.07	0.68	0.06	0.42	0.00	0.03	0.43	0.00	0.20	0.00	0.04	0.47	0.00	0.23	0.00	0.36	0.22	0.21	0.01	0.00
[0,7]	0.15	0.33	0.00	0.00	0.32	0.71	0.15	0.12	0.08	0.02	0.70	0.13	0.01	1.00	0.02	0.68	0.14	0.08	0.29	0.02
[0,30]	0.60	0.50	0.01	0.00	0.27	0.60	0.13	0.01	0.00	0.22	0.49	0.07	0.00	0.00	0.13	0.62	0.14	0.01	0.30	0.25
[30,60]	0.00	0.18	0.37	0.00	0.44	0.16	0.43	0.21	—	0.87	0.03	0.09	0.16	0.00	0.42	0.09	0.64	0.13	0.10	0.68
[60,90]	0.23	0.90	0.04	0.28	0.84	0.31	0.82	0.18	—	0.95	0.09	0.89	0.25	0.03	0.90	0.08	0.82	0.28	0.00	0.86

Table 8: Property State2endGPAM for $K = 5$

Time interval	AppsInPeriod					UBCOverallUsage					UBCStats					UBCAppsInPeriod				
	AP1	AP2	AP3	AP4	AP5	AP1	AP2	AP3	AP4	AP5	AP1	AP2	AP3	AP4	AP5	AP1	AP2	AP3	AP4	AP5
[0,1]	0.12	0.26	0.02	0.08	0.24	0.01	0.34	0.02	0.06	0.00	—	0.08	0.07	0.00	0.00	—	0.10	0.01	0.00	0.00
[0,7]	0.10	0.07	0.30	0.11	0.02	0.25	0.05	0.00	0.00	0.01	—	0.00	0.00	0.00	0.00	0.43	0.08	0.00	0.01	—
[0,30]	0.26	0.05	0.15	0.04	0.09	0.40	0.04	0.00	0.00	0.07	—	0.00	0.00	0.00	—	0.54	0.20	0.02	0.00	—
[30,60]	0.01	0.03	0.00	0.00	0.25	0.10	0.03	0.02	0.00	0.63	0.06	—	0.02	0.07	—	—	0.17	0.00	0.00	—
[60,90]	0.11	0.56	0.00	0.00	0.85	—	0.86	0.02	—	0.83	0.00	0.76	0.00	—	0.85	0.07	—	0.00	0.01	0.84