

Struggling with too many tabs?



Our Goal

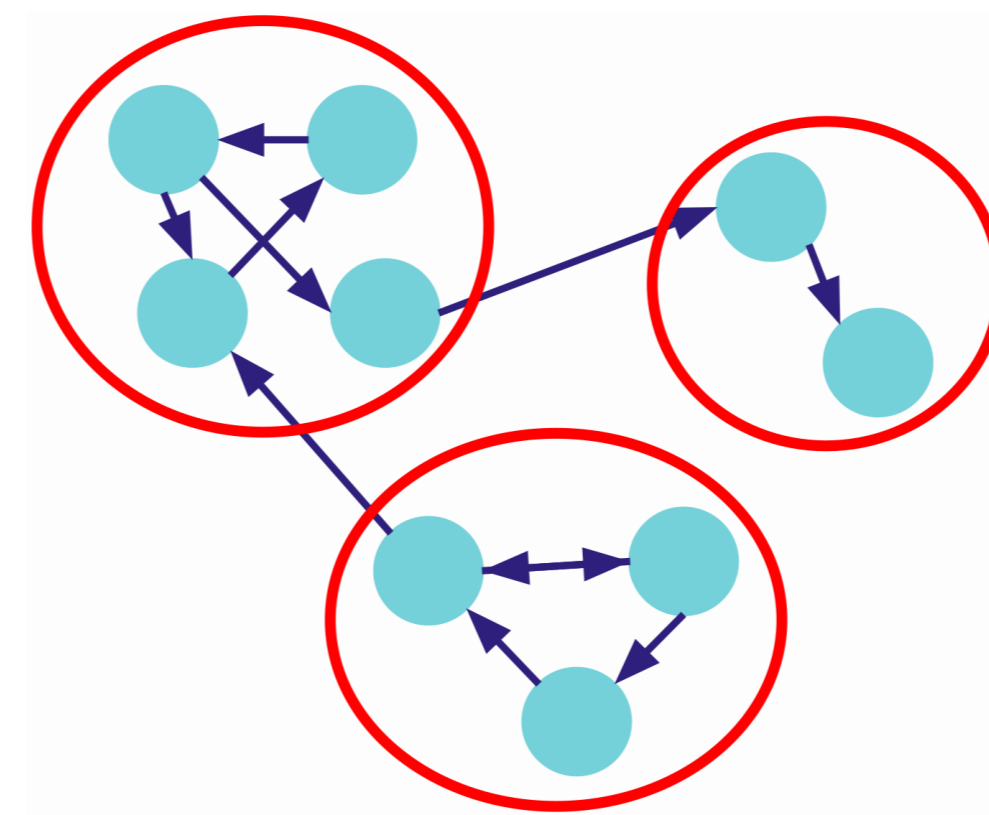
Automatic tab grouping into tasks

Related Work

- Based on URLs and domains
→ **does not correspond to “tasks”**
- Machine-learning based
→ **requires manual annotation**

Our Approach

Community detection from tab transition graphs



Directed Louvain [1] identifies densely connected subgraphs

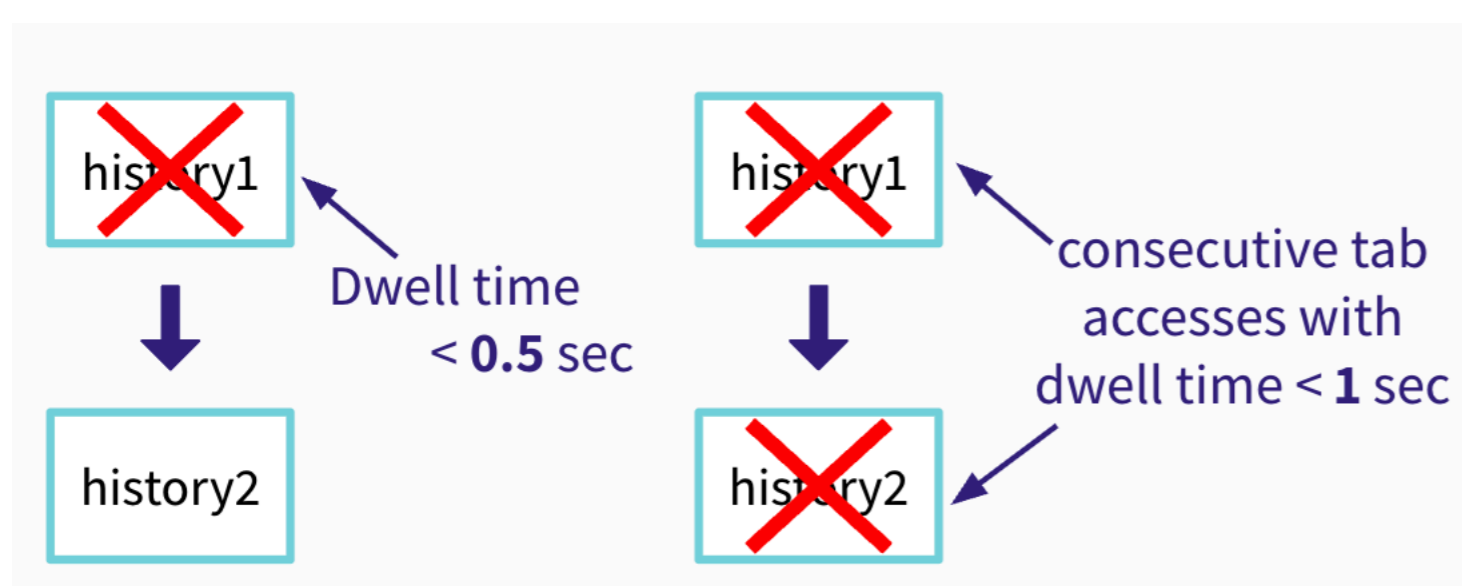
○ : communities
→ tab groups

Observed transitions among tabs

Pre-processing: Remove two types of transitions

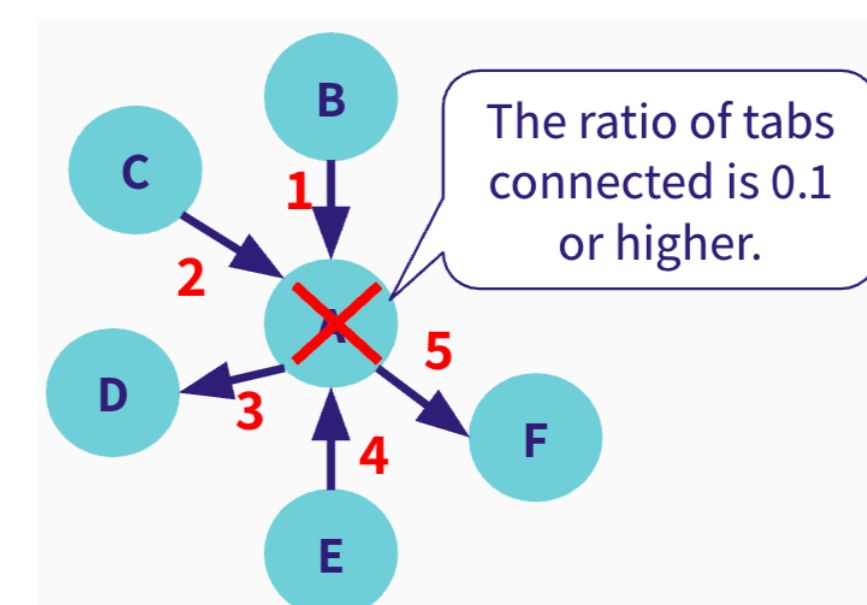
1. transient access

Visit history of tabs passed through to reach the target tab
(e.g, Navigating with Shortcut Keys)



2. interruptive access

frequently appears in any tasks
(e.g, email access, calendar check)



Baseline

Modified version of [2]

- **Identify task switch from tab sequence**
- by machine learning (RF)
- features: time, URLs, domains, . . .

observed sequence: A → B → A → C
 decision by RF: N N Y
 → tab groups: {A,B}, {C}

Evaluation Metrics

1. Expected number of clicks to navigate to other tabs in the same task
2. Share of a single task within a generated tab group (purity)
3. Adjusted Rand index

Experimental Results

user	Nav. cost		Purity		Adjusted Rand	
	prop.	base	prop.	base	prop.	base
D1	305	450	0.319	0.417	0.0607	0.0529
D2	81.6	88.7	0.408	0.595	0.210	0.210
D3	308	171	0.668	0.307	0.0204	0.0570
D4	59.8	60.0	0.568	0.143	0.280	0.00
D5	5.50	7.50	0.633	0.500	0.167	0.00
D6	68.3	87.9	1.00	1.00	0.148	0.0299
D7	776	560	0.736	0.500	0.00673	0.467
D8	145	197	0.712	0.623	0.239	0.122
D9	119	110	0.789	0.620	0.388	0.190
D10	555	417	0.821	0.558	0.0332	-0.0102
D11	378	252	0.750	0.201	0.0145	-0.0618
D12	167	111	0.710	0.250	-0.0152	0.00
D13	48.6	43.8	0.881	0.467	0.118	-0.0377
D14	391	490	1.00	1.00	0.0908	0.0195
D15	7.50	11.6	0.389	1.00	-0.176	0.328

- Comparable or better performance.
- **Without costly manual annotation.**

[1] N. Dugué and A. Perez. Direction matters in complex networks: A theoretical and applied study for greedy modularity optimization. Physica A: Statistical Mechanics and its Applications, Vol. 603 (2022).

[2] J.C. Chang, Y. Kim, V. Miller, M.X. Liu, B.A. Myers, and A. Kittur. Tabs.do: Task-Centric Browser Tab Management, ACM UIST (2021).