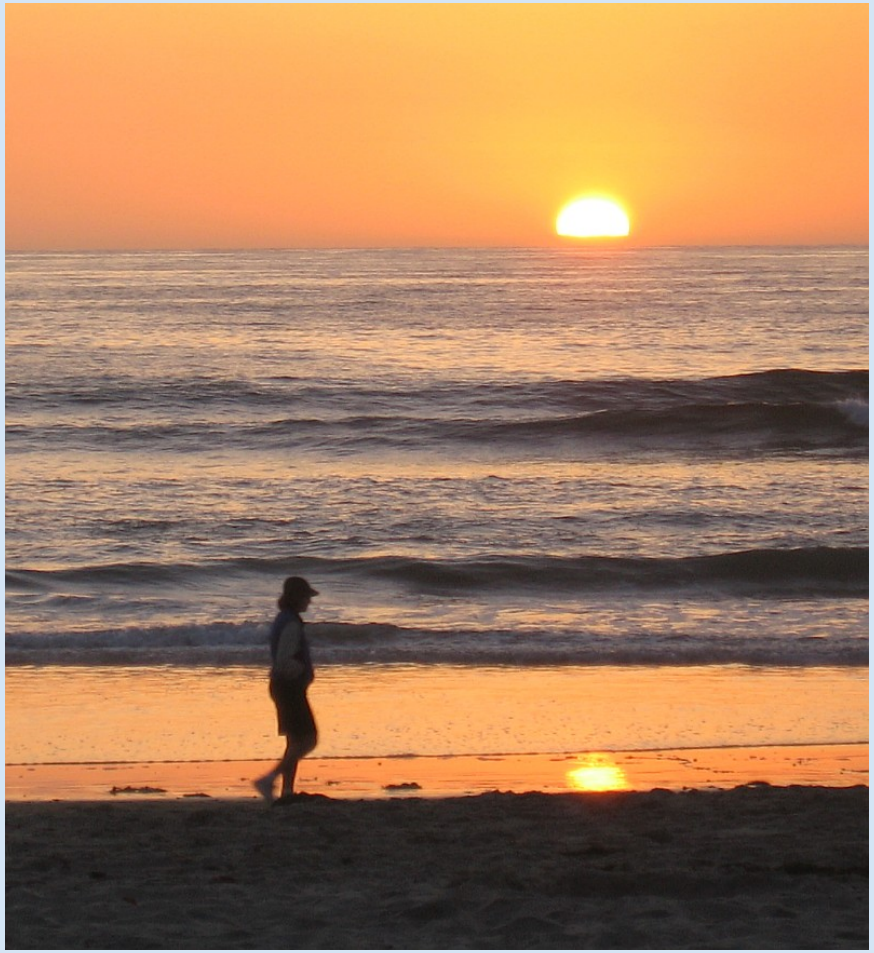

VB

Bibsonomy networks

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Viszards session

Sunbelt XXIX, San Diego, 12. March 2009

version: 12. Mar 2009 / 23 : 39

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Basic characteristics of networks

network	$\|V\|$	$\|V_1\|$	$\|V_2\|$	$\|E\|$	multi	> 1
UserTag	54748	2357	52391	804890	669678	
TagUrl	269936	52391	217545	804890	43259	
UserUrl	219980	2357	217623	242578	5	
UserTagS	54748	2357	52391	135212	0	53296

We selected to further analyze the network `UserTag`. Since it contains many multiple lines we first simplified it into `UserTagS` – replacing multiple lines with a single line with line count as its weight.

Line-Cuts

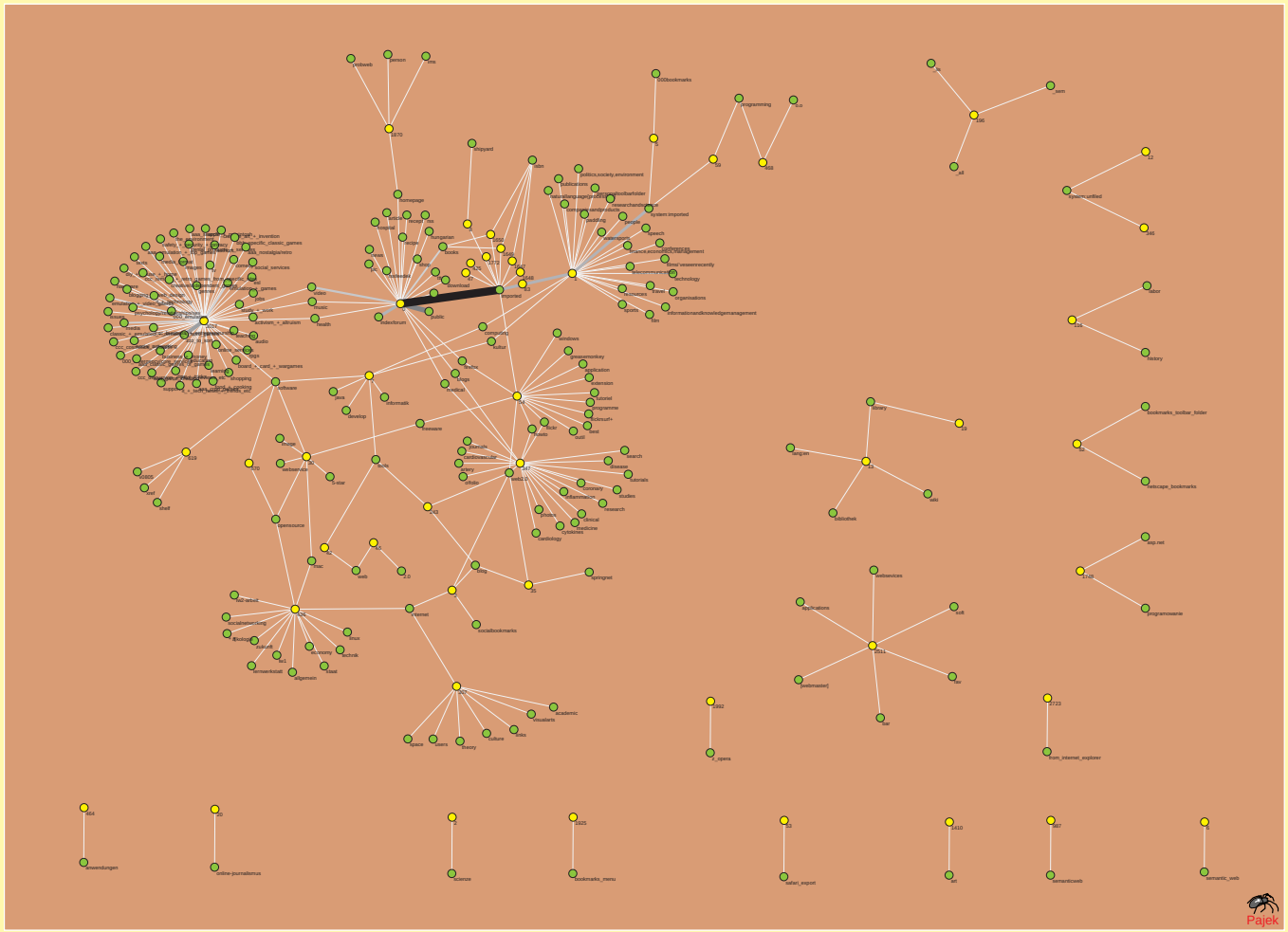
The *line-cut* of a network $\mathbf{N} = (\mathcal{V}, \mathcal{L}, w)$, $w : \mathcal{V} \rightarrow \mathbb{R}$, at selected level t is a subnetwork $\mathbf{N}(t) = (\mathcal{V}(\mathcal{L}'), \mathcal{L}', w)$, determined by the set

$$\mathcal{L}' = \{e \in \mathcal{L} : w(e) \geq t\}$$

and $\mathcal{V}(\mathcal{L}')$ is the set of all endpoints of the lines from $\mathcal{L}'$.

UserTagS line cut at level 250

highest value of line: 24934; treshold, size: 1000 45; 900 56; 500 102; 250 256; 100 632



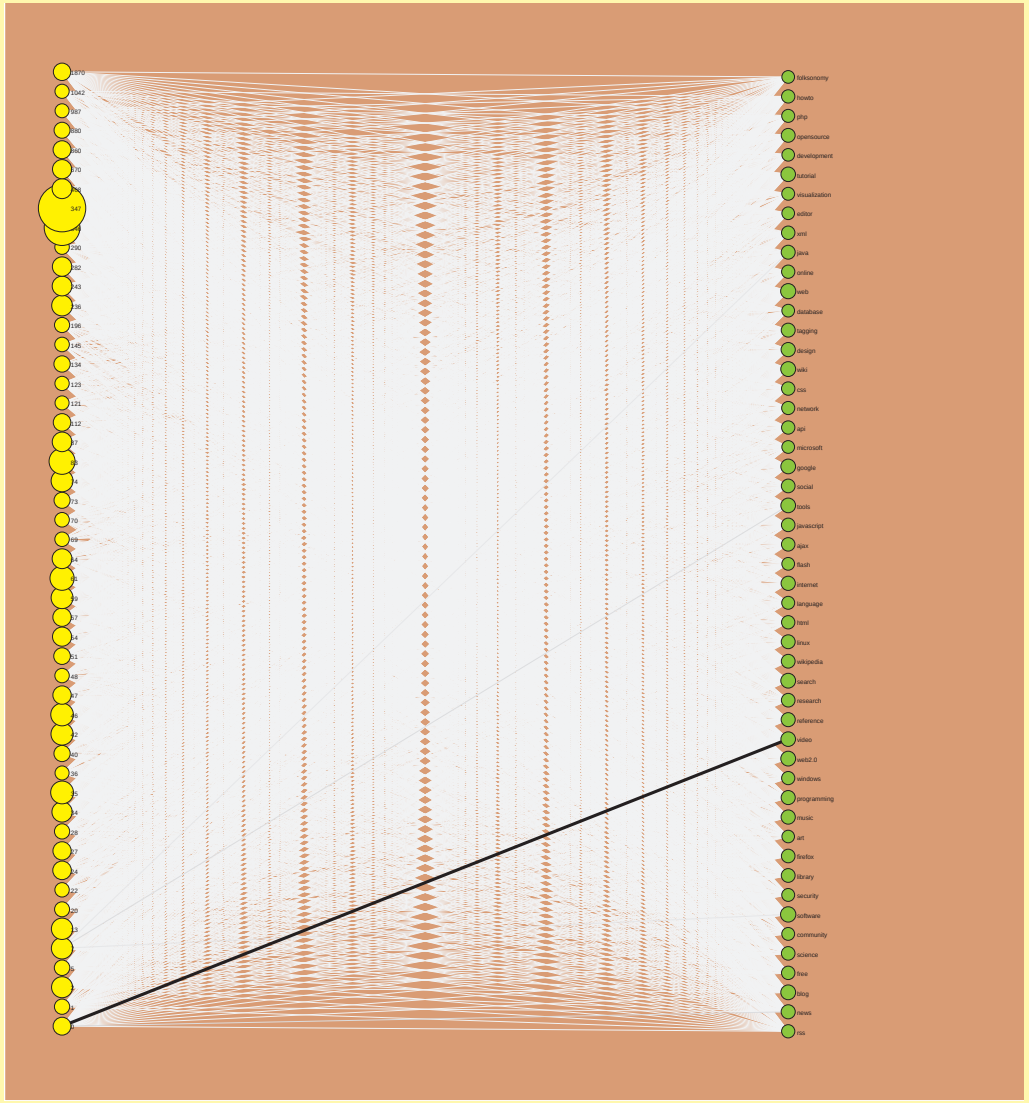
2-mode hubs and authorities

The Kleinberg's hubs and authorities can be extended to 2-mode networks. Let $\mathbf{W}$ be a network matrix then the 2-mode hubs and authorities weights $(\mathbf{x}, \mathbf{y})$ are normalized vectors satisfying the relations:

$$\mathbf{y} = \mathbf{W}\mathbf{x} \quad \text{and} \quad \mathbf{x} = \mathbf{W}^{\mathbf{T}}\mathbf{y}$$

They are determined by iteration procedure.

UserTagS 2-mode hubs and authorities 50/50



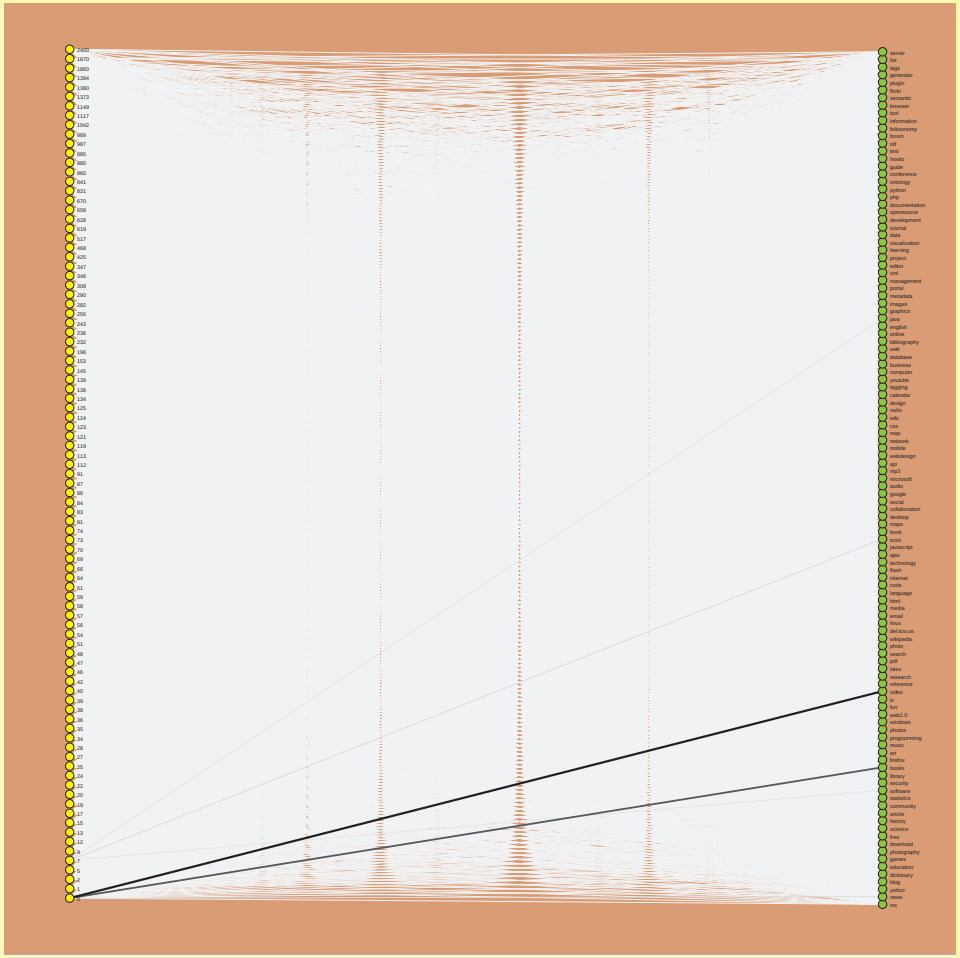
Bipartite cores

The subset of vertices $C \subseteq V$ is a (p, q)-*core* in a bipartite (2-mode) network $N = (V_1, V_2; L)$, $V = V_1 \cup V_2$ iff

a. in the induced subnetwork $K = (C_1, C_2; L(C))$, $C_1 = C \cap V_1$, $C_2 = C \cap V_2$ it holds $\forall v \in C_1 : \deg_K(v) \geq p$ and $\forall v \in C_2 : \deg_K(v) \geq q$;

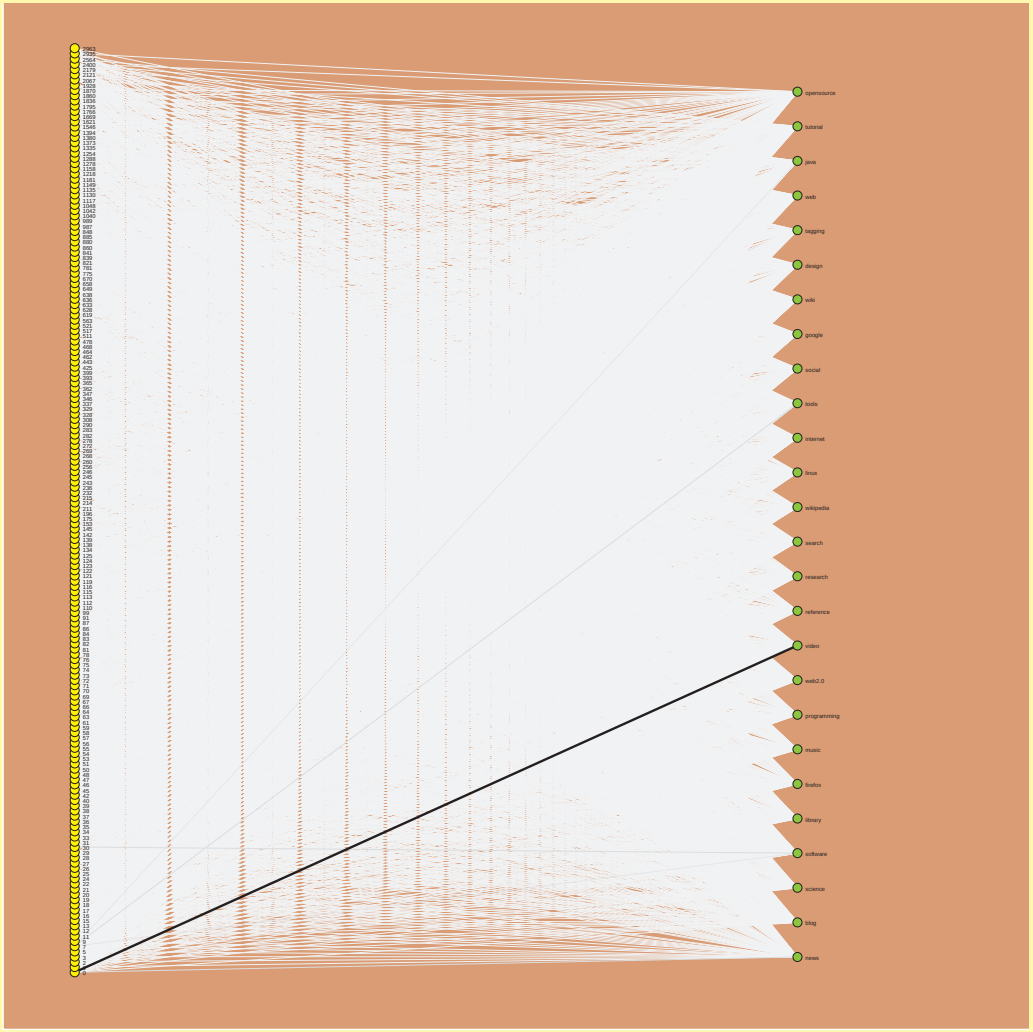
b. C is the maximal subset of V satisfying condition **a**.

UserTagS cores (46,46) / 91, 113

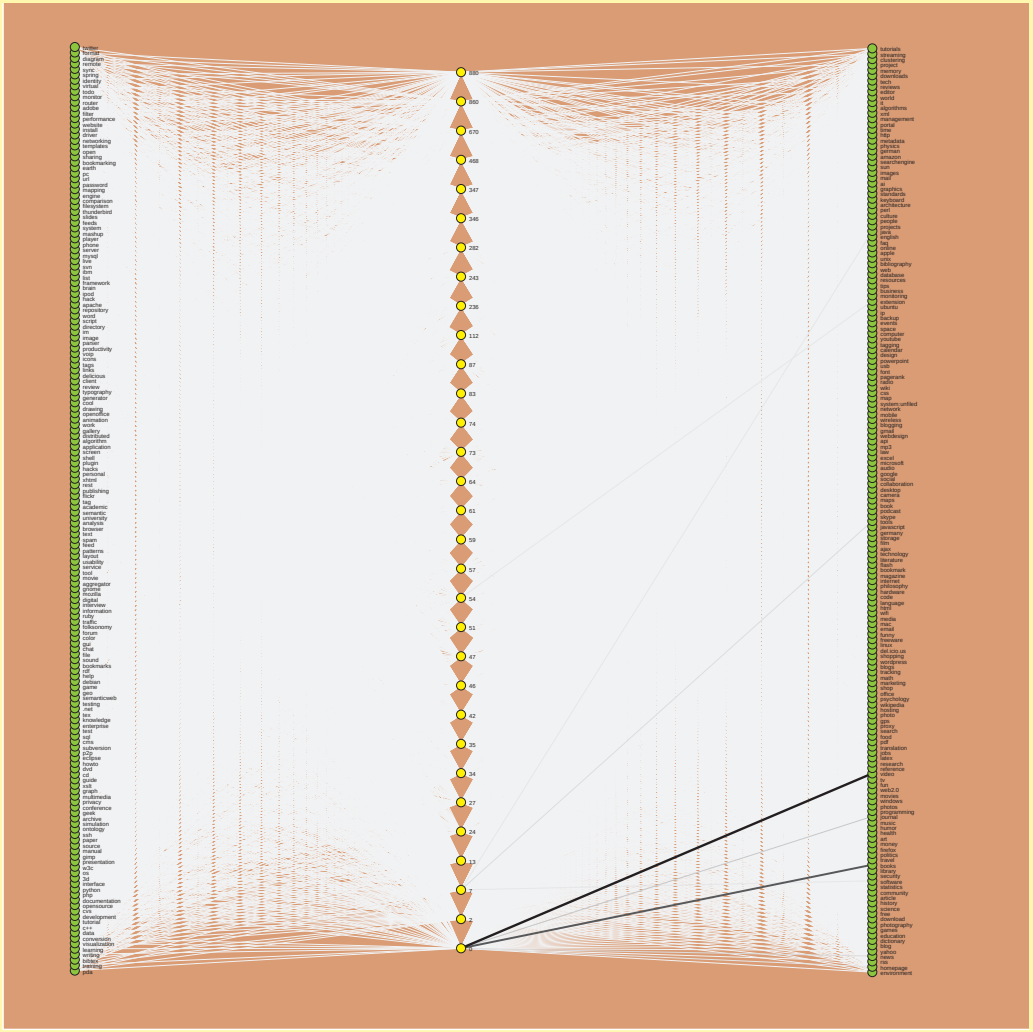


p	q	n1	n2
90	29	60	208
84	30	64	207
80	31	68	202
77	32	69	190
74	33	63	157
70	34	66	155
67	35	65	144
65	36	67	143
63	37	66	129
62	38	66	124
58	39	72	126
56	40	73	123
54	41	79	126
52	42	81	125
50	43	87	125
49	44	88	120
47	45	92	120
46	46	91	113
44	47	96	111
43	48	96	109
41	49	110	120
40	50	106	107
10	103	178	26
186	16	31	343

UserTagS cores (10,103) / 178, 26



UserTagS cores (186,16) / 31, 343



Islands

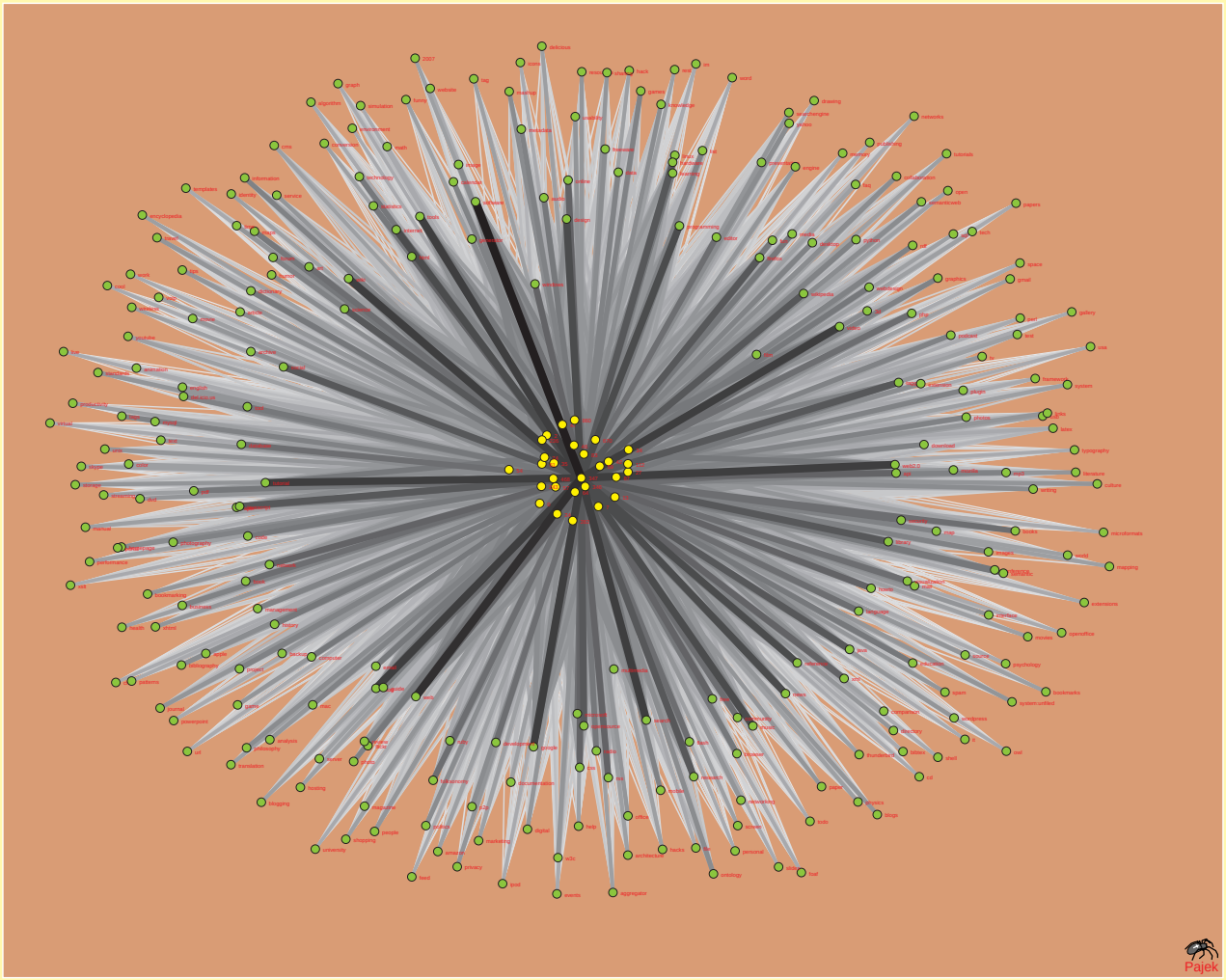
For a given property of vertices or weight of the lines an *island* is a connected subnetwork such that the values of elements inside the island are large than the values of elements in its neigborhood.

4-rings weight w_4 of a line equals to the number of 4-rings (semicycles) containing given line.

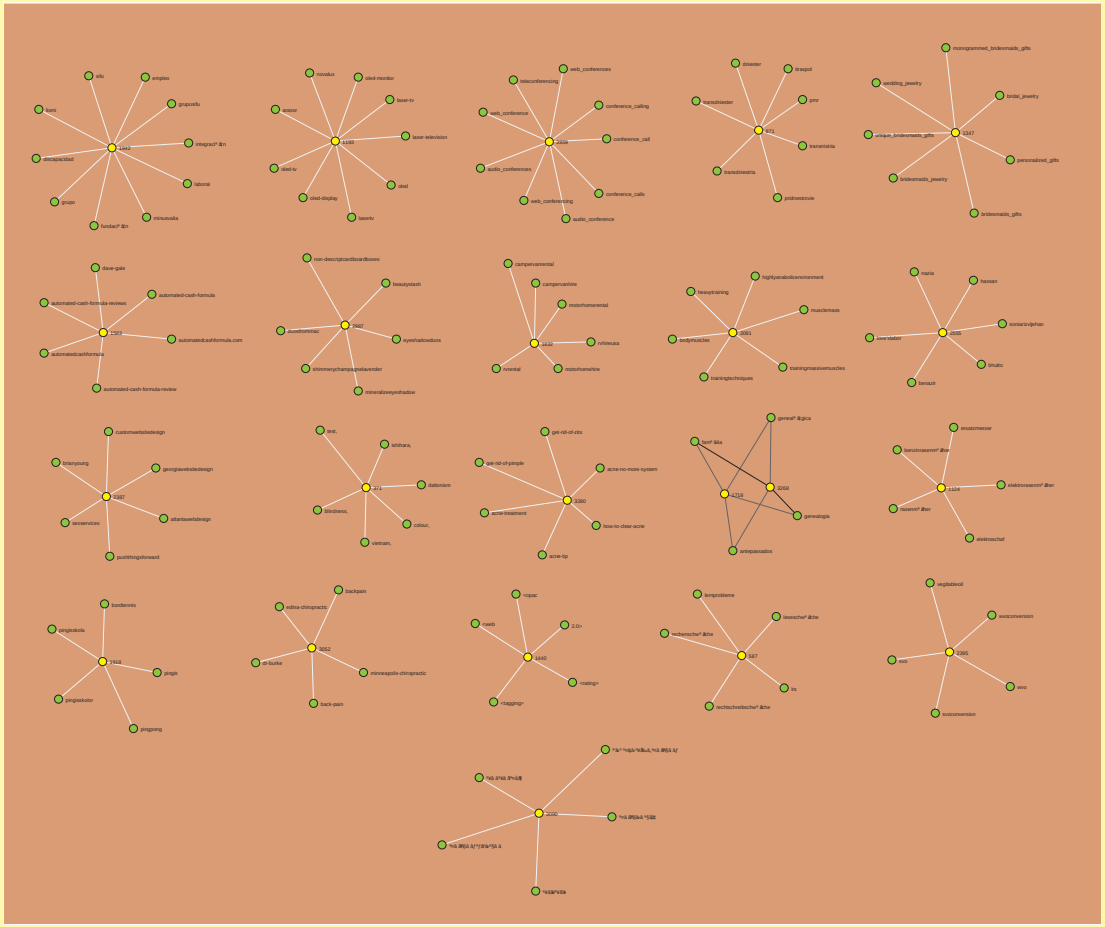
Dense parts of 2-mode network have high w_4 weight.

There are 146 simple (one peak) islands of size at least 5 in `UserTagS` for w_4. The largest has size 2604, followed by 65, 49, 11, 10, 10, 10, 10, ...

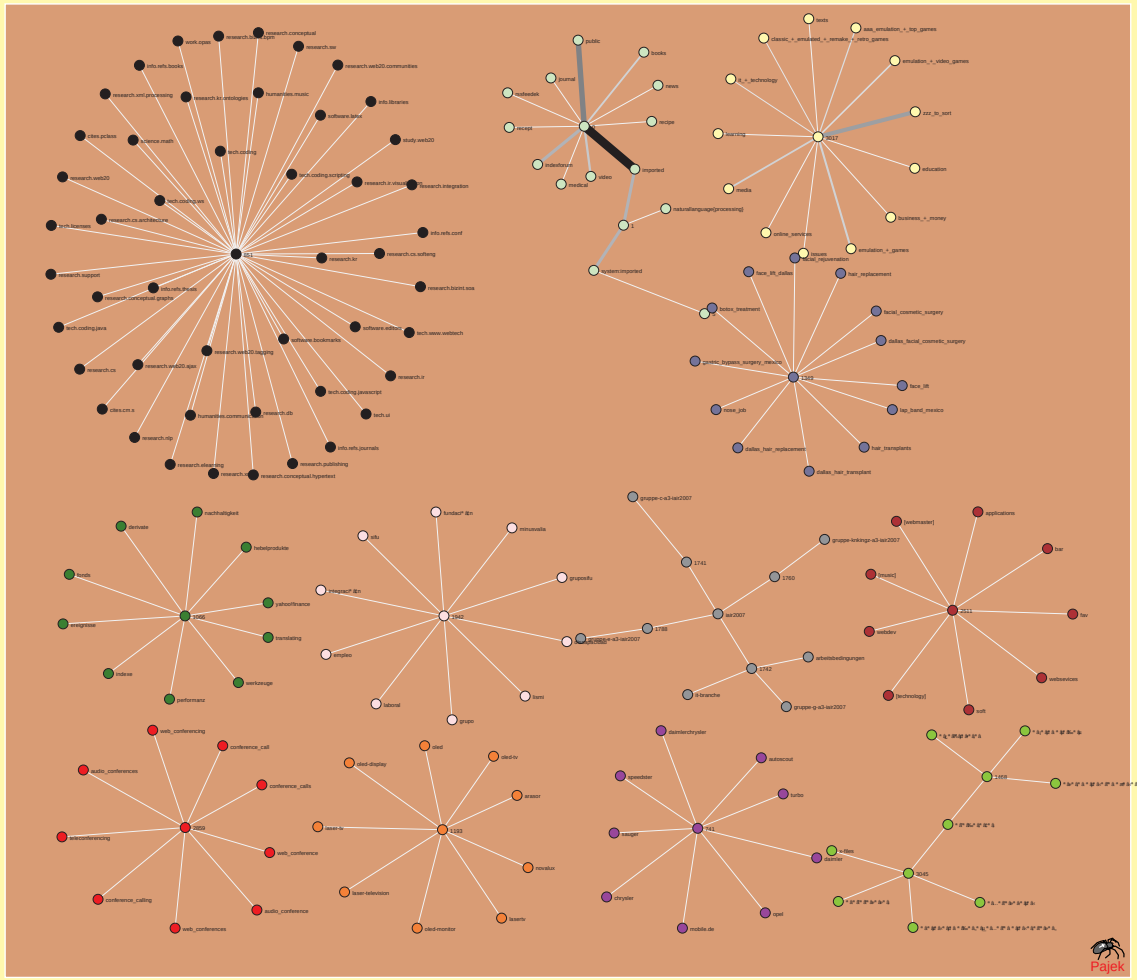
`UserTagS` part of largest simple island for w_4



UserTagS selected simple islands for w_4



`UserTagS` selected simple islands for line counts


Pajek