

Companionship Network Analysis

Information Gain Ranking, Time Dynamics and
Bipartite Properties

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Plain Ranking

1. Criteria: Avg. review
2. Criteria: # of reviews

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Average buyer ranking (length: 4200 ):
Buyer b3006 with avg review score of 1.0 and 1776 purchases
Buyer b8193 with avg review score of 1.0 and 1521 purchases
Buyer b739 with avg review score of 1.0 and 1296 purchases
Buyer b872 with avg review score of 1.0 and 1095 purchases
Buyer b5933 with avg review score of 1.0 and 1085 purchases
...
Buyer b1833 with avg review score of -1.0 and 3 purchases
Buyer b1654 with avg review score of -1.0 and 3 purchases
Buyer b6075 with avg review score of -1.0 and 3 purchases
Buyer b1879 with avg review score of -1.0 and 3 purchases
Buyer b9299 with avg review score of -1.0 and 3 purchases
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Average seller ranking (length: 2848 ):
Seller s1577 with avg review score of 1.0 and 1286 sells
Seller s4090 with avg review score of 1.0 and 731 sells
Seller s1396 with avg review score of 1.0 and 328 sells
Seller s4816 with avg review score of 1.0 and 315 sells
Seller s3873 with avg review score of 1.0 and 313 sells
...
Seller s3851 with avg review score of -1.0 and 3 sells
Seller s4783 with avg review score of -1.0 and 3 sells
Seller s2214 with avg review score of -1.0 and 3 sells
Seller s184 with avg review score of -1.0 and 3 sells
Seller s1400 with avg review score of -1.0 and 3 sells
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Information Gain Ranking

$$R_i^B = (1.1 - |avg_review|) \cdot \log_2(num_reviews) \quad (1)$$

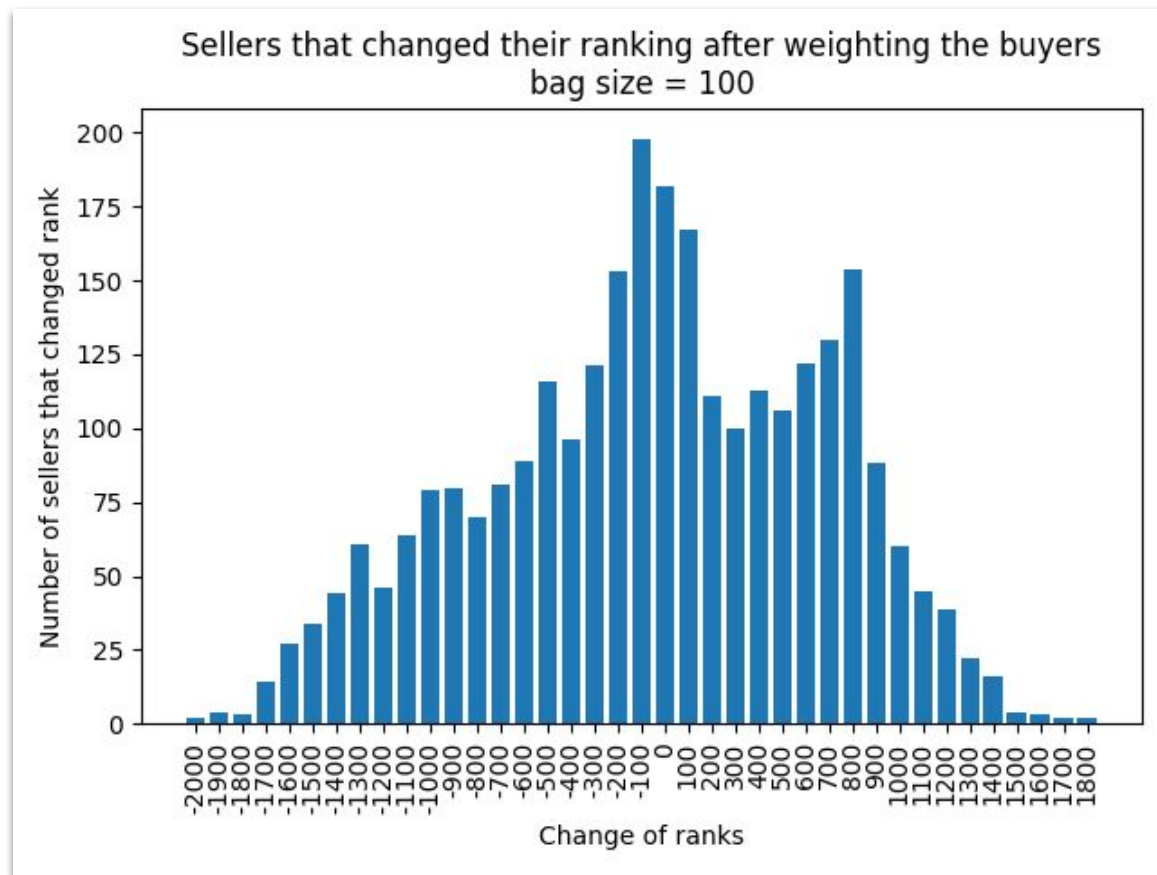
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Print weighted buyer ranking:
Total length of list: 4200
('b3006', 1.0794415866350118)
('b8193', 1.0570804437724506)
('b739', 1.0339850002884634)
('b872', 1.0096715154488547)
('b5933', 1.008347932733185)
('b4361', 0.9961449694398204)
('b6667', 0.9914385132155452)
...
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...
('b3574', 0.15849625007211576)
('b7983', 0.15849625007211576)
('b1833', 0.15849625007211576)
('b1654', 0.15849625007211576)
('b6075', 0.15849625007211576)
('b1879', 0.15849625007211576)
('b9299', 0.15849625007211576)
```

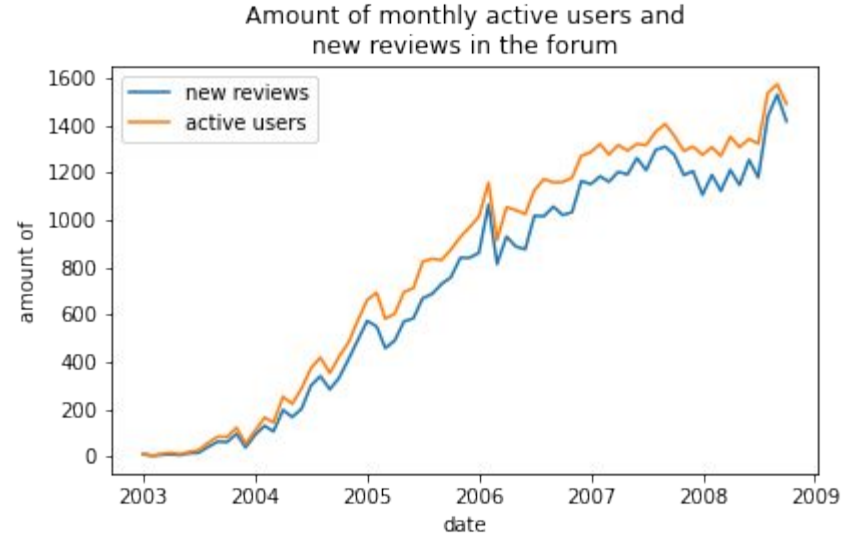
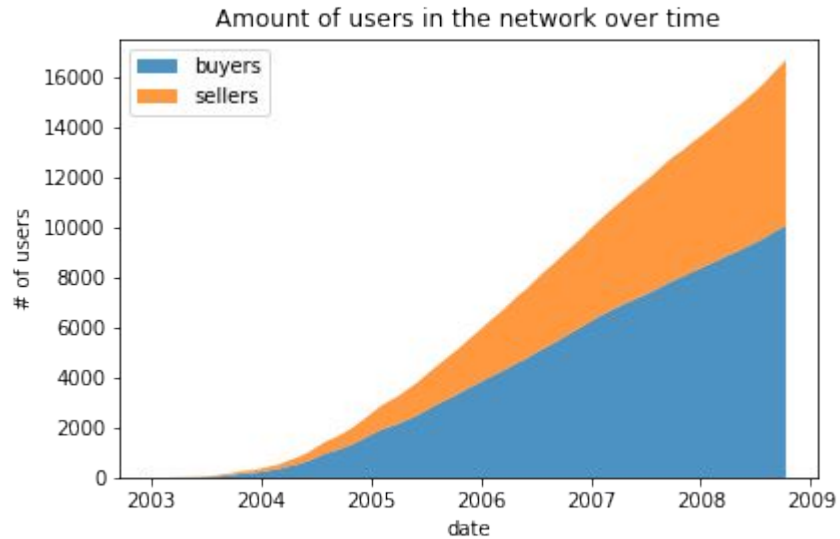
$$R_i^S = \sum_j R_j^S \cdot review_j \quad (2)$$

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Comparison between weighted and unweighted seller ranking:
1. s2845 avg 4293.762538068192 # 397 vs. s1577 avg 1.0 # 1286
2. s1345 avg 3746.4673972901946 # 401 vs. s4090 avg 1.0 # 731
3. s11 avg 3439.108747365422 # 615 vs. s1396 avg 1.0 # 328
4. s41 avg 2527.060103991063 # 433 vs. s4816 avg 1.0 # 315
5. s2799 avg 2503.0558424225956 # 293 vs. s3873 avg 1.0 # 313
...
2844. s69 avg -22.397834726154397 # 18 vs. s3851 avg -1.0 # 3
2845. s2052 avg -23.422208548128026 # 52 vs. s4783 avg -1.0 # 3
2846. s636 avg -24.541169213190734 # 4 vs. s2214 avg -1.0 # 3
2847. s16 avg -29.51188929849941 # 15 vs. s184 avg -1.0 # 3
2848. s1468 avg -32.98785394819705 # 24 vs. s1400 avg -1.0 # 3
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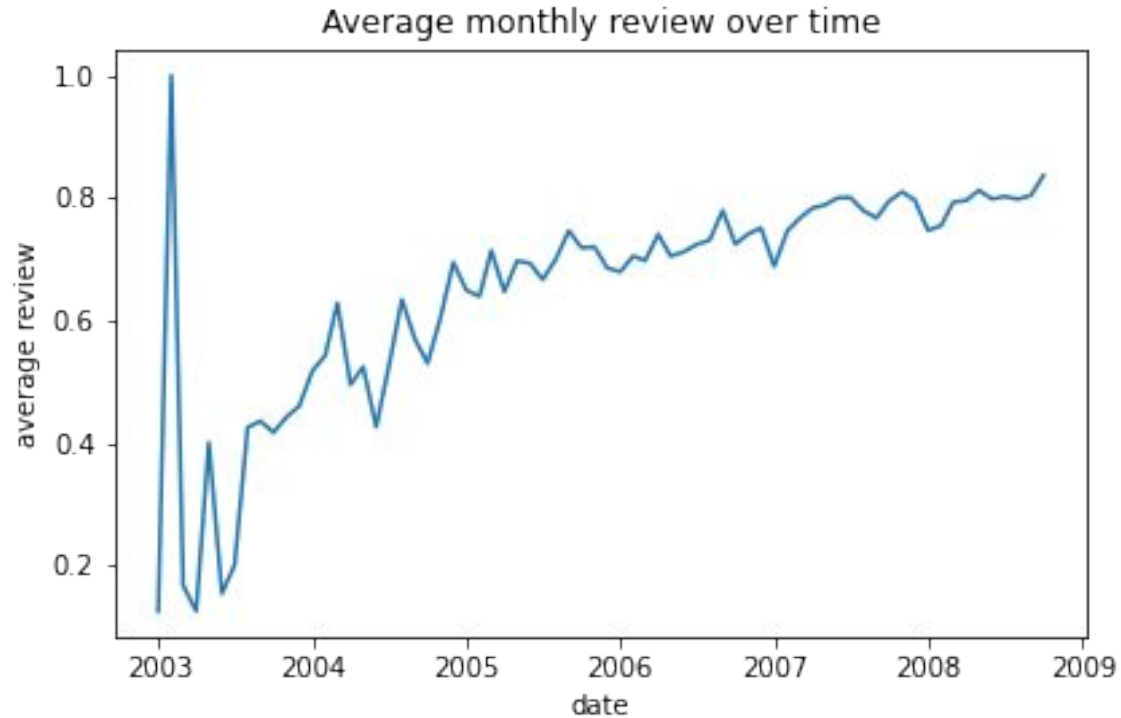
Change in Ranks with IG-Ranking



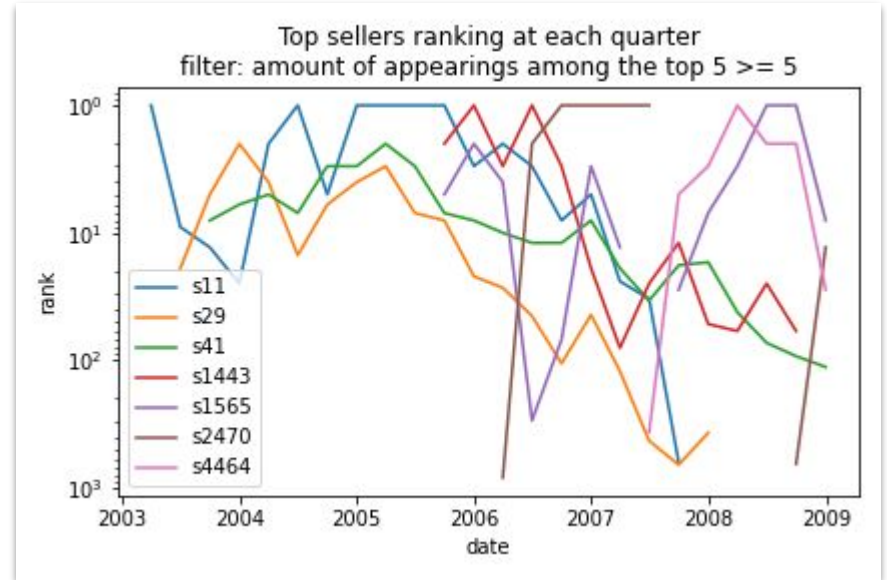
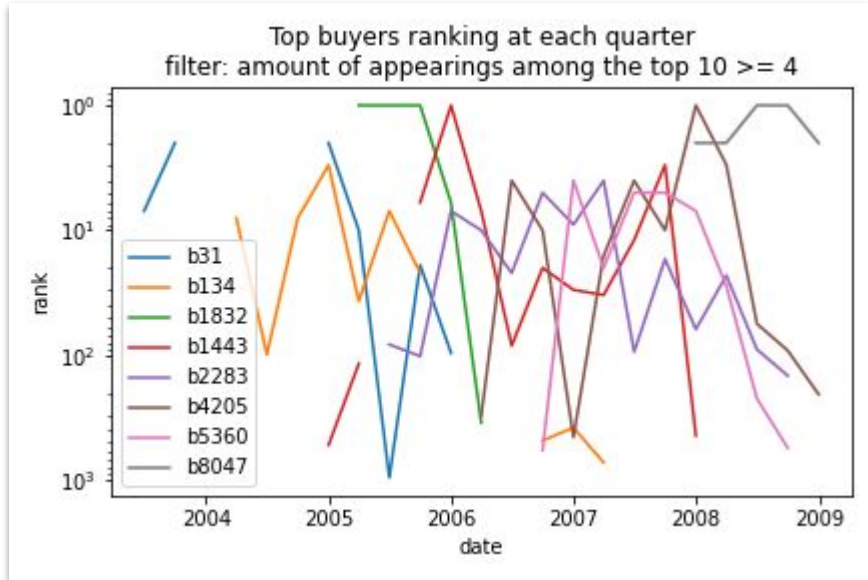
Network Growth



Review Trajectory



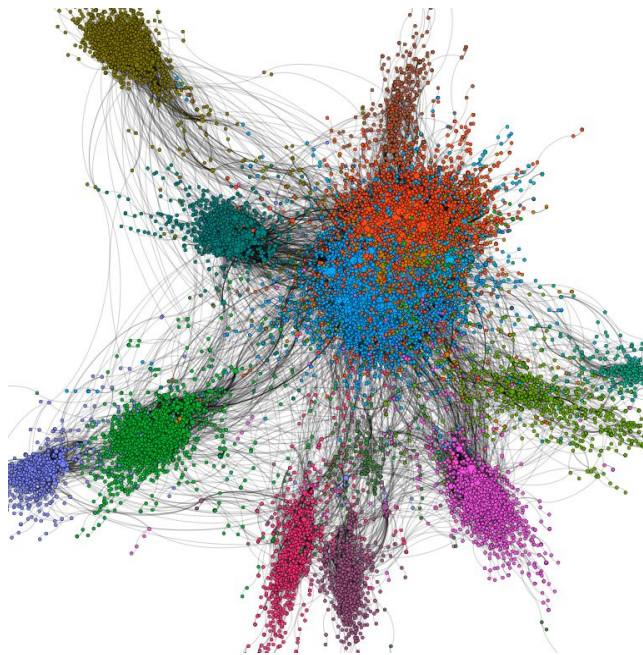
Top Buyers and Sellers



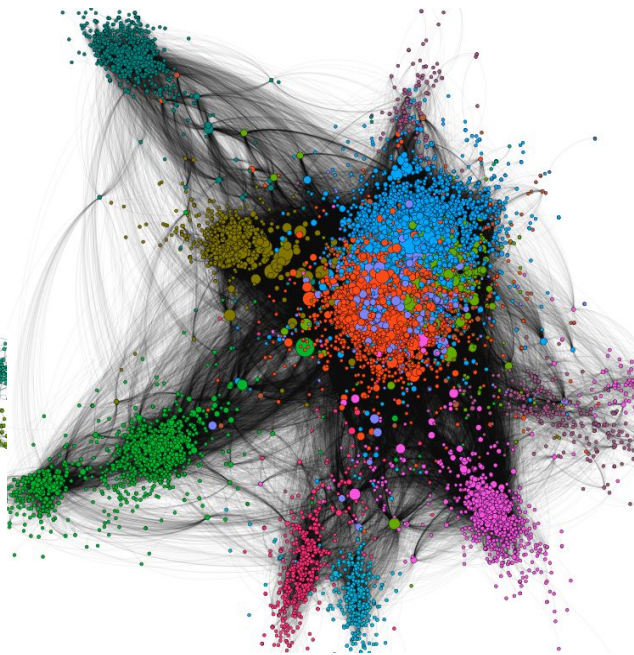
Bipartite Projections

	Giant Component	Buyer Projection	Seller Projection
Nodes	15,810	9,652	6,158
Edges	50,116	668,142	183,383
Average Degree	3.17	138.446	59.559
Network Diameter	17	8	8
Avg. Path Length	5.78	2.77	3.05
Modularity	0.676	0.412	0.621
Communities	16	15	16

Communities



Giant Component



Buyer Projection



Seller Projection