



Universität  
Zürich<sup>UZH</sup>

Digital Society Initiative



# Wie Bots und Algorithmen Demokratie machen

Abraham Bernstein

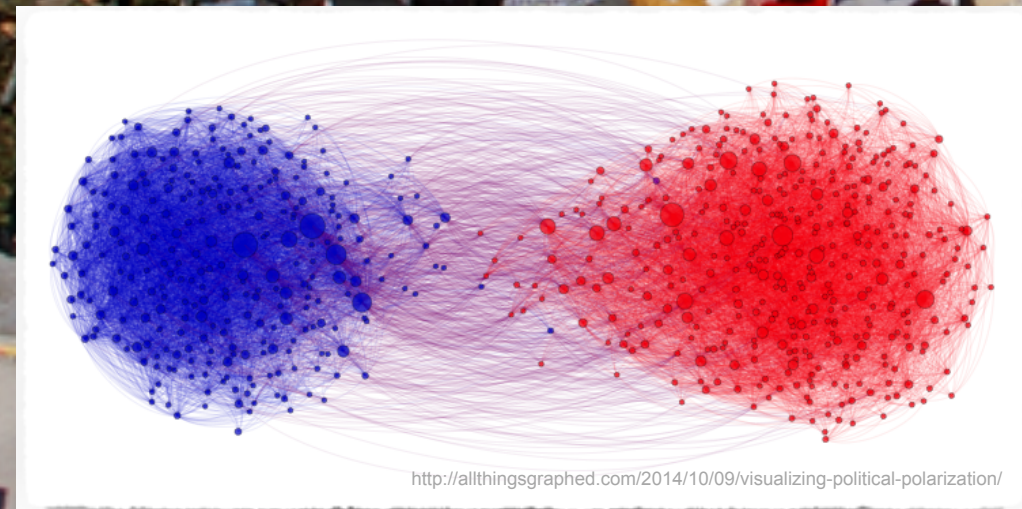




... about 50 to 55 percent of Clinton's Twitter activity—the likes, follows, and retweets she gets—is from bots, which is typical for high-profile public figures. ...

Trump's automated Twitter activity ... is a much higher 80 percent.

**WIRED**





## Wie funktionieren 'bots': Wie entscheidet man über 'retweets' bei Twitter?



Thomas Bayes 1702-1761

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

$$P(Retweet|Tweet) = \frac{P(Tweet|Retweet)P(Retweet)}{P(Tweet)}$$



## Wie entdeckt man einen ‘bot’?

$$P(Bot|Twitter Activity) = \frac{P(Twitter Activity|Bot)P(Bot)}{P(Twitter Activity)}$$

### **Twitter Activity:**

- Gebrauchsfrequenz
- Netzwerk
- Sentimentanalyse
- Inhalte
- “Freunde”



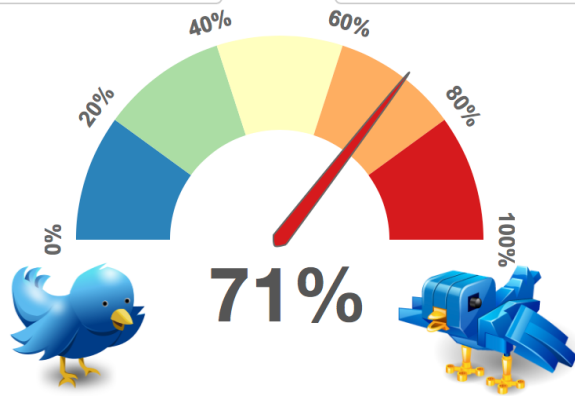




### Classification

Tweet this report

Flag as incorrect



Friend 49%

User 87%

Content 67%

Temporal 71%

Sentiment 78%

Network 74%



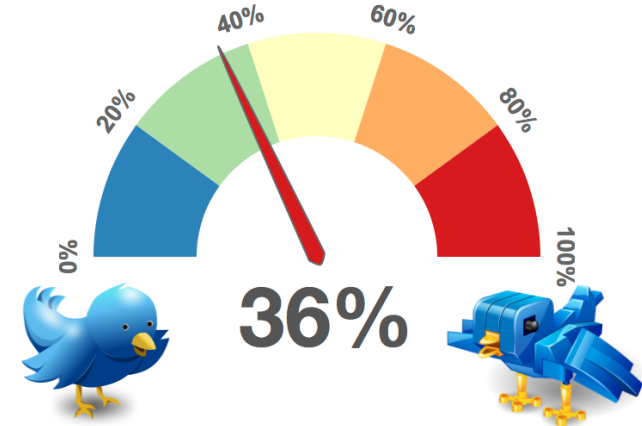
Twitter Activity  
 $P(\text{Twitter Activity})$



### Classification

Tweet this report

Flag as incorrect



User 15%

Friend 52%

Sentiment 18%

Content 52%

Network 39%

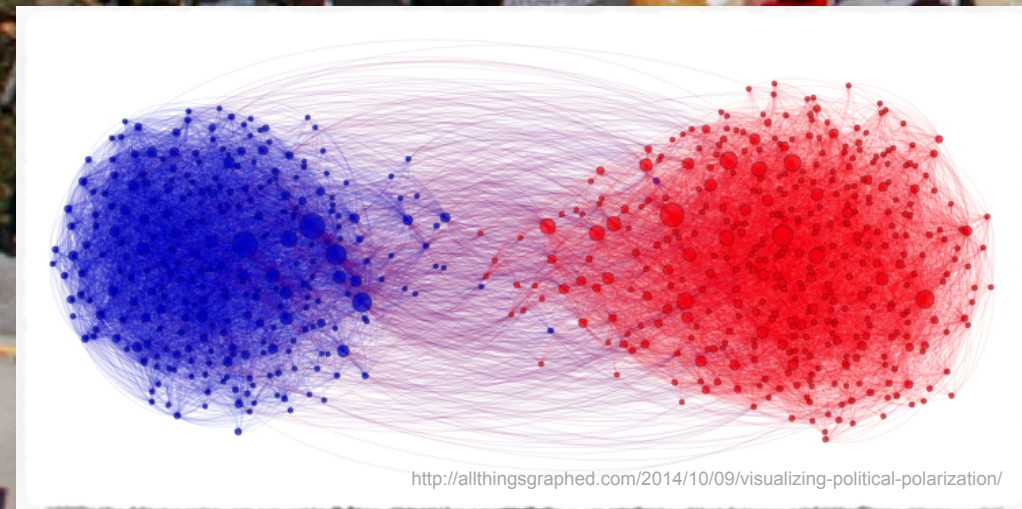
Temporal 50%



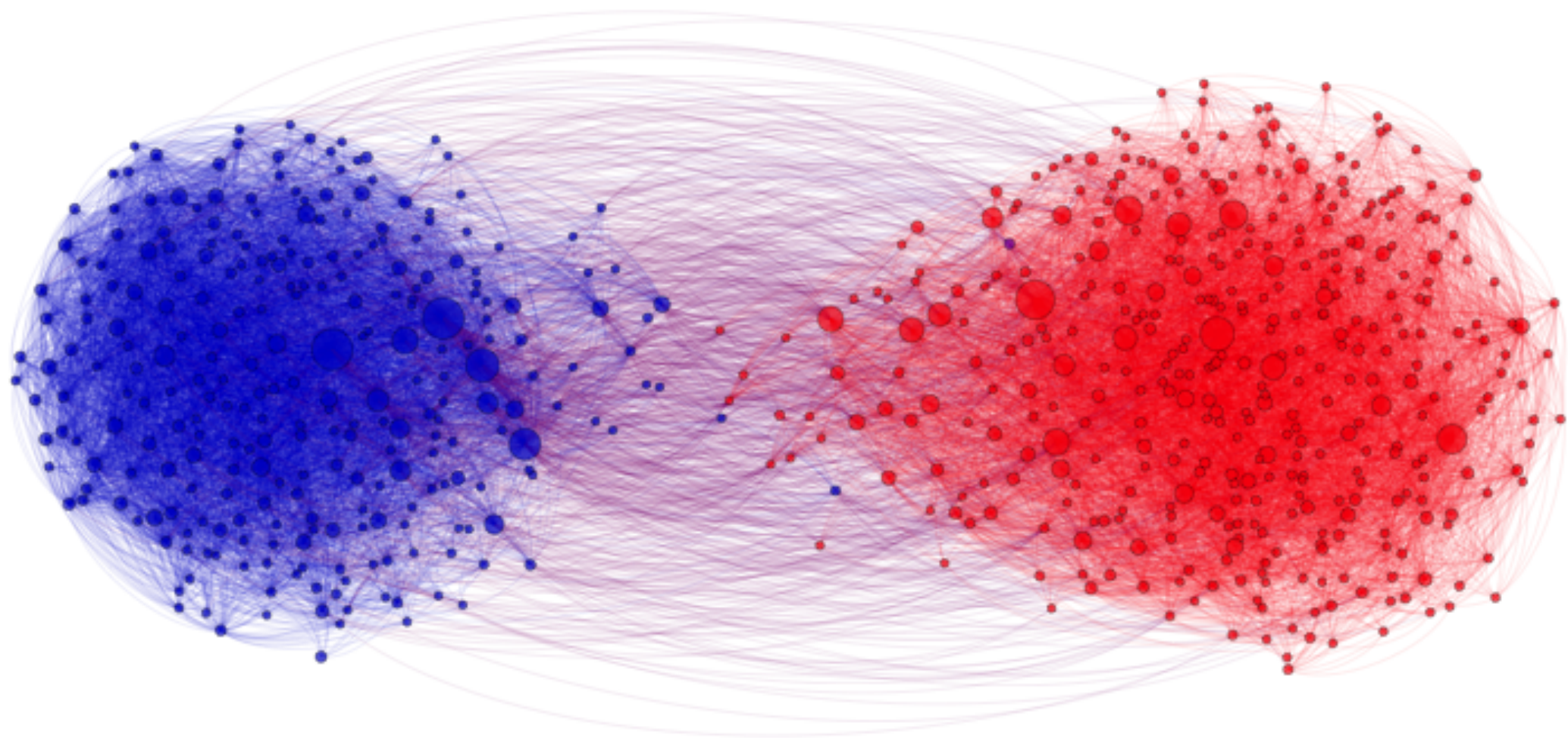
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## Wie funktionieren Empfehlungssysteme?

$$P(\text{Empfehlung} | \text{Aktivitäten}) = P(\text{Empfehlung} | \text{Beobachtete Präferenzen})$$



### Wird oft zusammen gekauft



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## Wie verbessert man Empfehlungssysteme?

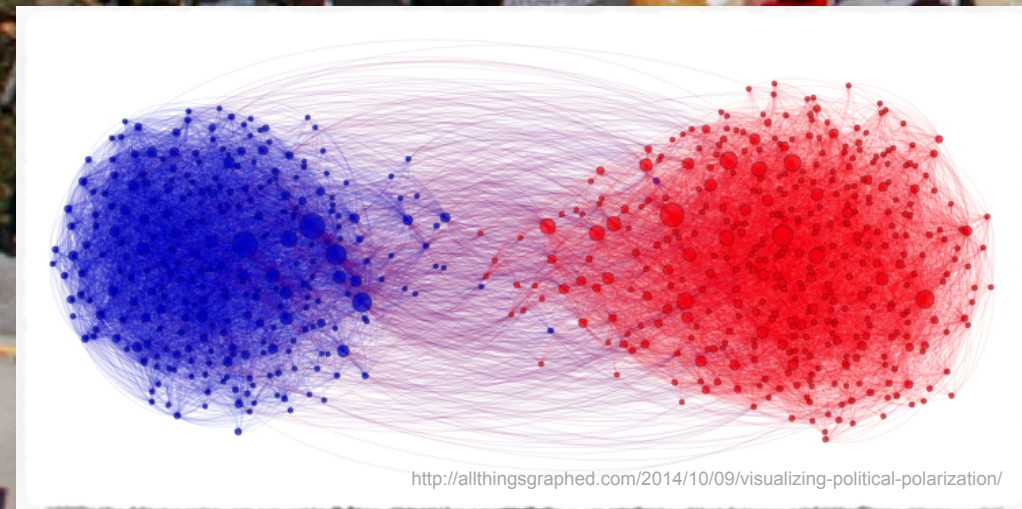
$$P(\text{Empfehlung}|\text{Aktivitäten}) = \alpha_1 P(\text{Empfehlung}|\text{Präferenzen}) + \\ \alpha_2 P(\text{Diversität}|\text{Präferenzen}) + \\ \alpha_3 P(\text{Störend}|\text{Präferenzen})$$



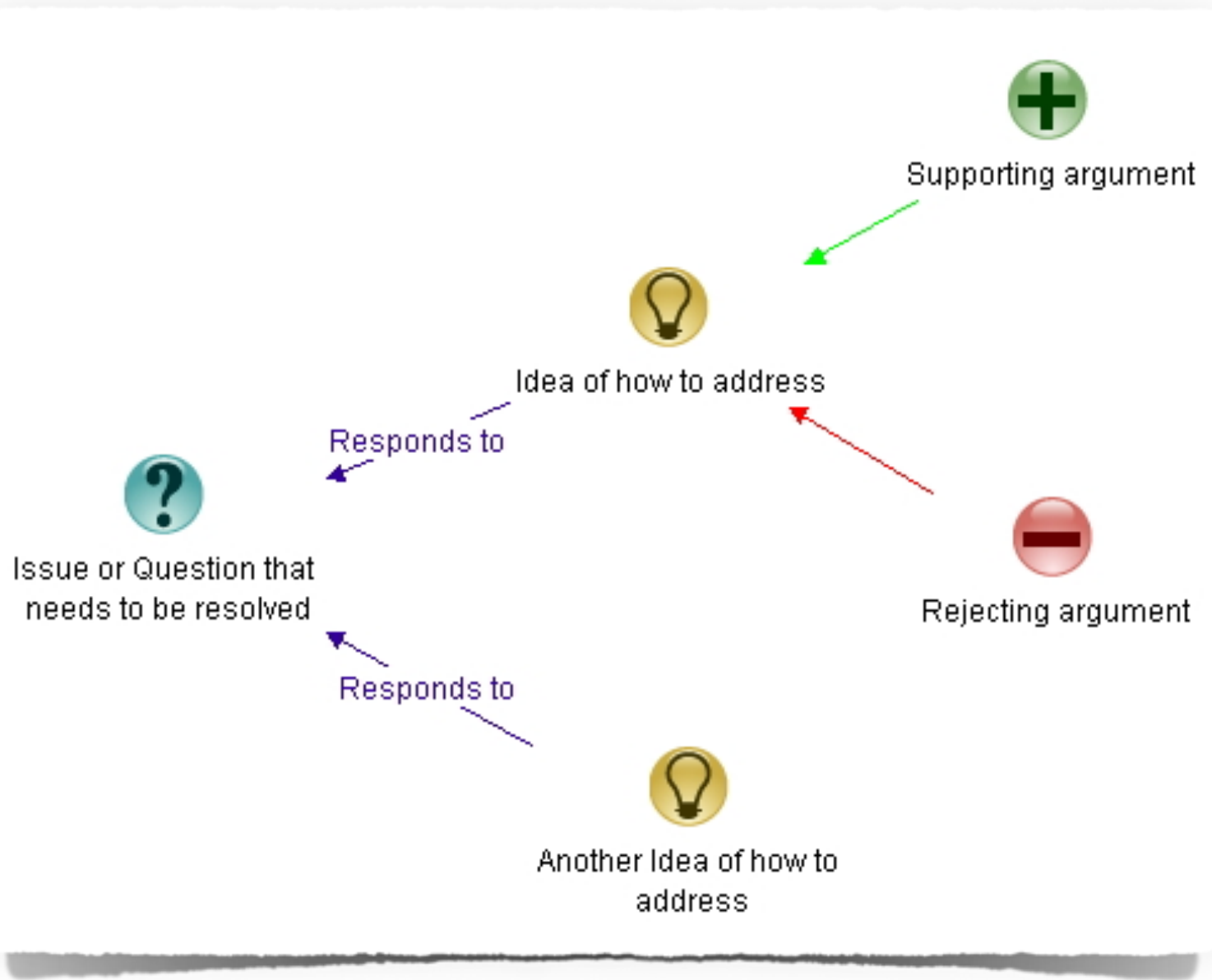
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## Mit tausenden Ideen sammeln



[Cast Votes](#) | [View Results](#) | [About this page](#)

Which do you think is a better idea for creating a greener, greater New York City?

Revise green roof tax abatement to promote gardening in green roofs

Increase safety on all bike lanes: protected lanes with barriers between bikes and traffic, bike bridges over roadways, bike parking.

I can't decide

23038 votes on 269 ideas

Add your own idea





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## Mit tausenden Ideen sammeln

ALL OUR IDEAS  
CREATE. CONTRIBUTE. DISCOVER.



[Cast Votes](#) | [View Results](#) | [About this page](#)

Which do you think is a better idea for creating a greener, greater New York City?

Score

Keep NYC's drinking water clean by banning fracking in NYC's watershed.

84 [?]



Invest in multiple modes of transportation and provide both improved infrastructure and improved safety

81 [?]



Plug ships into electricity grid so they don't idle in port - reducing emissions equivalent to 12000 cars per ship.

78 [?]



Implement congestion pricing in lower Manhattan

74 [?]



Continue enhancing bike lane network, to finally connect separated bike lane systems to each other across all five boroughs.

73 [?]



Composting! Provide municipal support for composting!!

73 [?]



Support and protect community gardens and create mechanisms to create new gardens and open space

72 [?]



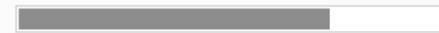
Provide long-term leases for organic farms in unused public spaces, a garden at every public school and public housing development

72 [?]



Provide better transit service outside of Manhattan

72 [?]



Create a network of protected bike paths throughout the entire city

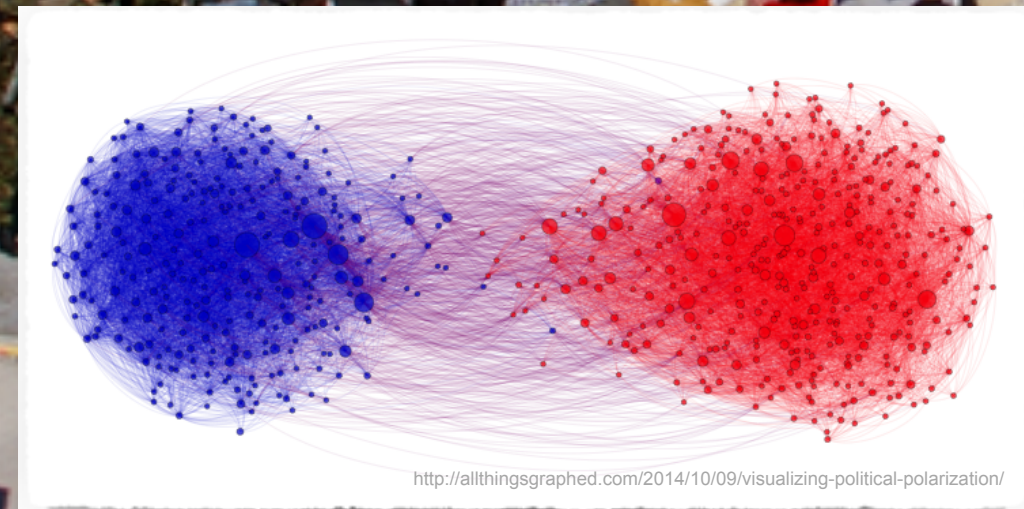
71 [?]



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