SPRITZ
SECURITY & PRIVACY
RESEARCH GROUP

UNIVERSITÀ
DEGLI STUDI
DI PADOVA

REVEALING THE SECRET POWER: HOW ALGORITHMS INFLUENCE CONTENT VISIBILITY ON TWITTER/X

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DOES THIS FEEL FAMILIAR?
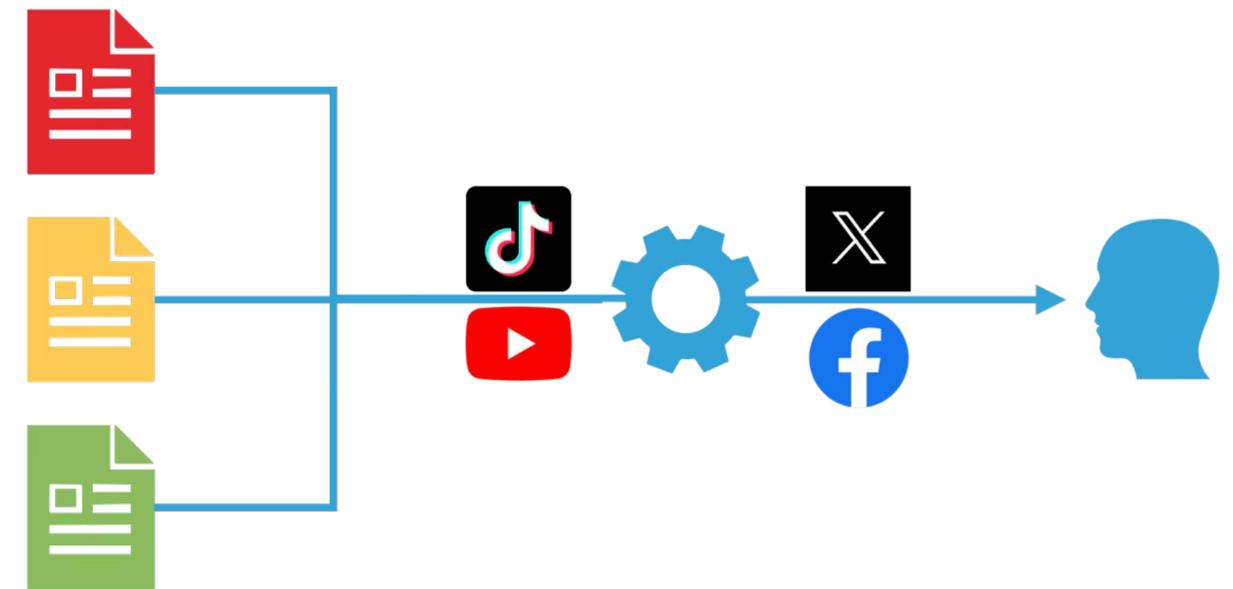
WHAT DECIDES THE CONTENT WE SEE ON SOCIAL MEDIA?

Social media algorithms shape public discourse
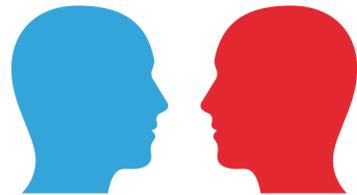
Obscure algorithms = Lack of transparency

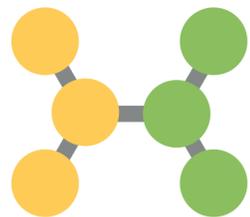Shadow banning: reducing user/content visibility

DO ALL CONTENT GET THE SAME VISIBILITY?
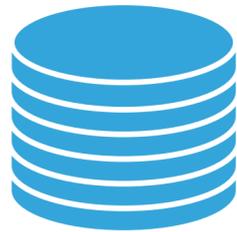
RQ1: Does content type affect visibility?

RQ2: Are some users systematically penalized?

RQ3: Are entire online communities affected?

DATASET SELECTION

 Ukraine–Russia war: 17M tweets

Baqir, A., et al. "Unveiling the drivers of active participation in social media discourse." *Scientific Reports*

 2024 US Presidential Election: 35M tweets

Balasubramanian, A., et al. "A public dataset tracking social media discourse about the 2024 US presidential election on twitter/x. *arXiv preprint arXiv:2411.00376*.
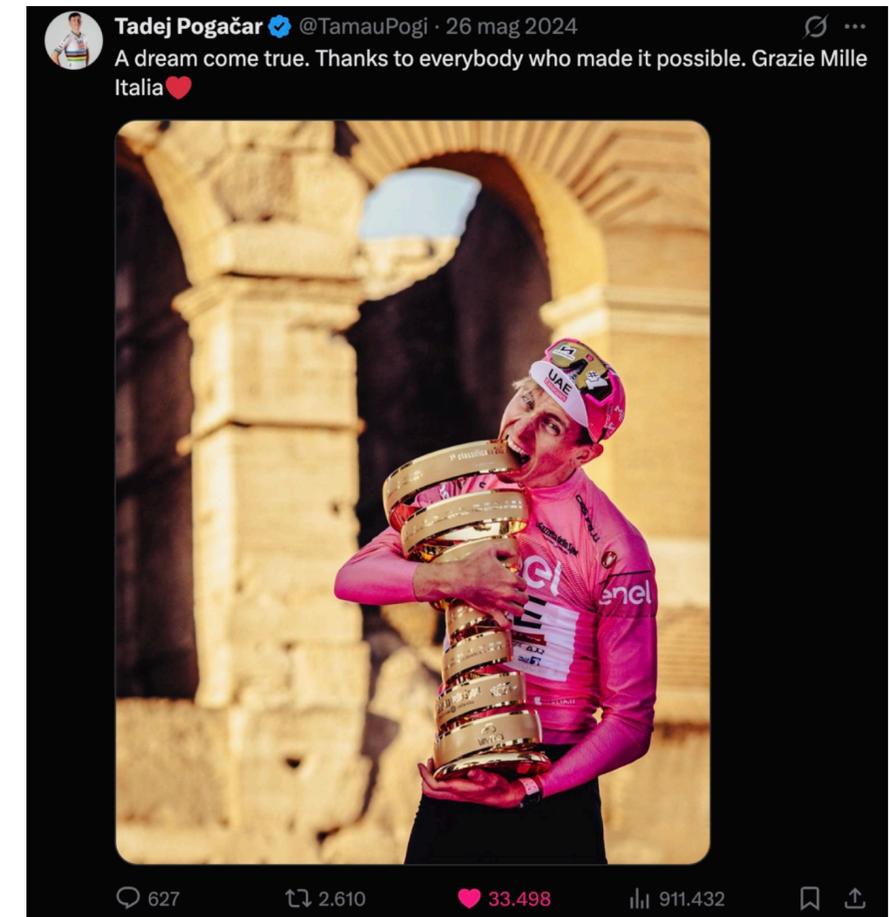

view count

HOW TO MEASURE VISIBILITY VARIATIONS?

Author popularity influences content diffusion.
How to account for that?
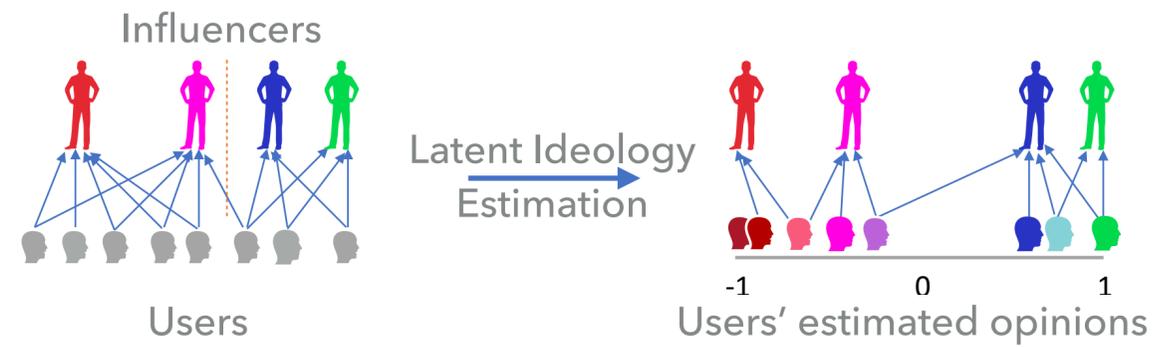
$$\text{p-score} = \frac{\text{view count}}{\text{followers count}}$$

▸ Normalizes visibility by author popularity

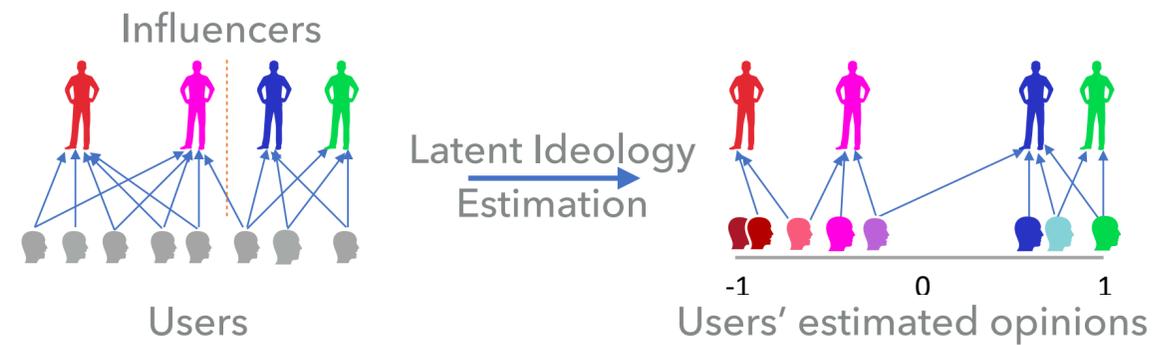▸ Allows fair comparison across users

HOW DO WE CHARACTERIZE USERS, CONTENT, AND COMMUNITIES?

LATENT IDEOLOGY ESTIMATION

HOW DO WE CHARACTERIZE USERS, CONTENT, AND COMMUNITIES?

LATENT IDEOLOGY ESTIMATION

Influencers

Latent Ideology
Estimation

Users

Users' estimated opinions

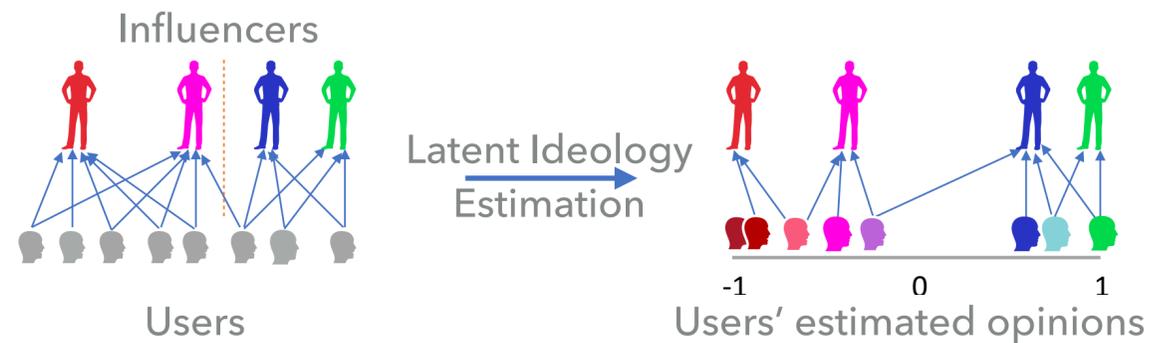-1   0   1

CLAIM DETECTION AND TRACKING

Lambretta
pipeline

Paudel, P., et al. "Lambretta: Learning to rank for twitter soft
moderation." 2023 IEEE Symposium on Security and Privacy
(SP). IEEE, 2023.

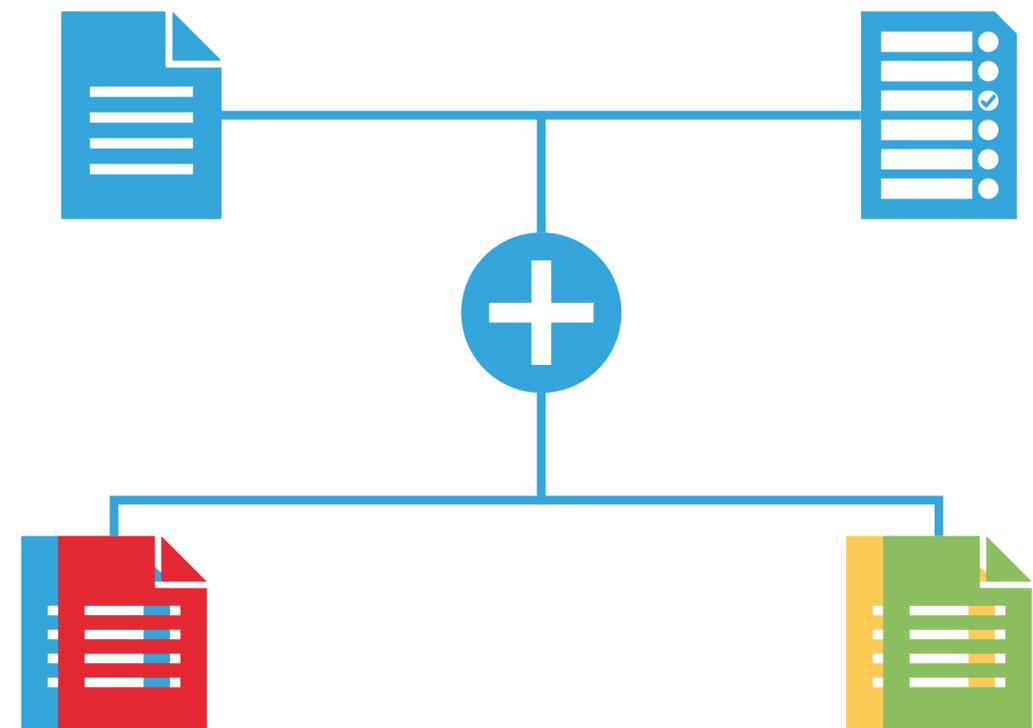# HOW DO WE CHARACTERIZE USERS, CONTENT, AND COMMUNITIES?

LATENT IDEOLOGY ESTIMATION
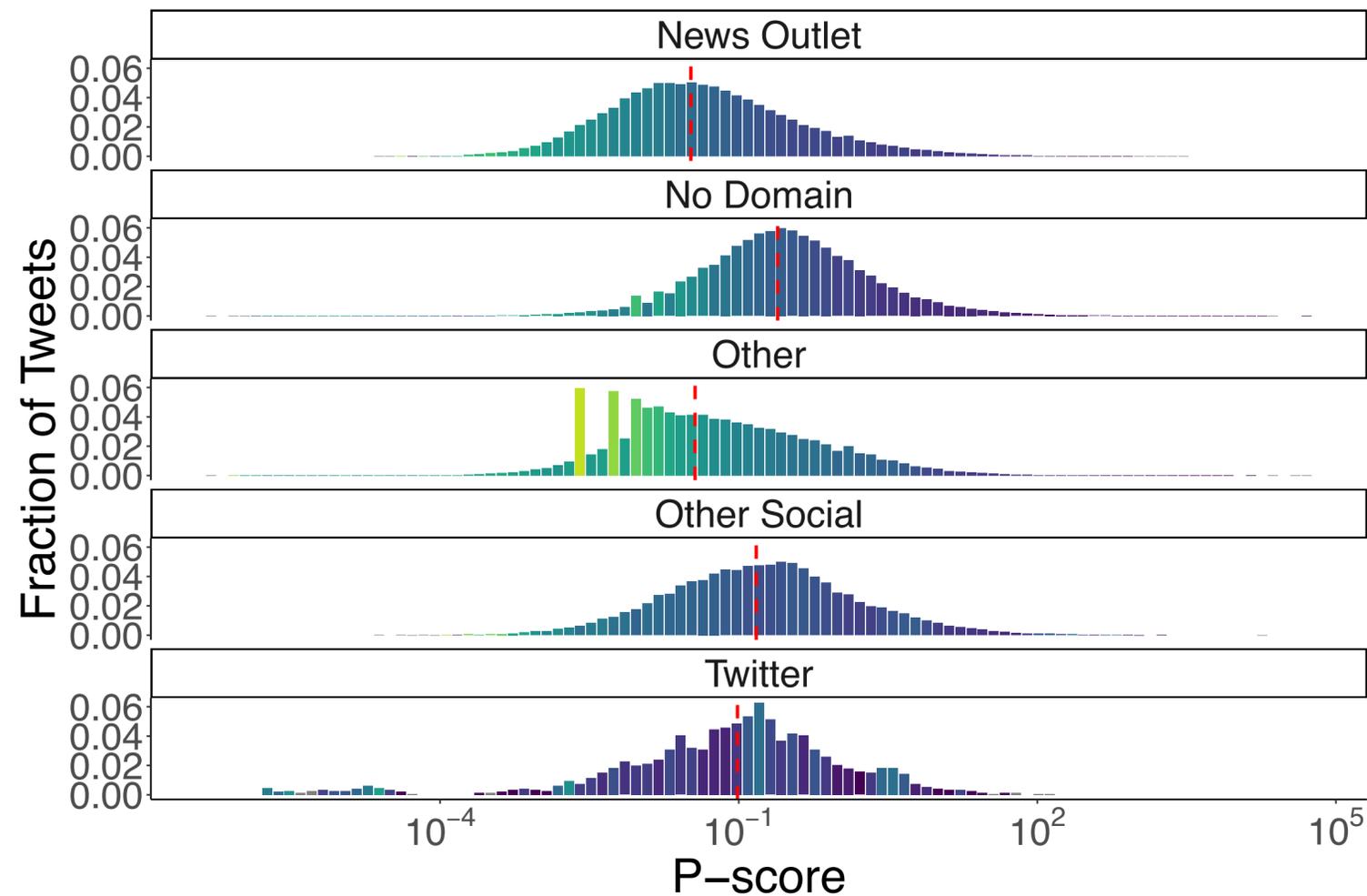

CLAIM DETECTION AND TRACKING

Lambretta pipeline

Paudel, P., et al. "Lambretta: Learning to rank for twitter soft moderation." 2023 IEEE Symposium on Security and Privacy (SP). IEEE, 2023.

TWEETS CLASSIFICATION
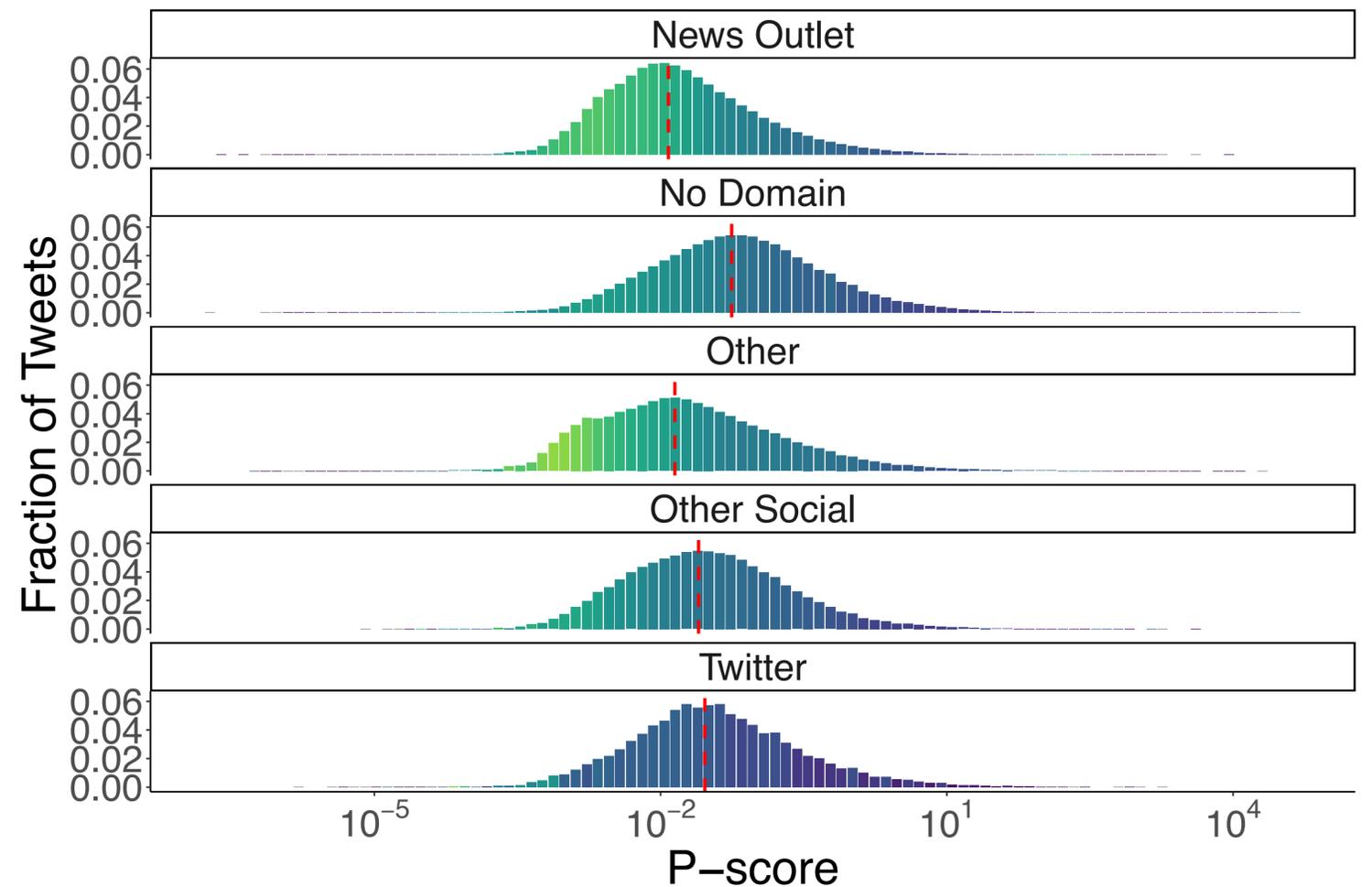

Tweets with URLs

News outlets list

Political leaning

Reliability

RQ1: LINKS MATTER MORE THAN SOURCE TYPE, POLITICAL LEANING, OR CLAIM
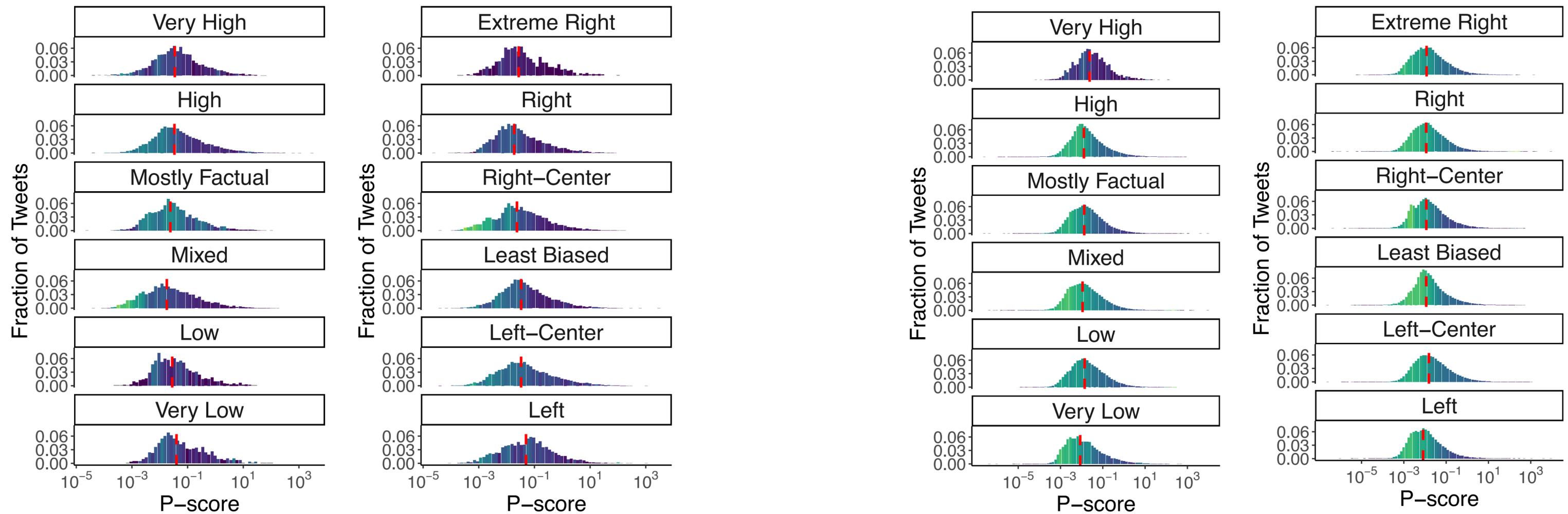

Ukraine-Russia War

US Elections

The algorithm penalizes content with links…

RQ1: LINKS MATTER MORE THAN SOURCE TYPE, POLITICAL LEANING, OR CLAIM
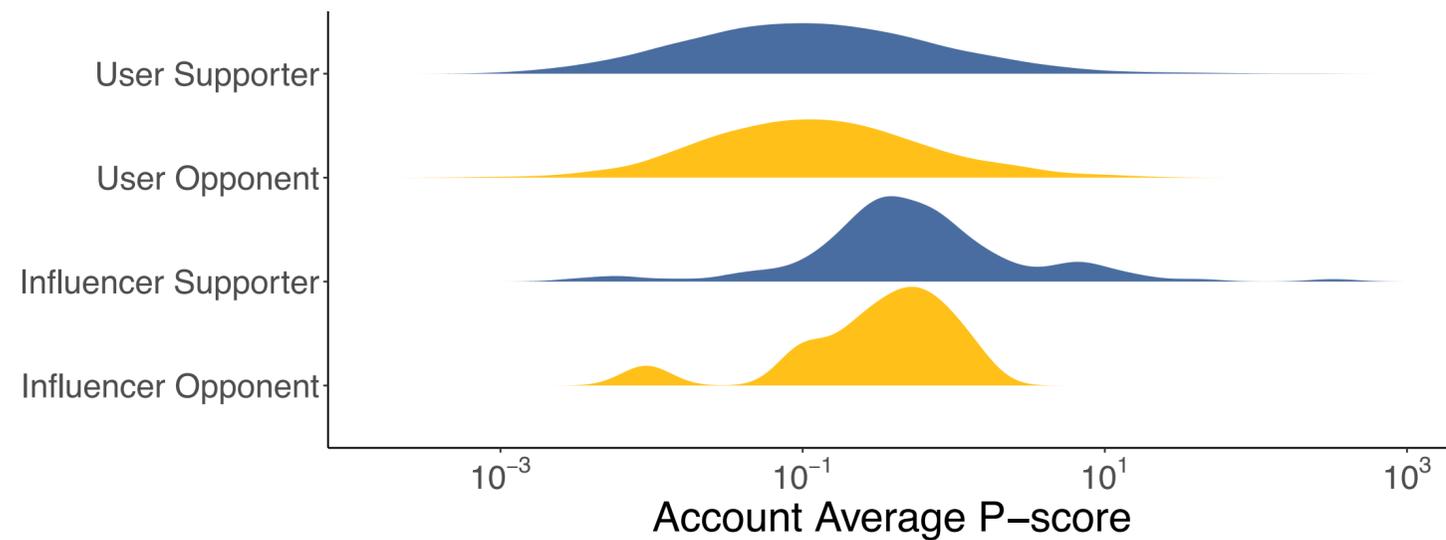

Ukraine-Russia War

US Elections

… all in the same way, independently of the claim.

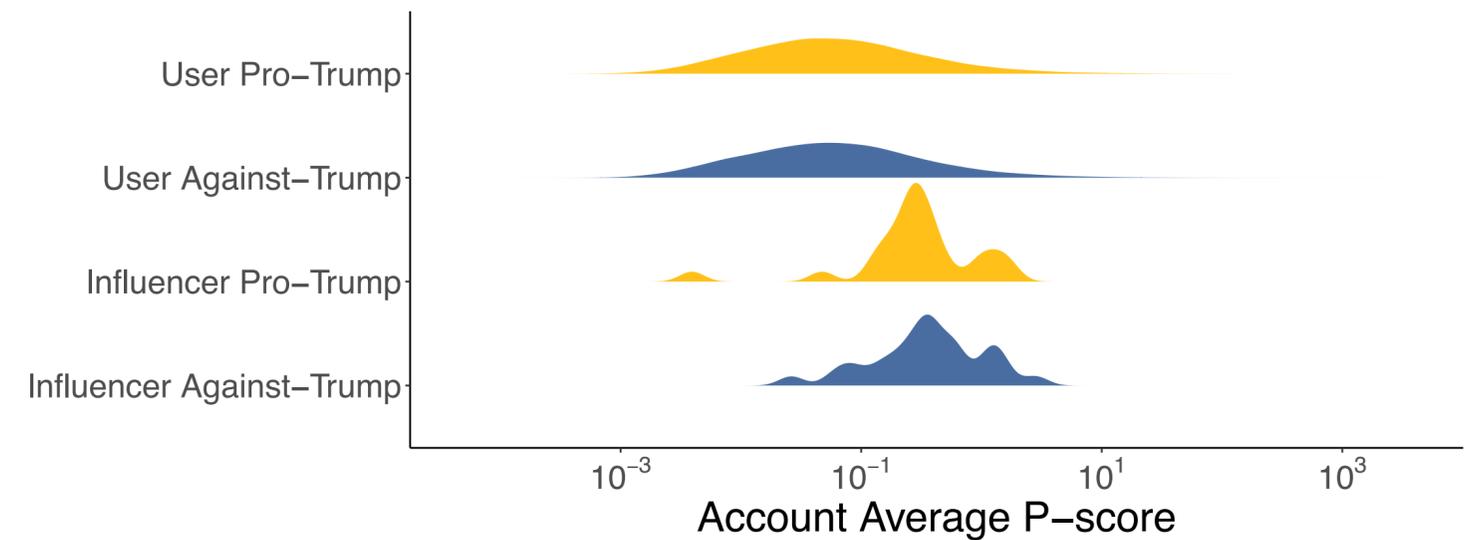# RQ2: NO SYSTEMATIC VISIBILITY DIFFERENCES BASED ON ESTIMATED USER IDEOLOGY...

Ukraine-Russia War
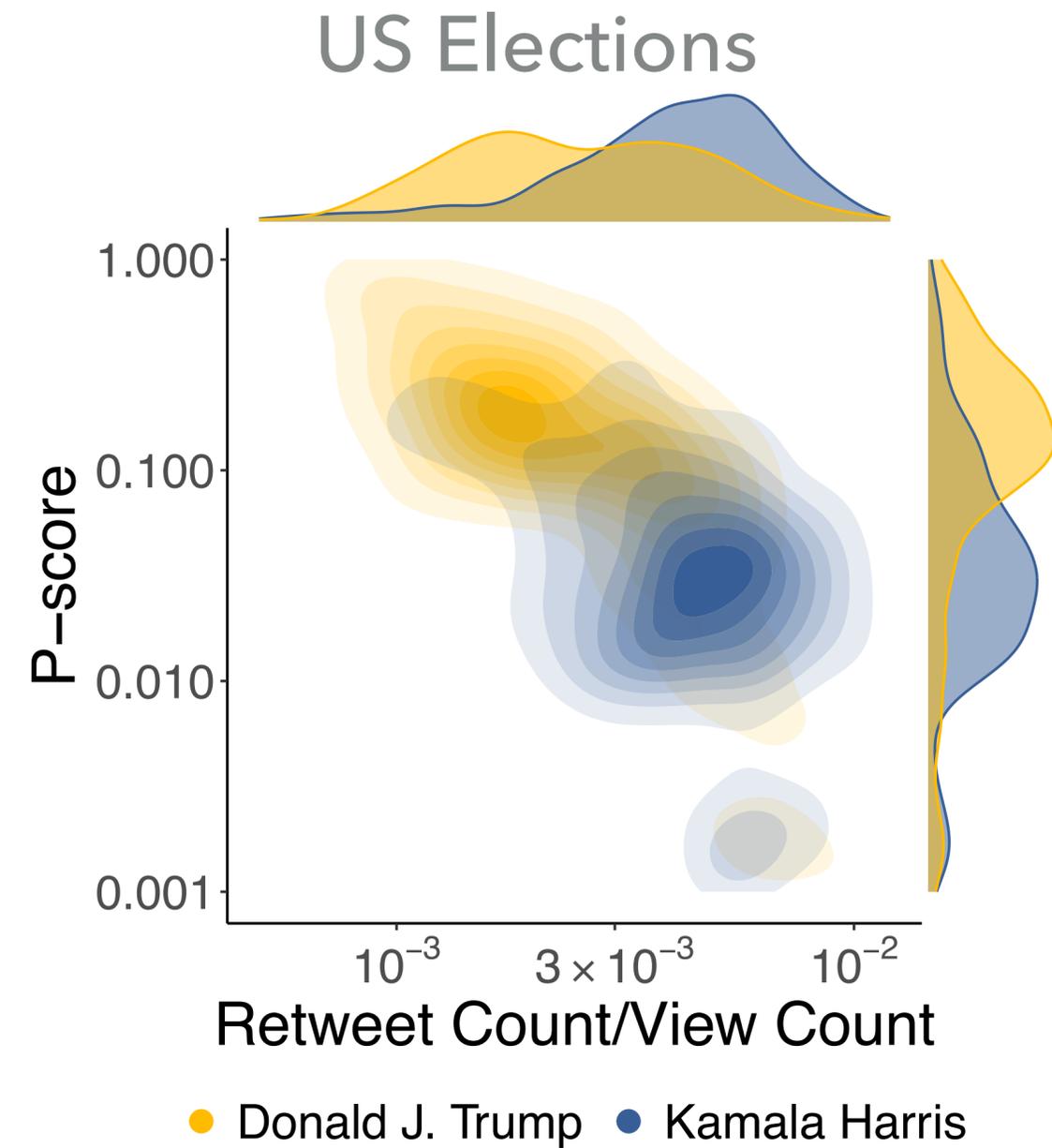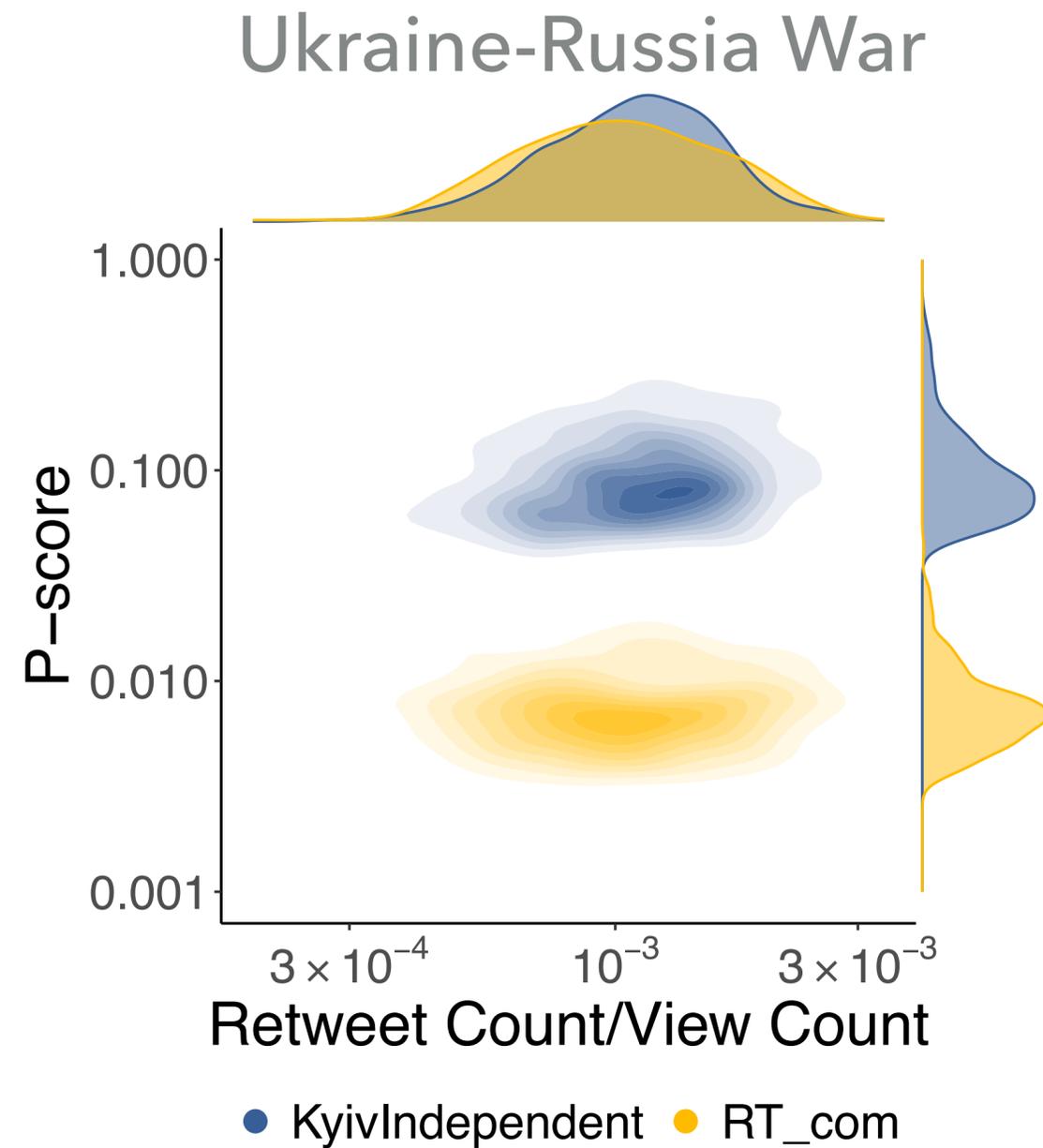
US Elections

No statistical differences by ideology...

RQ2: …BUT VISIBILITY DIFFERENCES BETWEEN SIMILAR INDIVIDUALS

Ukraine-Russia War

US Elections

● KyivIndependent ● RT_com

● Donald J. Trump ● Kamala Harris

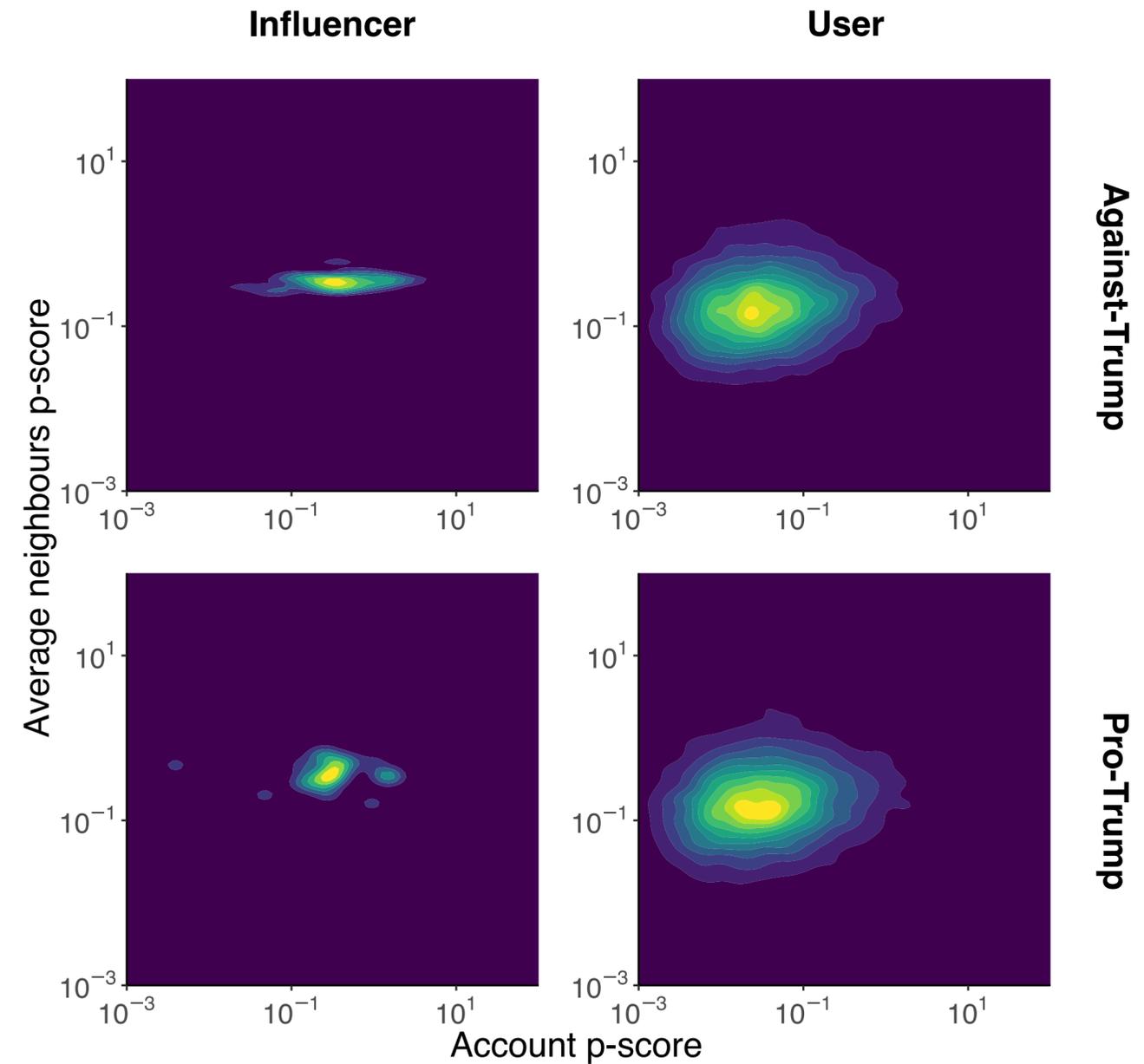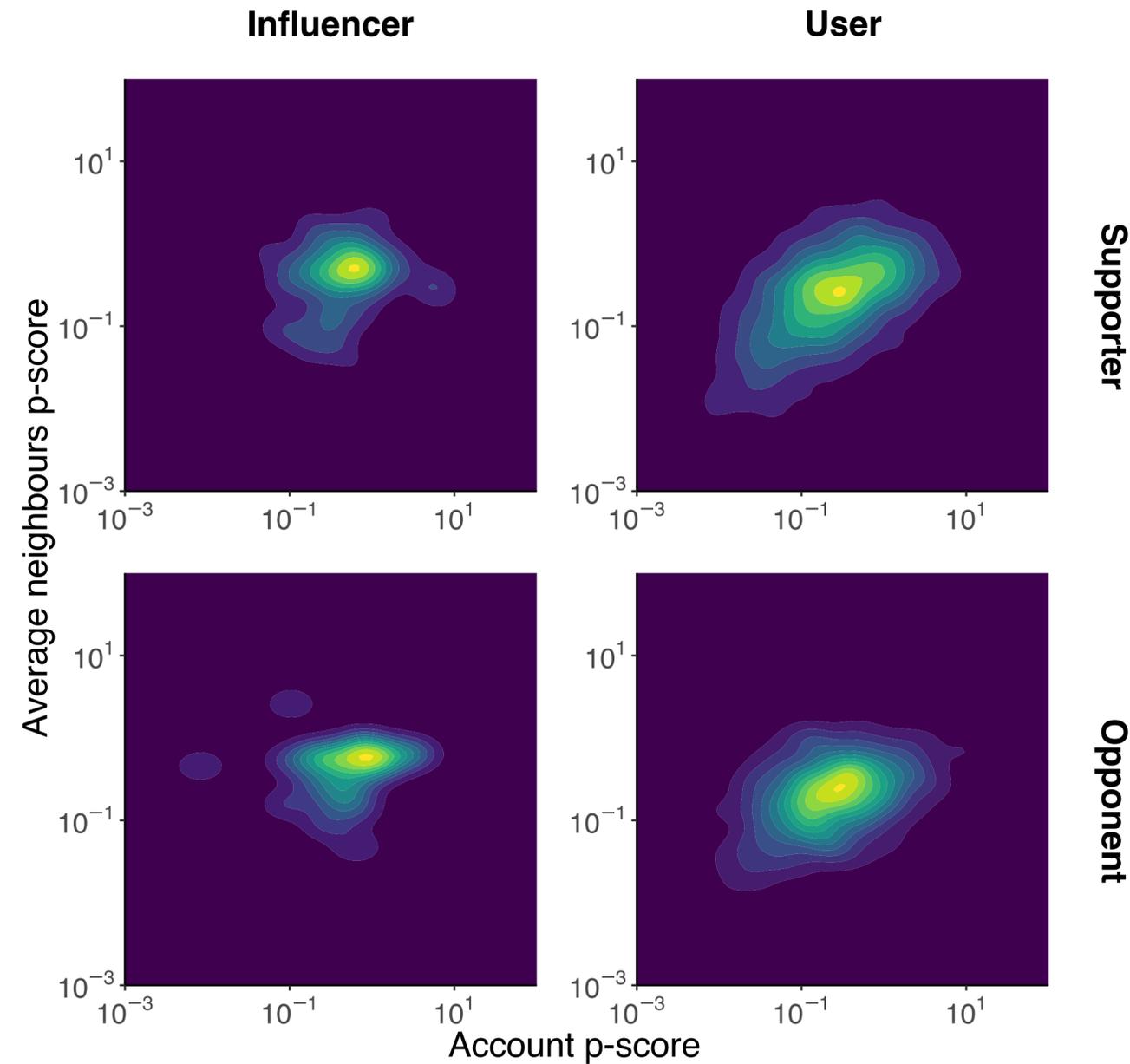… still, similar individuals can experience very different levels of visibility

RQ3: NO DIFFERENCES AT COMMUNITY LEVEL

Ukraine-Russia War

US Elections

TAKE HOME MESSAGE

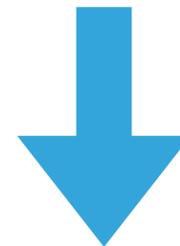View counts enable visibility auditing

Specific content/users experienced reduced visibility

No visibility reduction at claim or community levels

Access to view data is necessary for social media transparency

THANK YOU!

alessandro.galeazzi@unipd.it   @galessandro.bsky.social   @galessandro
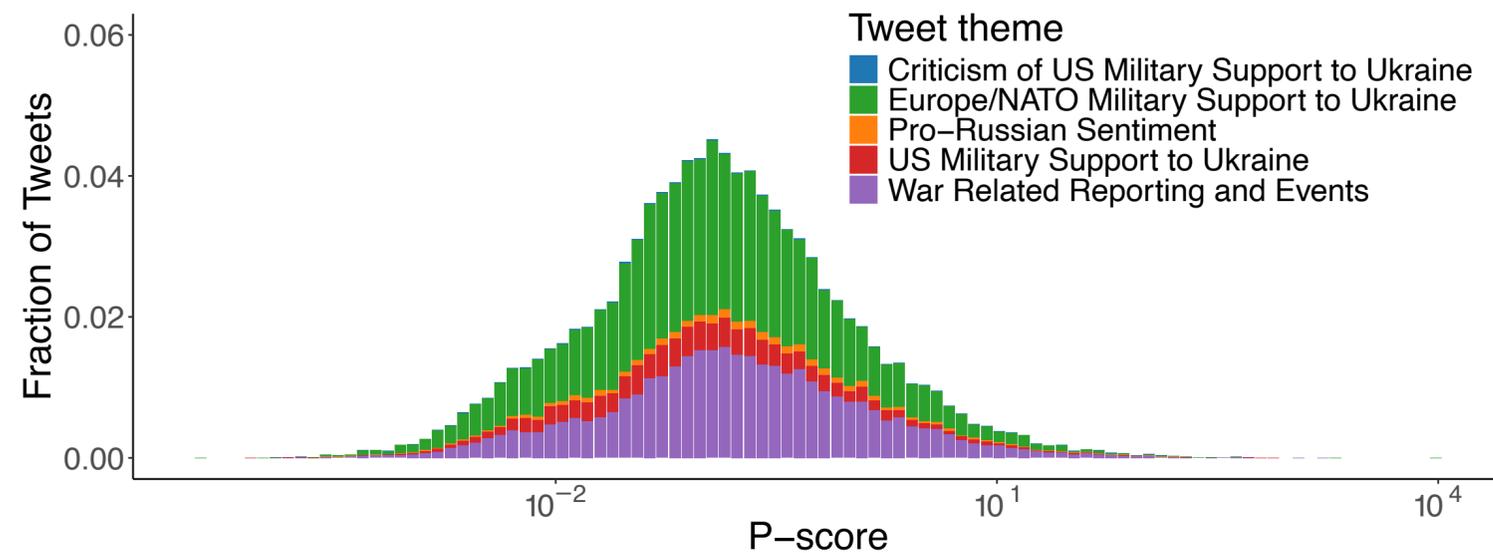
@ DeveloperGale   @gale_@mastodon.social

VISIBILITY VARIATIONS AT THE CLAIM LEVEL
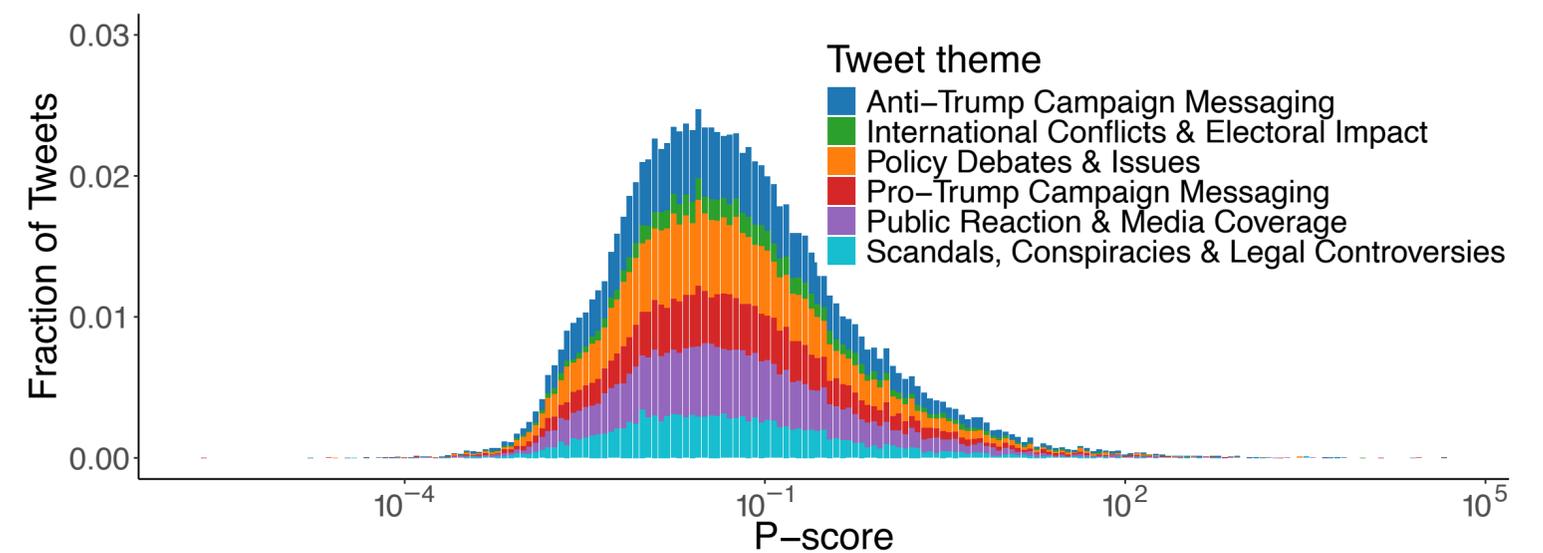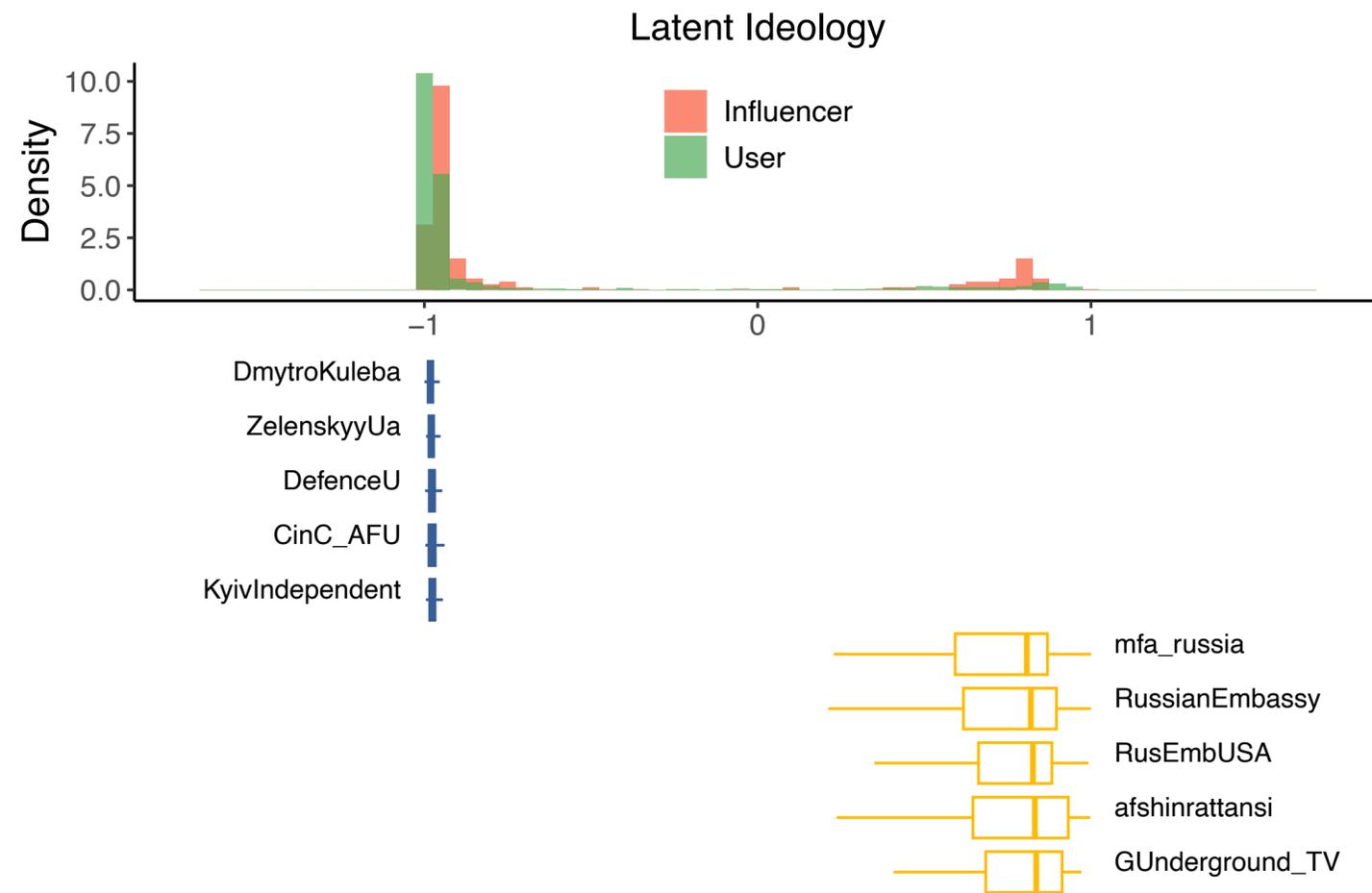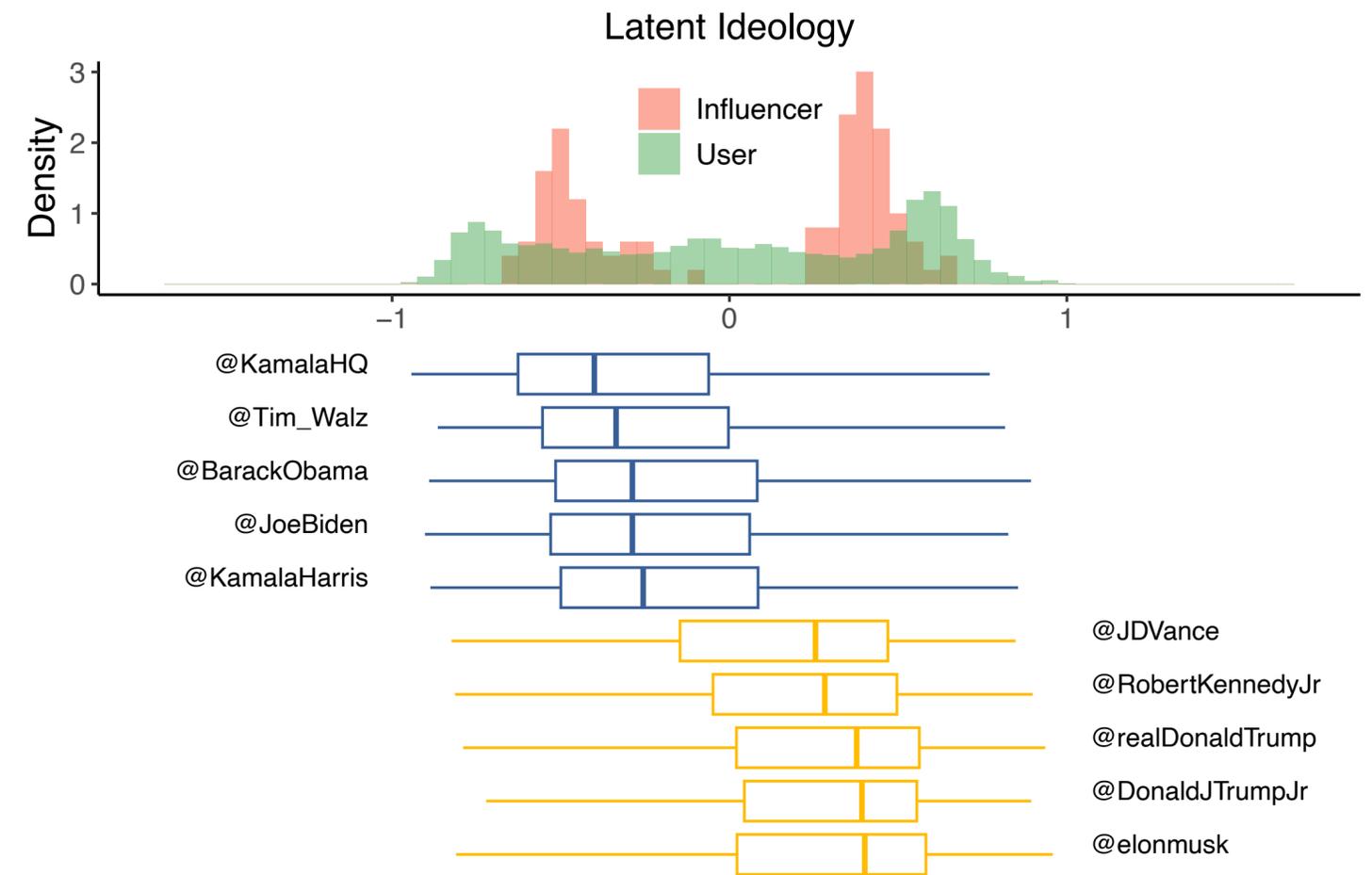
LATENT IDEOLOGY ESTIMATION

Ukraine-Russia War

US Elections

LATENT IDEOLOGY ESTIMATION

‣ Idea: users that retweeted the same influencers are placed closer

‣ Based on Correspondence Analysis

‣ See Flamino, J., Galeazzi, A., Feldman, S. et al. Political polarization of news media and influencers on Twitter in the 2016 and 2020 US presidential elections. Nat Hum Behav 7, 904–916 (2023). https://doi.org/10.1038/s41562-023-01550-8

Influencers

Latent Ideology Estimation →

Users

-1   0   1

Users' estimated opinion

Influencers

v_{11}	v_{12}
v_{21}	v_{22}
v_{31}	v_{33}

Users

Preprocessing Steps →

w_{11}	w_{12}
w_{21}	w_{22}
w_{31}	w_{33}

= SVD

Users Est

u_{11}	u_{12}	u_{12}
u_{21}	u_{22}	u_{22}
u_{31}	u_{33}	u_{33}

x

Eingenvalues

e_1	0
0	e_2
0	0

x

Influencers Est

i_{11}	i_{12}
i_{21}	i_{22}