How a Multi-Factorial Analysis of Polarization Paves the Way for Innovative Recommendation Strategies

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- To limit online polarization, **diversification** appears as an intuitive solution [1]
- **Balance** is delicate in terms of diversity of opinions, sources, and content [2]
- Diversification does not always bring a **positive effect** [3][4]

Need to adapt the level of diversity and recommendation strategies according to behavioral classes

1. Can a multi-factorial analysis help to better identify classes of polarization behavior?
2. How can recommendations be adapted to identified classes of polarization behavior?

### Twitter Dataset

- **Thematic:** COVID-19 vaccine debate
- **Period:** from 01/01/22 to 31/07/22
- 20 elite users: pro-vaccine / anti-vaccine
- 1,000 standard users (retweets)

Graph of standard users' interactions on elite users' tweets

### Polarization Factors

- **Entropy-based factors to evaluate users' behavior based on all their interactions**
- \[ H'_N(Z) = \frac{-\sum_z P(z) \log(P(z))}{\log(n)} \]

### Results

- k-means clustering on three polarization factors:
  - Identification of 4 well differentiated clusters

- **Silhouette Index:** 0.74
- **Davies-Bouldin Index:** 0.51

### Opinions

- Distribution of a user's interactions within confronting communities
  - **Cluster 1:** (n=365)
    - Users interacting only with the anti-vaccine community
  - **Cluster 2:** (n=452)
    - Users interacting with both communities, closer to the anti-vaccine community
  - **Cluster 3:** (n=140)
    - Users interacting with both communities, closer to the pro-vaccine community
  - **Cluster 4:** (n=43)
    - Users interacting only with the pro-vaccine community

- **Intermediate users:** 2 interesting clusters made of users that are not completely polarized, but close to anti-vaccine (C3) and pro-vaccine (C4) communities

### Sources

- Distribution of a user's interactions on information sources

### Innovative Recommendation Strategies

- **Depolarization strategies tailored to identified polarization classes**

  - Adapt the level of diversity according to the degree of polarization of users
  - Bring diversity for polarized users based on intermediate users' consumption

### Other avenues to explore:

- Temporal evolution of polarization
- Context-aware recommender systems

### References