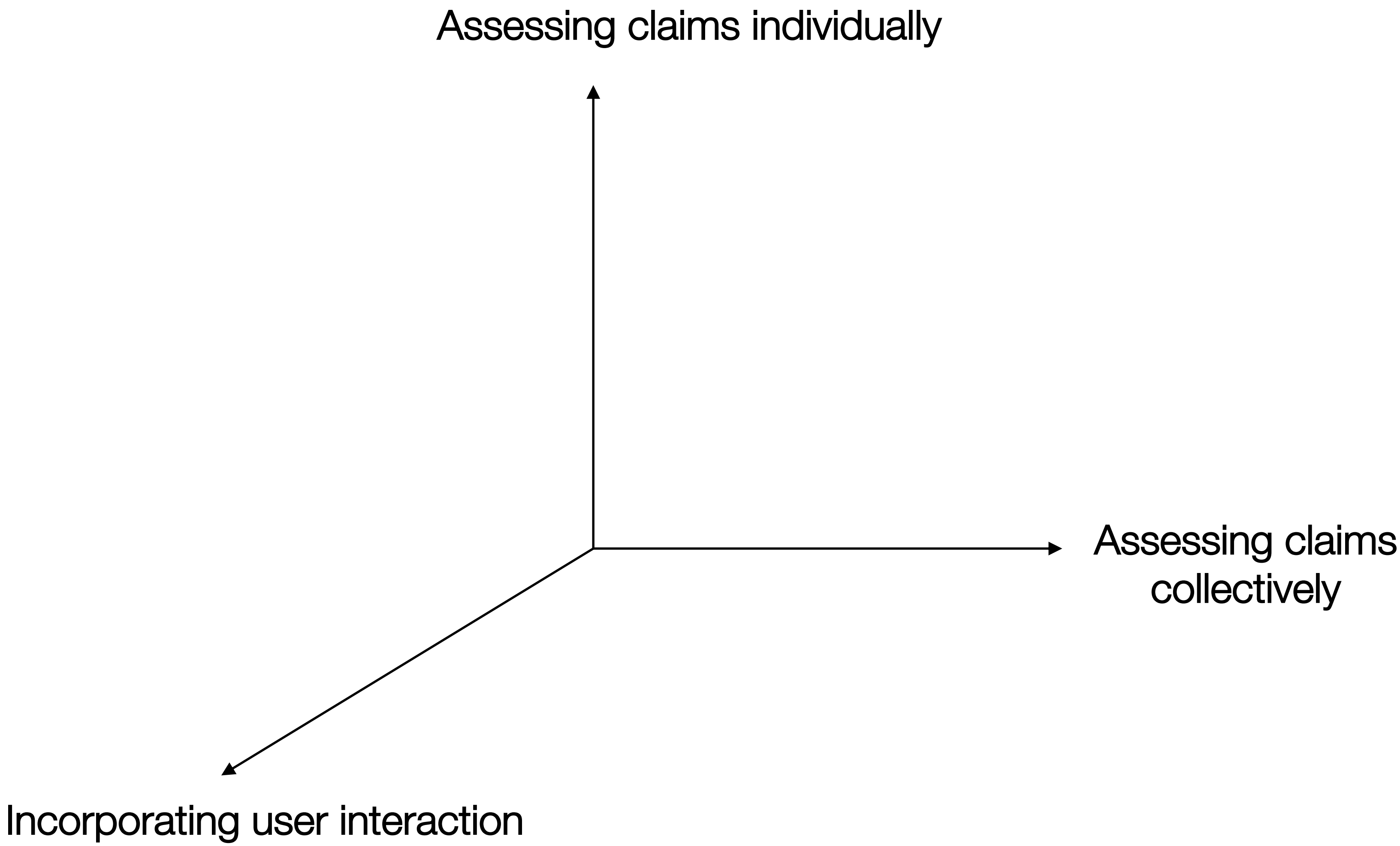
Auth-Integrate

Toward Combating False Data on the Internet

Romila Pradhan, Sunil Prabhakar

PURDUE UNIVERSITY

Basis of approaches to combat false data


Assessing claims individually
Assessing claims collectively
Incorporating user interaction

Claims are assessed individually or in a network setting

- Different forms of fabricated data
  - deception, fake reviews, vandalisms, controversies, hoaxes, rumors
- Leverage linguistic cues to detect false data
  - aspects of language (e.g., tone, stance, objectivity, hedges, negation) to infer correctness of claims
- Utilize structure of specific community networks to identify misinformation
  - vandalism/controversies/hoaxes in Wikipedia
  - rumors on microblogging websites and social media
  - fake reviews in the services business

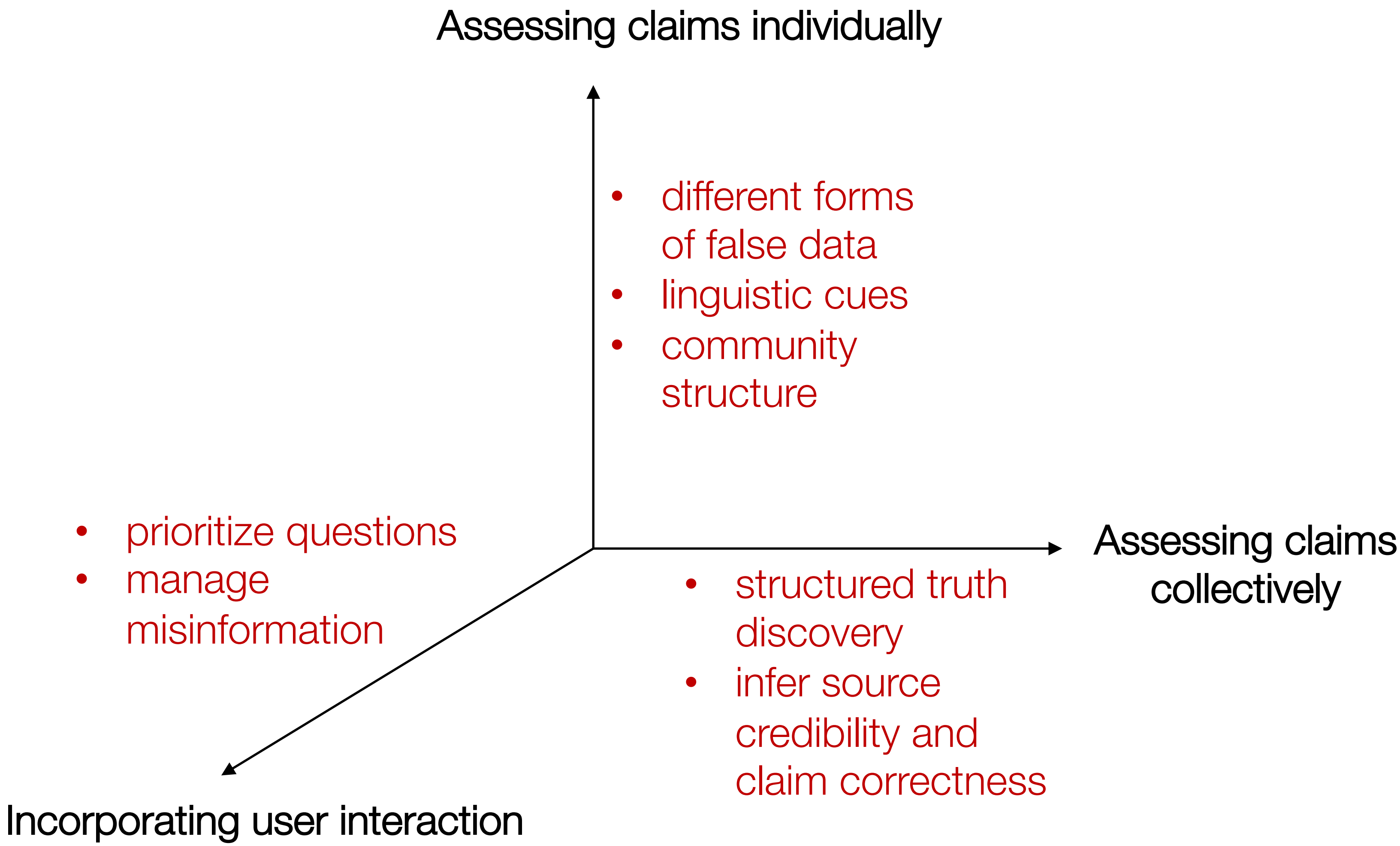
Multiple data conflicts resolved using truth discovery techniques

- Characterize data sources through quality measures (e.g., accuracy, precision, recall, FPR)
- Use techniques (e.g., Bayesian analysis, probabilistic graphical models, optimization and probabilistic soft logic) to jointly infer correctness of claims and credibility of sources
- Solutions strictly limited to structured data conflicts
- Strong assumption that sources are honest

Interacting with users is important

- Fact-checking websites (e.g., Snopes, PolitiFact, FactCheck) act as vanguards of truth
- Data management problems often seek human input to improve their effectiveness
  - User does not *always* have to be an expert
  - Advances made in crowdsourcing research and data management tasks can help in expediting the task of verifying facts

Basis of approaches to combat false data



Assessing claims individually

- different forms of false data
- linguistic cues
- community structure

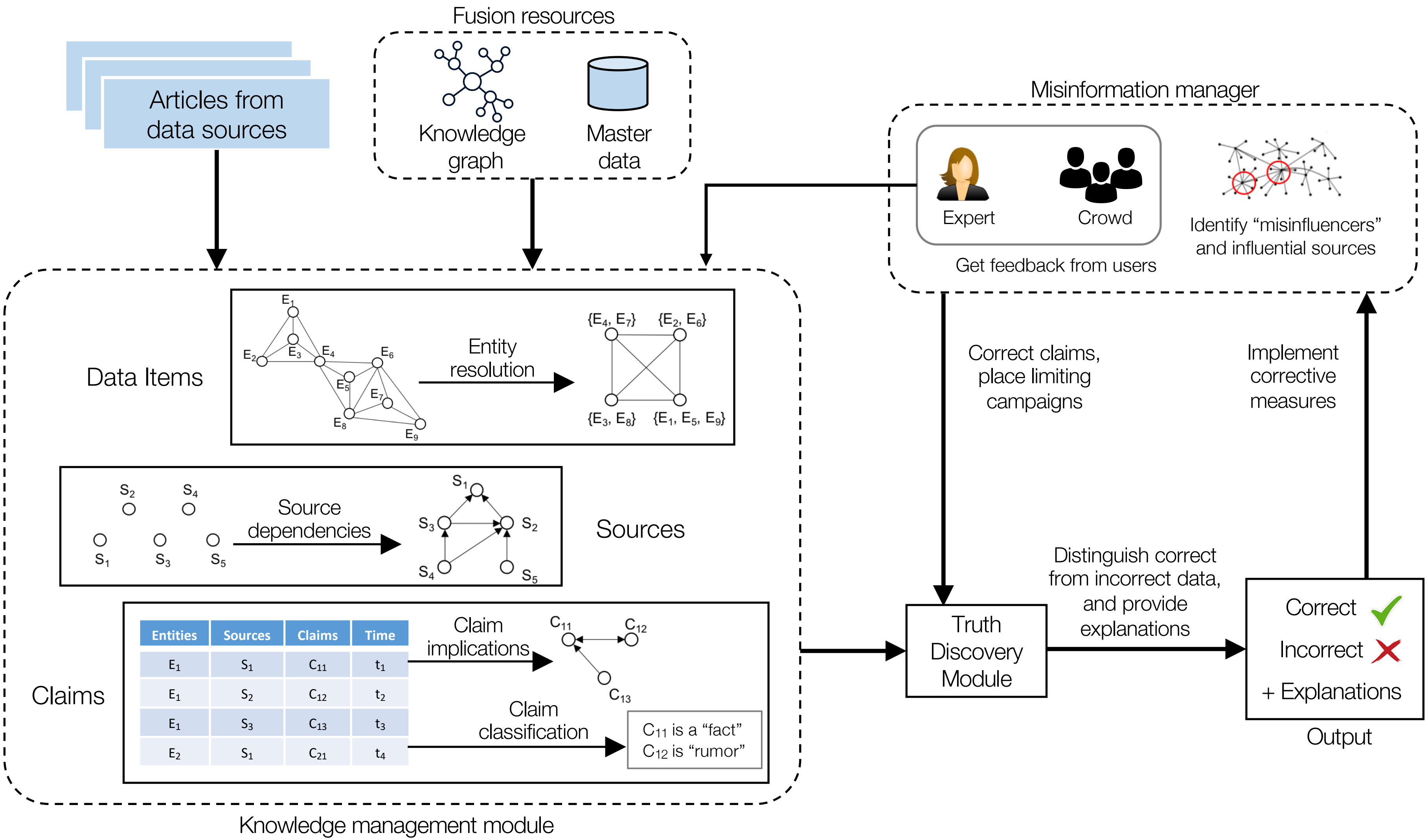
Assessing claims collectively

- structured truth discovery
- infer source credibility and claim correctness

Incorporating user interaction

- prioritize questions
- manage misinformation

System architecture



Articles from data sources

Fusion resources

Knowledge graph

Master data

Misinformation manager

Expert

Crowd

Get feedback from users

Identify “misinfluencers” and influential sources

Correct claims, place limiting campaigns

Implement corrective measures

Data Items

Entity resolution

Sources

Source dependencies

Claims

Entities	Sources	Claims	Time
E_1	S_1	C_{11}	t_1
E_1	S_2	C_{12}	t_2
E_1	S_3	C_{13}	t_3
E_2	S_1	C_{21}	t_4

Claim implications

Claim classification

C_{11} is a “fact”
C_{12} is “rumor”

Knowledge management module

Truth Discovery Module

Distinguish correct from incorrect data, and provide explanations

Correct ✓

Incorrect ✗

+ Explanations

Output

AuthIntegrate, an end-to-end system aimed at combating false data on the Internet

Foundations in DB and data mining. Research advances in the areas of IE, data fusion, adversarial ML and influence propagation. Key components:

- leverages authoritative resources of information to maintain knowledge and provenance related to data items, claims and sources
- presents false data detection as truth discovery of structured data
- engages user feedback and corrective measures to recognize influential sources, (limit) maximize dissemination of (mis)information