Mapping Trust: Credibility Through User Sharing Networks on Telegram

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Introduction

The rise of online misinformation poses critical risks to societal trust, public health, and democratic stability. Identifying and mitigating untrustworthy sources on digital platforms is essential, but current methods are often limited in scope and slow to adapt to new sources. Information credibility assessment generally takes one of two approaches:

Information credibility assessment

Source-based - Evaluates the trustworthiness of entire website domains based on ownership, transparency, and journalistic standards.

Article-based - Assesses the credibility of individual content pieces of websites through fact-checking.

Existing data bases of trustworthiness ratings of sources, such as NewsGuard or Lin et al.'s dataset [2] of over 11,000 rated domains, rely on web tracking and often focus primarily on high-traffic, English-language sites. This leaves small, emerging, or non-English websites - many of which contribute disproportionately to misinformation - underrepresented.

Similar to article-based fact-checking approaches, the manual assessment of source credibility is labor intensive and slow to update [2], creating a reactive approach to credibility that struggles to keep pace with rapidly emerging sources of misinformation. This study addresses these limitations by introducing a **user-based approach** to assess website credibility dynamically, focusing on user sharing behaviors on Telegram.
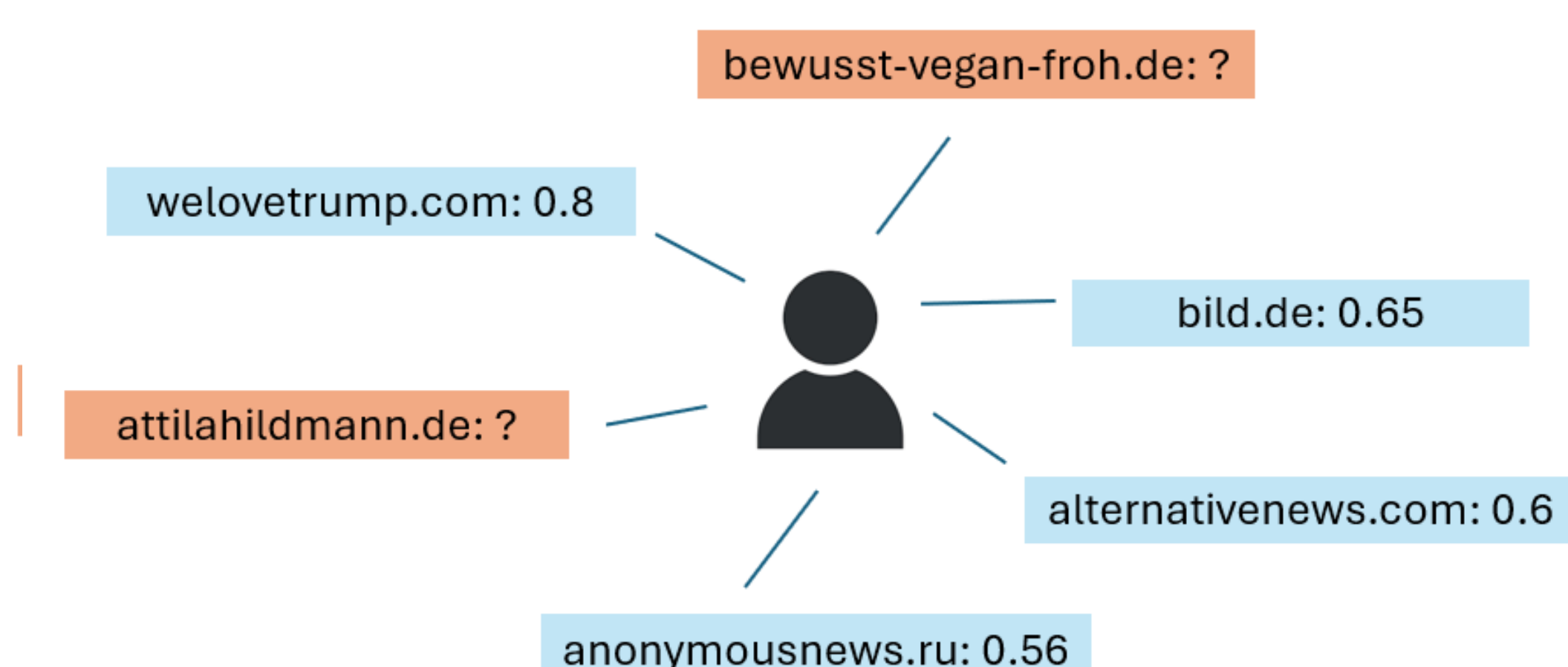
Our hypothesis builds on prior work by Mosleh et al. [3], who demonstrated that user sharing patterns can reveal political ideologies. We propose that user networks, specifically high-frequency sharers or "superspreaders," can similarly reveal the credibility levels of websites not yet included in existing databases. By analyzing a data set of posts on Telegram that strongly oversamples chats with high amounts of misinformation, we aim to enhance coverage of German low-credibility websites.

Method

To test our approach for inferring website credibility, we used the **Schwurbelarchiv dataset** [4] - a collection of over 50 million messages from German-speaking Telegram channels and groups associated with conspiracy narratives, spanning January 2020 to August 2022. Focusing on misinformation-prone groups allowed us to capture a high proportion of low-credibility content, which is often underrepresented in broader social media datasets.

1. Superspreader Identification: We identified superspreaders (the top 17% of users by volume of shared links, threshold chosen by optimising classification performance and the number of newly discovered domains), as they frequently share websites and play a key role in information dissemination.

2. Credibility Scoring: Each superspreader's credibility score was calculated by averaging the credibility ratings of shared websites. Users were classified as high-credibility (score > 0.65) or low-credibility (score < 0.45) if they demonstrated consistent sharing behavior (standard deviation < 0.19).

bewusst-vegan-froh.de: ?
welovetrump.com: 0.8
bild.de: 0.65
attilahildmann.de: ?
alternativenews.com: 0.6
anonymousnews.ru: 0.56

User Credibility Score: 0.34
Low-Credibility User

This illustration presents an example user who has shared six websites. Of these, four have credibility scores available in existing databases, while two do not. By averaging the scores of the four rated websites, this user receives a credibility score of 0.34, categorizing them as a low-credibility user.

3. Website Classification: To infer credibility for websites not rated in databases, we applied a **majority-based classification** approach. A domain was classified as credible/non-credible if it was mentioned by at least eight users, with over 70% of mentions coming from users within a single credibility group (high or low).

Results

Distribution of Credibility Scores of Superspreaders
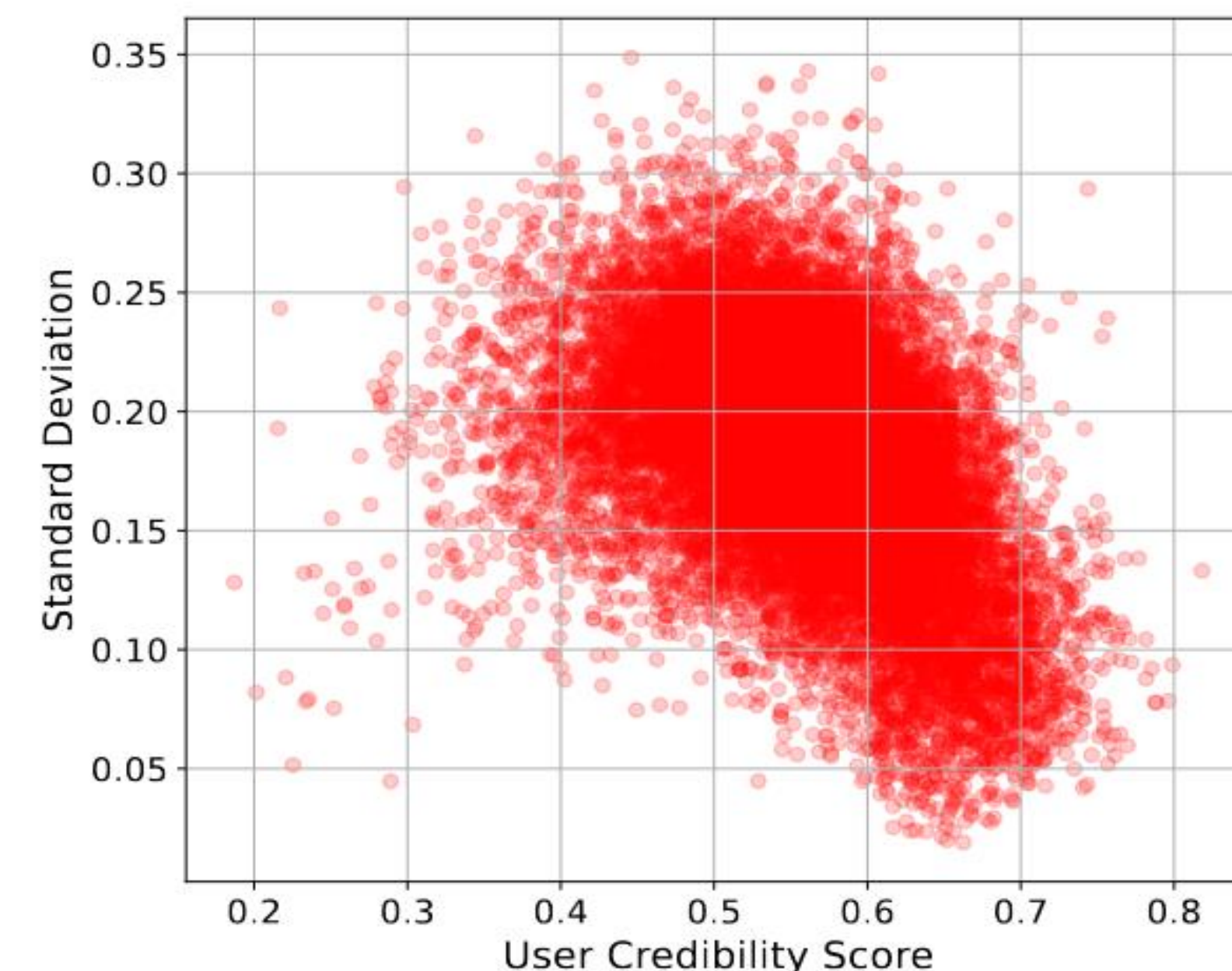
Low Credibility and High Credibility User Group
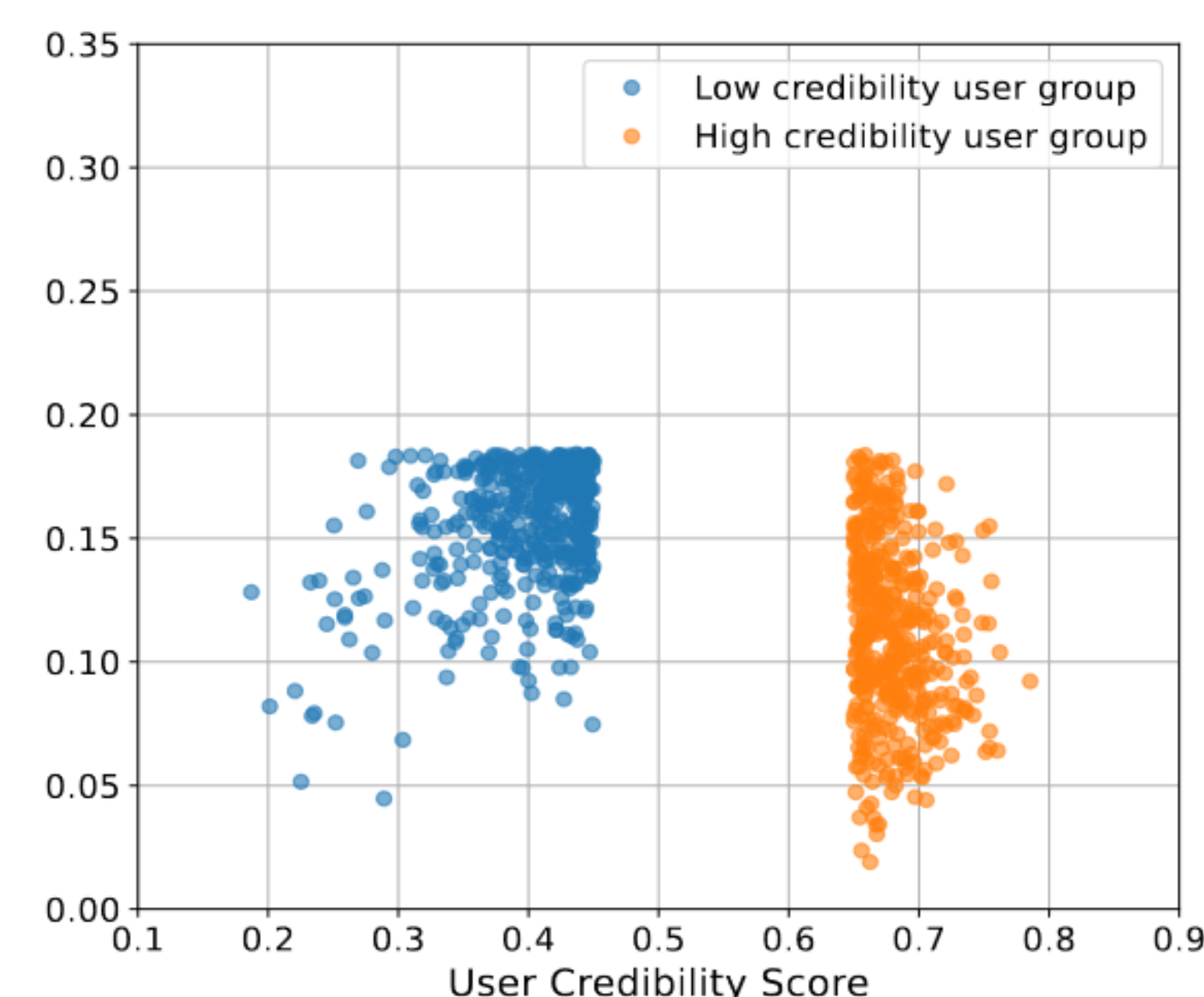
Low: Score < **0.45**
High: Score > **0.65**

60 newly classified websites: 43 high-credibility and 17 low-credibility

Increases the number of covered German websites in existing databases by 20%. The lower count of low-credibility sites likely reflects their shorter lifespan and lower sharing frequency, while high-credibility users tended to share more labeled sites, contributing to this imbalance.

Validation

We validated the method with **10-fold cross-validation** by excluding 10% of labeled sites when calculating user credibility scores. This validation process achieved a **mean F1 score of 0.88**, with 0.9 precision and 0.86 recall, demonstrating robust classification performance.

Conclusion

This study introduces a method for inferring website credibility by analyzing user-sharing networks in conspiracy-focused Telegram channels. By identifying high- and low-credibility user groups, we classified 60 new domains - an important addition, as NewsGuard's German-language database currently lists only 350 sites for Germany and Austria.

Our binary credible/not credible classification expands coverage for German and Austrian sites often overlooked in US-centric databases, offering a valuable tool for identifying credible and non-credible sources in misinformation-prone environments.

References

[1] Lin, H., Lasser, J., Lewandowsky, S., Cole, R., Gully, A., Rand, D.G. *High level of correspondence across different news domain quality rating sets*. PNAS Nexus 2(9), (2023).

[2] Lühring, Jula, et al. *Best Practices for Source-based Research on Misinformation and News Trustworthiness*. PsyArXiv. (2024).

[3] Mosleh, M., & Rand, D. G. (2022). *Measuring exposure to misinformation from political elites on Twitter*. Nature Communications, 13(1), 7144.

[4] *Schwurbelarchiv*. (2024) https://schwurbelarchiv.wordpress.com/

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