

Kai-Cheng Yang

CONTACT INFORMATION **Luddy School of Informatics, Computing, and Engineering**
Indiana University Bloomington
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EDUCATION Ph.D., Informatics, Complex Systems track, Indiana University August 2017—
M.S., Theoretical Physics, Lanzhou University (China) June 2017
B.S., Theoretical Physics, Lanzhou University (China) June 2014

AWARDS

- IU Luddy Outstanding Research Award (\$500) 2021
- IU School of Public Health Big Idea Challenge (\$250) 2020
- IU Informatics Ph.D. Student Conference Travel Awards (\$1000) 2020
- IU GISA Conference Travel Awards (\$700) 2019
- IU Informatics Ph.D. Student Conference Travel Awards (\$1000) 2019
- **NSF Research Trainee scholarship** in Complex Networks and Systems (\$5000) 2018

RESEARCH PROJECTS

Social Media PI: **Filippo Menczer**

- Social bot detection [C2, C3, J9], human perception of bots [J8], role of bots [P2]
- Misinformation [J2, P4, W3, J7, J12]
- Abusive behaviors [C1]
- Social media ecosystem bias [P6, P7]

Public health PIs: **Brea Perry, Yong-Yeol Ahn**

- Opioid epidemic in the U.S. [P1, P3, J3, J4, J10]
- COVID-19 pandemic [J1]

Network Science

- Network embedding [J5, J6, P5]
- Spreading phenomena [J11, J13]

PUBLICATIONS **Journal Articles**

- J1. **Yang, K.-C.**, Lee, B., Ahn, Y.-Y. & Perry, B. L. Use of and Comorbidities Associated With Diagnostic Codes for COVID-19 in US Health Insurance Claims. *JAMA Network Open* **4**, e2124643 (2021).
- J2. **Yang, K.-C.**, Pierri, F., Hui, P.-M., Axelrod, D., Torres-Lugo, C., Bryden, J. & Menczer, F. The COVID-19 Infodemic: Twitter versus Facebook. *Big Data & Society* **8**, 20539517211013861 (2021).
- J3. Lee, B., Zhao, W., **Yang, K.-C.**, Ahn, Y.-Y. & Perry, B. L. Systematic Evaluation of State Policy Interventions Targeting the US Opioid Epidemic, 2007-2018. *JAMA Network Open* **4**, e2036687 (2021).
- J4. Perry, B. L., Odabas, M., **Yang, K.-C.**, Lee, B., Kaminski, P., Aronson, B., Ahn, Y.-Y., Oser, C. B., Freeman, P. R. & Talbert, J. C. New means, new measures: Assessing prescription drug seeking indicators over ten years of the opioid epidemic. *Addiction* (2021).

- J5. Yoon, J., **Yang, K.-C.**, Jung, W.-S. & Ahn, Y.-Y. Persona2vec: A Flexible Multi-role Representations Learning Framework for Graphs. *PeerJ Computer Science* **7**, e174 (2021).
- J6. Zhang, Y.-J., **Yang, K.-C.** & Radicchi, F. Model-free hidden geometry of complex networks. *Physical Reviews E* **103**, 012305 (2021).
- J7. Pasquetto, I. V., Swire-Thompson, B., Amazeen, M. A., Benevenuto, F., Brashier, N., Bond, R. M., Bozarth, L. C., Budak, C., Ecker, U. K., ... & **Yang, K.-C.** Tackling misinformation: What researchers could do with social media data. *The Harvard Kennedy School (HKS) Misinformation Review* **1** (2020).
- J8. Yan, H., **Yang, K.-C.**, Menczer, F. & Shanahan, J. Asymmetrical Perceptions of Partisan Political Bots. *New Media & Society*. doi:[10.1177/1461444820942744](https://doi.org/10.1177/1461444820942744) (2020).
- J9. **Yang, K.-C.**, Varol, O., Davis, C. A., Ferrara, E., Flammini, A. & Menczer, F. Arming the public with artificial intelligence to counter social bots. *Human Behavior and Emerging Technologies*, e115 (2019).
- J10. Perry, B. L., **Yang, K.-C.**, Kaminski, P., Odabas, M., Park, J., Martel, M., Oser, C. B., Freeman, P. R., Ahn, Y.-Y. & Talbert, J. Co-prescription network reveals social dynamics of opioid doctor shopping. *PLoS ONE* **14**, e0223849 (2019).
- J11. Zhang, Y.-J., Wu, Z.-X., Holme, P. & **Yang, K.-C.** Advantage of Being Multicomponent and Spatial: Multipartite Viruses Colonize Structured Populations with Lower Thresholds. *Physical Reviews Letters* **123**. (Editors' Suggestion), 138101 (2019).
- J12. Shao, C., Ciampaglia, G. L., Varol, O., **Yang, K.-C.**, Flammini, A. & Menczer, F. The spread of low-credibility content by social bots. *Nature Communications* **9**, 4787 (2018).
- J13. **Yang, K.-C.**, Wu, Z.-X., Holme, P. & Nonaka, E. Expansion of cooperatively growing populations: Optimal migration rates and habitat network structures. *Physical Reviews E* **95**, 012306 (2017).

Peer-reviewed Conference Proceedings

- C1. Torres-Lugo, C., **Yang, K.-C.** & Menczer, F. *The Manufacture of Partisan Echo Chambers by Follow Train Abuse on Twitter* in (Forthcoming) *Proceedings of the International AAAI Conference on Web and Social Media (ICWSM)* (2022).
- C2. **Yang, K.-C.**, Varol, O., Hui, P.-M. & Menczer, F. *Scalable and Generalizable Social Bot Detection through Data Selection* in *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)* **34** (New York, NY, USA, 2020), 1096–1103.
- C3. Sayyadiharikandeh, M., Varol, O., **Yang, K.-C.**, Flammini, A. & Menczer, F. *Detection of Novel Social Bots by Ensembles of Specialized Classifiers* in *Proceedings of the 29th ACM International Conference on Information & Knowledge Management (CIKM)* (Virtual, 2020), 2725–2732.

Peer-reviewed Workshop/Demo/Dataset/Software Papers

- W1. DeVerna, M. R., Pierri, F., Truong, B. T., Bollenbacher, J., Axelrod, D., Loynes, N., Torres-Lugo, C., **Yang, K.-C.**, Menczer, F. & Bryden, J. *CoVaxxy: A Collection of English-Language Twitter Posts About COVID-19 Vaccines* in *Proceedings of the International AAAI Conference on Web and Social Media (ICWSM)* **15** (2021), 992–999.
- W2. **Yang, K.-C.**, Aronson, B. & Ahn, Y.-Y. BiRank: Fast and Flexible Ranking on Bipartite Networks with R and Python. *Journal of Open Source Software* **5**, 2315 (2020).
- W3. **Yang, K.-C.**, Torres-Lugo, C. & Menczer, F. *Prevalence of Low-Credibility Information on Twitter During the COVID-19 Outbreak* in *Proceedings of the ICWSM International Workshop on Cyber Social Threats (CySoc)* (Virtual, 2020).

- W4. Hui, P.-M., **Yang, K.-C.**, Torres-Lugo, C. & Menczer, F. *BotSlayer: DIY Real-Time Influence Campaign Detection* in *Proceedings of the International AAAI Conference on Web and Social Media (ICWSM)* **14** (Virtual, 2020), 980–982.
- W5. **Yang, K.-C.**, Hui, P.-M. & Menczer, F. *Bot Electioneering Volume: Visualizing Social Bot Activity During Elections* in *Companion Proceedings of The 2019 World Wide Web Conference (WWW)* (San Francisco, CA, USA, 2019), 214–217.
- W6. Hui, P.-M., **Yang, K.-C.**, Torres-Lugo, C., Monroe, Z., McCarty, M., Serrette, B., Pentchev, V. & Menczer, F. BotSlayer: real-time detection of bot amplification on Twitter. *Journal of Open Source Software* **4**, 1706 (2019).

Working Papers

- P1. **Yang, K.-C.**, Aronson, B., Odabas, M., Ahn, Y. Y. & Perry, B. L. Comparing Measures of Centrality in Bipartite Social Networks: A Study of Drug Seeking for Opioid Analgesics. *In submission* (2021).
- P2. Duan, Z., Li, J., Lukito, J., **Yang, K.-C.**, Chen, F., Shah, D. V. & Yang, S. Algorithmic Communicators in the Hybrid Media System: How Social Bots Selectively Promoted Polarized Issues during the COVID-19 Pandemic. *In submission* (2021).
- P3. Lee, B., **Yang, K.-C.**, Kaminski, P., Ahn, Y.-Y., Peng, S., Odabas, M., Gupta, S., Green, H. & Perry, B. L. Substitution of physical therapy with longer and stronger doses of opioid prescriptions during the COVID-19 pandemic. *In submission* (2021).
- P4. Pierri, F., Perry, B., DeVerna, M., **Yang, K.-C.**, Flammini, A., Menczer, F. & Bryden, J. The impact of online misinformation on U.S. COVID-19 vaccinations. *arXiv preprint arXiv:2104.10635* (2021).
- P5. Zhang, Y.-J., **Yang, K.-C.** & Radicchi, F. Systematic comparison of graph embedding methods in practical tasks. *arXiv preprint arXiv:2106.10198* (2021).
- P6. **Yang, K.-C.**, Hui, P.-M. & Menczer, F. How Twitter Data Sampling Biases U.S. Voter Behavior Characterizations. *arXiv preprint arXiv:2006.01447* (2020).
- P7. Wen, C., Pacheco, D., **Yang, K.-C.** & Menczer, F. Neutral Bots Reveal Political Bias on Social Media. *arXiv preprint arXiv:2005.08141* (2020).

TOOLS

Observatory on Social Media (OSoMe)

- **Botometer**[®] [C3, J9], **BotometerLite** [C2]: popular bot detection tools with 250,000 daily requests from researchers, journalists, and social media users
- **BotSlayer** [W4, W6], **BEV** [W5], **Hoaxy**[®]: bot amplification detection & visualization tools with thousands of users
- **OSoMeTweet** (GitHub, PyPI): Python library for accessing Twitter’s V2 API
- **CoVaxxy** [W1]: dashboard for COVID-19 vaccine Twitter discussion

Network Science

- **Persoan2vec** (GitHub) [J5]: multi-role representations embedding for networks
- **BiRank** (GitHub, PyPI, CRAN) [W2]: bipartite network PageRank

PRESENTATIONS Tutorials

- Identifying Social Media Manipulation with OSoMe Tools (video)
IC²S² 2020 (Virtual)

Jul. 2020

Talks

- The COVID-19 Infodemic: Twitter versus Facebook [J2]
IC²S² 2021 (Virtual) Jul. 2021
NetSci 2021 (Virtual) Jul. 2021
Computation + Journalism Symposium — C+J 2021 (Virtual) Feb. 2021
The 3rd North American Social Networks Conference — NASN 2021 (Virtual) Jan. 2021
NetSci 2021 (Virtual) Jul. 2021
- Bipartite Network Centrality Comparison: A Study of Opioid Doctor Shopping [P1]
IC²S² 2020 (Virtual) Jul. 2020
- Prevalence of Low-Credibility Information on Twitter During the COVID-19 Outbreak [W3]
CySoc 2020 (Virtual) Jun. 2020
- BotometerLite [C2]
IC²S² 2020 (Virtual) Jul. 2020
AAAI 2020 (New York, USA) Feb. 2020
- Bot Electioneering Volume [W5]
CyberSafety 2019 (San Francisco, USA) May 2019
- Expansion of Cooperatively Growing Populations on Networks [J13]
Chinese Physical Society Fall Meeting 2016 (Beijing, China) Sep. 2016

WORKING EXPERIENCE

TikTok Inc. (ByteDance), CA, USA
 Security engineering intern Summer 2021

Indiana University, IN, USA
 Research assistant, doctor shopping project Fall 2018 – Fall 2021

TEACHING EXPERIENCE

Indiana University, IN, USA
 Undergraduate Research Opportunities in Computing (UROC) mentor Spring 2021

Indiana University, IN, USA
 Associate instructor, I590 Applied Data Science Fall 2017, Spring 2018

SERVICE

Journal Reviewer
 Social Network Analysis and Mining; ACM Digital Threats: Research and Practice; IEEE Internet Computing; PeerJ Computer Science; Humanities & Social Sciences Communications; IEEE Transactions on Knowledge and Data Engineering; Information Processing & Management; Online Social Networks and Media; Information, Communication and Society; PLoS ONE; Big Data & Society; International Communication Gazette; International Journal of Data Science and Analytics

Conference Reviewer
 ICWSM'20, '21; CIKM'21

IN THE PRESS

Selected Media Coverage

- Using **OSoMe tools** to track inauthentic actors and spread of misinformation online
AXIOS (May 2021); USA Today (Mar. 2021); IndyStar (Mar 2021); AXIOS (Feb. 2021); Scientific American (Jan. 2021); Bloomberg News (Nov. 2020); The New York Times (Oct. 2020); Newsweek (Oct. 2020); Bloomberg News (Mar. 2020); The National Interest (Nov. 2019); The Conversation (Nov. 2019); IU news (Sep. 2019); IDS news (Sep. 2019); Science Node (Sep. 2019); Reuters (Nov. 2018)
- Low-credibility information on Twitter during the COVID-19 outbreak [W3]

IEEE Spectrum (Jul. 2020)

- Asymmetrical perceptions of partisan political bots [J8]

IU the Media School Report (Jul. 2020)

- The spread of low-credibility content by social bots [J12]

Salon (Sep. 2020), IU news (Nov. 2018), ScienceNews (Nov. 2018)

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