Kai-Cheng Yang

CONTACT INFORMATION	Luddy School of Informatics, Computing, and Engineering Indiana University Bloomington 901 E 10th street Bloomington, IN 47408	yangkc@iu.edu kaichengyang.me Google Scholar

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, J11], human perception of bots [J10], role of bots [P2]
- Misinformation [J2, P4, W3, J8, J14]
- Abusive behaviors [C1]
- Social media ecosystem bias [P5, J9]

Public Health   PIs: Brea Perry, Yong-Yeol Ahn

- Opioid epidemic in the U.S. [P1, P3, J3, J4, J12]
- COVID-19 pandemic [J1]

Network Science

- Network embedding [J5–J7]
- Spreading phenomena [J13, J15]

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. Zhang, Y.-J., **Yang, K.-C.** & Radicchi, F. Systematic comparison of graph embedding methods in practical tasks. *Physical Reviews E* **104,** 044315 (2021).

J8. 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).

J9. Wen, C., Pacheco, D., **Yang, K.-C.** & Menczer, F. Neutral bots probe political bias on social media. *Nature Communications* **12,** 5580 (2020).

J10. Yan, H., **Yang, K.-C.**, Menczer, F. & Shanahan, J. Asymmetrical Perceptions of Partisan Political Bots. *New Media & Society.* doi:10.1177/1461444820942744 (2020).

J11. **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).

J12. 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).

J13. 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).

J14. 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).

J15. **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** (Virtual, 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. **Yang, K.-C.**, Hui, P.-M. & Menczer, F. How Twitter Data Sampling Biases U.S. Voter Behavior Characterizations. *arXiv preprint arXiv:2006.01447* (2020).

Tools

Observatory on Social Media (OSoMe)

- Botometer® [C3, J11], 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

- Persona2vec (GitHub) [J5]: multi-role representations embedding for networks
- BiRank (GitHub, PyPI, CRAN) [W2]: bipartite network PageRank

Presentations

Tutorials and Demos

- Introduction to Botometer®
  Knight Research Network Tool Demonstration Day (Virtual)   Oct. 2021

- Identifying Social Media Manipulation with OSoMe Tools (video)
  IC^{2}S^2 2020 (Virtual)   Jul. 2020

Talks

- The COVID-19 Infodemic: Twitter versus Facebook [J2]
  Social Media Lab Guest Speaker Series (Virtual)   Oct. 2021
  IC^{2}S^2 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
- Bipartite Network Centrality Comparison: A Study of Opioid Doctor Shopping [P1]
  IC^{2}S^2 2020 (Virtual)   Jul. 2020
- Prevalence of Low-Credibility Information on Twitter During the COVID-19 Outbreak [W3]
  CySoc 2020 (Virtual)   Jun. 2020
- BotometerLite [C2]
  IC^{2}S^2 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 [J15]
  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

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 mentor   Spring 2021, Fall 2021

Indiana University, IN, USA

Associate instructor, I590 Applied Data Science   Fall 2017, Spring 2018

Service

Journal Reviewer
Social Network Analysis and Mining (2020); ACM Digital Threats: Research and Practice (2020); IEEE Internet Computing (2020); PeerJ Computer Science (2020); Humanities & Social Sciences Communications (2020); IEEE Transactions on Knowledge and Data Engineering (2020); Information Processing & Management (2021); Online Social Networks and Media (2021); Information, Communication and Society (2021); PLoS ONE (2021); Big Data & Society (2021); International Communication Gazette (2021); International Journal of Data Science and Analytics (2021); Computers & Security (2021);
Conference Reviewer
ICWSM ('20,'21,'22); CIKM ('21);

In the press

Selected Media Coverage

- Using OSoMe tools to track inauthentic actors and spread of misinformation online
  Futurity (Oct. 2021); *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)*;

- Neutral bots probe political bias on social media [J9]
  Futurity (Oct. 2021);
- Low-credibility information on Twitter during the COVID-19 outbreak [W3]
  IEEE Spectrum (Jul. 2020);
- Asymmetrical perceptions of partisan political bots [J10]
  IU the Media School Report (Jul. 2020);
- The spread of low-credibility content by social bots [J14]
  Salon (Sep. 2020); *IU news (Nov. 2018)*; *ScienceNews (Nov. 2018)*;

Last updated: October 22, 2021