Mi Feng

Ph.D Student in Hong Kong Baptist University
Gender: Male; Date of Birth: Dec. 1993

(+852)69076707 | fengmi9312@gmail.com | http://mfengweb.com | fengmi9312 | Hong Kong, China

Education

Department of Physics, Hong Kong Baptist University (HKBU) *Hong Kong, China*
Ph.D in Physics Sep. 2020 - Jun. 2024 (estimated)

School of Computer Science and Engineering, University of Electronic Science and Technology (UESTC) *Chengdu, China*
Master in Computer Science Sep. 2016 - Jun. 2019

School of Physical Science and Technology, Lanzhou University (LZU) *Lanzhou, China*
Bachelor in Physics Sep. 2012 - Jun. 2016

Visiting Experience

School of Electrical, Computer and Energy Engineering, Arizona State University (ASU) *Tempe, USA*
Visiting Scholar Feb. 2023 - Aug. 2023

School of Communication and Electronic Engineering, East China Normal University (ECNU) *Shanghai, China*
Visiting Student Sep. 2017 - Jun. 2018

Technical Skills

Programming	C++, Python, Javascript
Professional Software	Visual Studio, Anaconda, Git, Linux
Drawing & Typesetting	Matplotlib, Adobe Illustrator, LaTeX, Microsoft Office, Markdown, HTML, CSS
Languages	Chinese (native), English

Publications

[1] **Feng, M.**, Cai, S. M., Tang, M., & Lai, Y. C. (2019). Equivalence and its invalidation between non-Markovian and Markovian spreading dynamics on complex networks. ***Nature communications***, 10(1), 3748. (Impact Factor = 16.6) [Link]
Note: we find that the existence of steady-state equivalence between non-Markovian and Markovian spreading depends on a specific edge activation mechanism.

[2] Lin, Z. H., **Feng, M.**, Tang, M., Liu, Z., Xu, C., Hui, P. M., & Lai, Y. C. (2020). Non-Markovian recovery makes complex networks more resilient against large-scale failures. ***Nature communications***, 11(1), 2490. (Impact Factor = 16.6) [Link]
Note: we find that memory associated with nodal recovery can counter-intuitively make the network more resilient against large-scale failures.

[3] **Feng, M.**, Tian, L., & Zhou, C. (2021). Mechanism of optimal time-course COVID-19 vaccine prioritization based on non-Markovian steady-state prediction. *medRxiv*, 2021-10. (**under revision**) [Link]
Note: we have successfully addressed the challenge of predicting the steady state in non-Markovian age-stratified transmission dynamics, based on any transient state. This achievement allows us to optimize control strategies effectively, with the objective of minimizing the steady state. Through mathematical analysis of the model, we reveal that dynamic control strategy to combinations of different groups is necessary to achieve optimal prioritization.

[4] **Feng, M.**, Tian, L., Lai, Y. C., & Zhou, C. (2023). Validity of Markovian modeling for transient memory-dependent epidemic dynamics. *arXiv preprint arXiv:2306.16864*. (**submitting**) [Link] [Github Source] [Web-based Application]
Note: we develop a comprehensive computational and analytic framework to establish that the transient-state equivalence between non-Markovian and Markovian theories holds when the average generation time matches the average removal time in memory-dependent transmission, resulting in minimal Markovian estimation errors in the basic reproduction number, epidemic forecasting, and evaluation of control strategy. Strikingly, the errors depend on the generation-to-removal time ratio but not on the specific values and distributions of these times, and this universality will further facilitate estimation rectification. Overall, our study provides a general criterion for modeling memory-dependent processes using the Markovian frameworks.

Research

My research focuses on studying how **temporal** and **spatial** properties affect transmission in **complex networks**. For temporal effects, we analyze these effects on transmission accuracy using Markovian and non-Markovian approaches, and further develop **control strategies**, **accuracy criteria**, and **rectification methods** for these theories. Regarding spatial effects, the loop structure in networks poses a major challenge, reducing the accuracy of contemporary numerical and theoretical approaches, and transforming the problem into an NP-hard question. To address this issue, we are now employing **deep learning (graph neural networks)** to study and overcome these limitations.

Awards and Honors

Sep. 2020 - 2024	**Scholarship**: "Graduate Scholarship "	*Hong Kong*
Aug. 2021	**Contest**: First Prize for Poster Presentation in "One-day Research Postgraduate Workshop"	*Hong Kong*
Oct. 2019	**Contest**: Second Prize for Best Student Thesis in "13th Chinese Conference of Complex Networks"	*Zhenjiang*
Sep. 2013	**Scholarship**: Second-class scholarship in Lanzhou University	*Lanzhou*

Conferences

Presentation *China*

Academic Conference 2018 & 2019

- 14th Chinese Conference of Complex Networks (CCCN 2018), Chongqing, China (Oct. 2018)
- 15th Chinese Conference of Complex Networks (CCCN 2019), Zhenjiang, China (Oct. 2019)

Attendance *China & South Korea*

Academic Conference 2016, 2017, 2022 & 2023

- 12th Chinese Conference of Complex Networks (CCCN 2016), Taiyuan, China (Oct. 2016)
- 13th Chinese Conference of Complex Networks (CCCN 2017), Shenzhen, China (Oct. 2017)
- Dynamics Days Asia Pacific (DDAP12), Daejeon, South Korea (Nov. 2022)
- Unifying Themes in Complex Systems Dynamics and Machine Learning - Satellite Meeting of STATPHYS28, Hong Kong, China (Aug. 2023)

References

- Prof. Changsong Zhou [Link]
  Ph.D, Professor, at Department of Physics, Hong Kong Baptist University, Hong Kong, China
  ✉ cszhou@hkbu.edu.hk
- Dr. Liang Tian [Link]
  Ph.D, Assistant Professor, at Department of Physics, Hong Kong Baptist University, Hong Kong, China
  ✉ liangtian@hkbu.edu.hk
- Prof. Ying-Cheng Lai [Link]
  Ph.D, Professor, at School of Electrical, Computer and Energy Engineering, Arizona State University, Tempe, USA
  ✉ ying-cheng.lai@asu.edu