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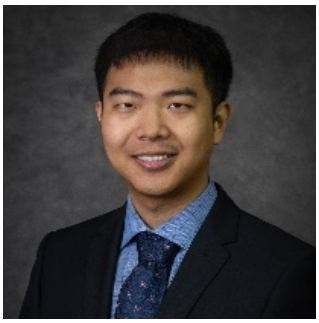

Statistical Transfer Learning for Modeling, Monitoring, and Prognosis

Dr. Chao Wang

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Friday, April 19, 2024 from 10:00AM-11:00AM (Central Time)

- **Join Online:** MS Teams (see link below)

https://teams.microsoft.com/l/meetup-join/19%3ameeting_NjczY2I3NzEtYmJlMC00ZTQxLTk4N2EtZTIyYTQyZjNjMTgx%40thread.v2/0?context=%7b%22Tid%22%3a%22170bbabd-a2f0-4c90-ad4b-0e8f0f0c4259%22%2c%22Oid%22%3a%22c9f8dd10-bdbf-4c7a-bc65-d4bc72037cbe%22%7d

Abstract: Transfer learning focuses on building relationship among different tasks so that shared information can be transferred from related source tasks to the target task. Various statistical models have been developed/applied to build such relationship and facilitate the transfer learning. However, most of existing statistical models can only be applied in ideal cases with many assumptions, e.g., complete data and/or transferability of shared information. In engineering practice, violation of these assumptions often occurs, which poses great challenges for transfer learning. In this talk, two widely used statistical models, i.e., Gaussian process and mixed model, are studied to facilitate transfer learning under violation of certain assumptions. More specifically, we focus on the incomplete data issue in Gaussian process and the transferability issue in mixed model. The Gaussian process model and its incomplete data issue are studied under the context of transfer learning for profile monitoring, and mixed model and its transferability issue are studied under the context of transfer learning for (soft failure) prognosis. Our works demonstrate the importance of assumptions when applying these statistical models, and the proposed solutions effectively expand the applicability of these models in transfer learning when violations occur. Both methods are validated using numerical studies and real-world data from engineering processes.

Biosketch: Dr. Chao Wang is an Assistant Professor in the Department of Industrial and Systems Engineering at the University of Iowa. He received his B.S. from the Hefei University of Technology in 2012, and M.S. from the University of Science and Technology of China in 2015, both in Mechanical Engineering, and his M.S. in Statistics and Ph.D. in Industrial and Systems Engineering from the University of Wisconsin-Madison in 2018 and 2019, respectively. His

research interests include statistical modeling, analysis, monitoring and control for complex systems. His research is supported by various federal funding agencies such as NSF, DoD, DoE, and DoT. He is a recipient of Outstanding Young Manufacturing Engineer Award from SME, Best Paper Award from IISE Transactions, and several Best Paper Awards/Finalist at INFORMS Annual Conferences. He is an Associate Editor of the Journal of Intelligent Manufacturing, and a member of INFORMS, IISE, and SME.