Title: Automating Neural Architecture Design: From Search to Generation

Abstract: This talk will provide an overview of automated neural architecture design, with a focus on its motivation, evolution, and recent advances. I will first introduce the background and necessity of automating neural network architecture design, emphasizing the limitations of manual design in the face of increasing model complexity and application diversity.

I will then review the development of Neural Architecture Search (NAS), covering the foundational frameworks built around search spaces, search strategies, and performance estimation methods. While NAS has achieved remarkable success, significant challenges remain in these three core components. I will discuss some of these limitations and present contributions from our research group aimed at addressing them.

Finally, the talk will shift toward the emerging paradigm of neural architecture generation (NAG). I will introduce several of our recent works in this direction and highlight promising research avenues, such as improving scalability, incorporating semantic constraints, and enhancing generalization across tasks. The presentation aims to provide both a historical perspective and a forward-looking view on the automation of neural architecture design.

Introduction to Yanan Sun:

Yanan Sun is a professor at the College of Computer Science, Sichuan University, China. Previously, he was a postdoctoral research fellow at Victoria University of Wellington, New Zealand, under the supervision of Profs. Mengjie Zhang and Bing Xue. His research focuses primarily on evolutionary neural architecture search. He has published over 100 papers in fully refereed journals and top international conferences, including IEEE TEVC, IEEE TNNLS, IEEE TCYB, IEEE TKDE, NeurIPS, CVPR, ICCV, ICML, ICLR, GECCO, and CEC. Among his publications, 14 have received notable recognitions such as ESI Hot Papers, ESI Highly Cited Papers, Best Paper Award from IEEE CIS Chengdu Section, AJCAI 2024 Spotlight Paper, MLMI 2022 Best Paper, and Best Paper Nominations at GECCO25 and CEC24. He is also the leading author of two books: *Evolutionary Deep Neural Architecture Search: Fundamentals, Methods, and Recent Advances* (Springer Nature) and *Automated Machine Learning* (China Science Publishing). In addition, he is the core proposer of “GPU Days” and co-inventor of “Performance Predictor,” both of which have been widely adopted in the neural architecture search community.

Dr. Sun was the founding chair of the IEEE Computational Intelligence Society (CIS) Task Force on

Evolutionary Deep Learning and Applications. He has chaired the Special Session on Evolutionary Deep Learning and Applications at IEEE CEC from 2019 to 2022 and again in 2024 and 2025, and led the Symposium on Evolutionary Neural Architecture Search and Applications at IEEE SSIC from 2019 to 2023. He also holds editorial appointments as an Associate Editor of IEEE Transactions on Evolutionary Computation (TEVC), an Associate Editor of IEEE Transactions on Neural Networks and Learning Systems (TNNLS), and an Editorial Board Member of Memetic Computing.