Towards Fully Automated Optimization with Agile Workflows and Large Language Models

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***Abstract*— The increasing complexity and difficulty of optimization problems today have greatly raised the need for efficient and accurate algorithms. Evolutionary computation techniques have proven to be effective and, in many cases, superior for tackling challenging real-world problems. To fully realize their potential, however, solving these problems requires a systematic optimization framework that carefully structures each step. In this talk, I will introduce an agile and iterative workflow approach that encourages close collaboration between optimization experts and decision-makers. This approach ensures that algorithms are used effectively and reduces the risk of failure from unforeseen changes. I will also discuss the philosophy of prioritizing simplification over pure optimization, which shows how streamlined processes can often yield better results than overly complex ones. The talk also covers a new approach that integrates Large Language Models (LLMs) into various stages of the optimization lifecycle to increase autonomy. This emerging technology enables algorithms to adapt dynamically based on real-time feedback, which bring us closer to fully automated intelligent optimization systems. This advancement represents a transformative path for both research and practical applications with the potential to make complex optimization more accessible and beneficial for society.**

Short Bio

Prof. Seyedali Mirjalili is the founding director of the Center for Artificial Intelligence Research and Optimization at Torrens University. Internationally recognized for his contributions to nature-inspired artificial intelligence techniques, he has published over 500 works with more than 120,000 citations and an H-index of 120. Since 2019, he has been listed among the top highly-cited researchers, and Web of Science has named him one of the most influential researchers worldwide. In 2022 and 2023, *The Australian* newspaper honored him as a global leader in Artificial Intelligence and a national leader in Evolutionary Computation and Fuzzy Systems. He is a senior member of IEEE and holds editorial positions in several top AI journals.