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Applied Statistics in the Era of Artificial Intelligence: A focus on AI Assurance

The advent of artificial intelligence (AI) technologies has significantly changed many domains, including applied statistics. This talk explores the evolving role of applied statistics in the AI era, drawing from our experiences in engineering statistics, focusing on how statistics can be employed to study the properties of AI models and enhance AI systems, especially in AI assurance.

We briefly review the role of applied statistics in traditional areas, then focus on the relationship between statistics and AI, with particular emphasis on AI assurance. We explore how applied statistics contributes to key aspects of AI reliability by introducing the "SMART" statistical framework for AI reliability research. This framework consists of five components, including the structure of the system, metrics of reliability, analysis of failure causes, reliability assessment, and test planning, with the overarching goal of ensuring that an AI system can perform its designed functionality for the intended period. Several concrete examples from our recent research are presented, including the reliability analysis of autonomous vehicles, out-of-distribution detection, and AI test planning.

Together, these examples demonstrate that statistical principles provide a rigorous foundation for evaluating and improving AI systems. The talk concludes with reflections on the future role of statisticians in an increasingly AI-driven world.

Special/ Invited session

Session Bridging AI and Statistics / Bart De Ketelaere

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Mainly application

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