

Metrology-Inspired Methods to Assess the Biases of Artificial Intelligence Systems

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Abstract : With the field of artificial intelligence (AI) experiencing exponential growth, fueled by technological advancements that pave the way for increasingly innovative and promising applications, there is an escalating need to develop rigorous methods for assessing their performance in pursuit of transparency and equity. This article proposes a metrology-inspired statistical framework for evaluating bias and explainability in AI systems. Drawing from the principles of metrology, we propose a pioneering approach, using a concrete example, to evaluate the accuracy and precision of AI models, as well as to quantify the sources of measurement uncertainty that can lead to bias in their predictions. Furthermore, we explore a statistical approach for evaluating the explainability of AI systems based on their ability to provide interpretable and transparent explanations of their predictions.

Keywords : artificial intelligence, metrology, measurement uncertainty, prediction error, bias, machine learning algorithms, probabilistic models, interlaboratory comparison, data analysis, data reliability, measurement of bias impact on predictions, improvement of model accuracy and reliability

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