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TITLE: Machine learning meets statistical modelling: boosting, simplicity and predictions

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ABSTRACT: Modern statisticians are confronted with a large and continuously growing set of methods for prediction modelling. In particular, machine learning offers a wide range of algorithms that promise strong predictive performance, often accompanied by recent efforts to improve interpretability and explainability. At the same time, a more sobering picture emerges from applied work: many proposed prediction models remain academic exercises and are rarely used in practice. Moreover, differences in predictive performance between methods are frequently small and unstable, especially when compared to the losses observed when models are transferred across populations or settings (e.g. polygenic scores that heavily rely on ancestry). Even when framed more broadly as artificial intelligence, prediction modelling continues to raise the same fundamental questions concerning model complexity, accuracy, transferability and practical usability.

In this context I will present relatively simple approaches on how to use gradient boosting to estimate and regularize structured statistical models that are by design interpretable, without claiming superiority over alternative approaches. I will highlight recent advancements to extend model classes but also the resulting limitations. I will discuss that in many applications, multiple models perform similarly well (Rushomon), and that methodological complexity should therefore be approached with caution.

BRIEF SPEAKER BIO: Andreas Mayr is Head of the Institute for Medical Biometry and Statistics (IMBS) at Philipps University Marburg, Germany. His methodological research focuses on statistical modelling and prediction, with particular emphasis on distributional regression and modern regression techniques. He is the author of both methodological and clinical publications, as well as a book on distributional regression. Before joining Marburg, he held positions at the University of Bonn (Epidemiology) and LMU Munich (Applied Stochastics). He completed his PhD and habilitation at FAU Erlangen-Nürnberg Medical School and studied statistics at LMU Munich and the University of Buenos Aires (UBA), Argentina. He is an editor of the *Statistical Modelling* Journal and a member of the Clinical Ethics Committee in Marburg.