Please join the Biometric Colloquium

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OVER-OPTIMISM IN THE EVALUATION OF CLUSTERING RESULTS AND NOVEL CLUSTER ALGORITHMS

October 12th, 2022 at 9:00 am

Informatikbibliothek, Raum 88.03.806
Medizinischen Universität Wien, Spitalgasse 23, 1090 Wien

HOST: Daniela Dunkler

ABSTRACT

Cluster analysis is frequently performed in many application fields to find groups in data. A multitude of cluster algorithms and methods for evaluating clustering results has been proposed in the literature. Yet, issues remain regarding the reliability and trustworthiness of a) clustering results in applied research, and b) results concerning newly presented cluster algorithms in the methodological literature. It has rarely been discussed whether such results might be over-optimistic, in the sense that they cannot be validated on other datasets or in other settings. Over-optimism may be caused by the multiplicity of possible analysis strategies regarding the choice of clustering method and/or study design, coupled with selectively reporting only the "best" results.
My talk will discuss three papers which consider different aspects of this topic. The first paper introduces a systematic framework for validating clustering results on validation data. This framework is then used in the second paper to quantify over-optimism effects in the exemplary context of unsupervised microbiome research. Finally, the third paper considers over-optimism in methodological clustering research. It is well known that authors who present a new method typically claim that this method is superior to existing approaches. However, such claims cannot always be taken at face value, as the authors have a vested interest in presenting their method as favorably as possible. Our paper is an illustrative study which demonstrates the mechanisms by which authors—consciously or unconsciously—paint their novel cluster algorithm's performance in an over-optimistic light. The three papers presented in my talk illuminate the importance of strategies for avoiding the problems of over-optimism (such as, e.g., neutral benchmark studies).