

A cordial invitation to the opening talk of the  
Brown Bag Seminar  
*Recent Developments in Data Science:*

## **A Bootstrap Permutation Variable Importance Test**

By  
Matthias Wild

Date: 08.02.2024 (Thursday) at 12:00 (s.t.)

Location: SR 027 WIWI

Link and further  
information: [Course 39740 Seminar: Doctoral Seminar "Recent Developments in Data Science" in Stud.IP](#)

**Abstract:**

Permutation variable importance quantifies the contribution of a covariate to the predictive ability of a supervised learning method. The increase in loss after the random permutation of a covariate allows for ranking, but in the absence of a threshold, a distinction between informative and non-informative covariates cannot be made.

We show that most recent approaches to permutation variable importance tests are computationally expensive and exceed their nominal Type I error level for mutually dependent covariates. We propose an alternative approach using a bootstrap to derive the null distribution, reducing the required number of permutations substantially. This approach can be applied to any predictive algorithm and is remarkably faster than conventional permutation variable importance tests. We investigate the control of the type I error and the decisive power in simulation studies. Even in the presence of mutually dependent covariates, our test is conservative and has comparable or superior power compared to recent permutation variable importance tests.

**Speaker: Matthias Wild**

Matthias Wild is PhD Student at the Chair of Statistics & Data Analytics of the University of Passau. At the interface of statistics and machine learning, he works on the analysis and optimization of state-of-the-art predictive algorithms. Recent work involves the synthesis of boosting- and bagging-based procedures, with a focus on computational efficiency, predictive performance, and statistical interpretability.