UNIVERSITY OF PASSAU
Faculty of Business Administration and Economics

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

Problem-driven Scenario Generation for Stochastic Programming: Two Recent Approaches

By
Jamie Fairbrother

Date:	21.11.2024 (Thursday) at 12:00 pm
Location:	WIWI (SR 024) Zoom: https://uni-passau.zoom-x.de/j/8409950789
Link and further information:	Course 39740 Seminar: Doctoral Seminar "Recent Developments in Data Science" in Stud.IP

Abstract:

Stochastic programming is a tool for making decisions under uncertainty.
Under this paradigm, uncertain parameters are modelled as a random vector, and one attempts to minimize the expectation or risk measure of some cost function which depends on the initial decision. However, typically to solve a stochastic program the underlying random vector needs to be finite and discrete.

The construction of such a discrete random vector is called scenario generation, and the individual mass points are scenarios. Typically, the more scenarios one uses, the more accurate the representation of the uncertainty, but the more computationally expensive the resulting stochastic program becomes to solve. Scenario generation should therefore aim to represent uncertainty with as few scenarios as possible.

Traditionally scenario generation approaches were distribution-driven.
That is, they constructed scenarios in such a way to match some reference distribution without explicitly considering the underlying stochastic program. More recently problem-driven methods to scenario generation have been proposed which exploit problem structure to provide a more concise representation of uncertainty.

In this talk we present two recent problem-driven approaches to scenario generation. The first approach deals with general two-stage stochastic programs where one minimizes the expectation. The method aims to detect degeneracy in output distributions by analysing those belonging to a set of candidate solutions. Scenarios are then selected to preserve expectations in an as efficient a manner as possible. The approach is agnostic to problem and distribution type as it relies only on evaluating the cost function in different outcomes. The second method is for problems which involve minimizing tail risk measures such as conditional value-at-risk. For these problems we identify risk regions of distributions, which are the areas which determine the value of a tail risk measure. We then propose scenario generation approaches which prioritise the generation of scenarios in these areas.

Speaker:

Jamie Fairbrother

Dr Jamie Fairbrother is lecturer of operational research at Lancaster University. His research is primarily focused on optimization under uncertainty, and in particular scenario generation for stochastic programming. He has also worked on applications in logistics and telecommunications, and developed several software packages for his research and more broadly for statistics.