Disziplin: Operations

1. Language

English

2. Title

Choice-Based Optimization

3. Lecturers

Univ.-Prof. Dr. habil. Knut Haase (Universität Hamburg)

www.bwl.uni-hamburg.de/vw/personen/prof-knut-haase

Univ.-Prof. Dr. habil. Sven Müller (RWTH Aachen University)

https://www.business-school.rwth-aachen.de/dozierende/prof-dr-sven-mueller/

4. Date and Location

July 10–13, 2023,

SlowDown Travemünde

Priwallpromenade 20

23570 Lübeck-Travemünde

5. Course Description

5.1. Summary and study goals

Demand is an important quantity in many optimization problems such as revenue management and supply chain management. Demand usually depends on “supply” (price and availability of products, f. e.), which in turn is decided on in the optimization model. Hence, demand is endogenous to the optimization problem. Choice-based optimization (CBO) merges discrete choice models with math programs. Discrete choice models (DCM) have been applied by both practitioners and researchers for more than four decades in various fields. DCM describe the choice probabilities of individuals selecting an alternative from a set of available alternatives. CBO determines (i) the availability of the alternatives and/or (ii) the attributes of the alternatives, i.e., the decision variables determine the availability of alternatives and/or the shape of the attributes. We present CBO applications to location planning, supply chain management, assortment and revenue management.

5.2. Content

Students will learn how to develop and use predictive models (discrete choice models) in the software R and how to introduce such models in mathematical models for decision-making (i.e., mixed integer programs) to consider demand as an auxiliary variable. The models will be implemented in a modeling environment (GAMS). Case studies will be used for practicing purposes.

5.3. Course format

The course will be held in person. The lecturers will give presentations about the theoretical contents. Active participation is compulsory.

5.4. Schedule

Theoretical contents will be taught in the morning sessions. The interactive computer exercises will be done in the afternoon.

6. Course preparation and references

6.1. Requirements

Basic knowledge of Operations Research and Econometrics is required.

6.2. Compulsory reading

- Train, K. (2009): Discrete Choice Methods with Simulation. Cambridge. Chapters 1-9. https://eml.berkeley.edu/~train/distant.html
- Haase, K., Müller, S. (2014): A comparison of linear reformulations for multinomial logit choice probabilities in facility location models. European Journal of Operational Research 232(3), 689-691.

6.3. Additional reading

Participants will receive comprehensive course material before attending the course.

6.4. Course preparation

It is compulsory to study the course material and to do the reading. The documents will be provided. The attendees are expected to be basically familiar with GAMS: https://www.gams.com/latest/docs/UG_TutorialQuickstart.html and R http://www.r-tutor.com/r-introduction

Prior to the course students are expected to have downloaded and installed the following software:

R: https://cloud.r-project.org

R-studio: https://rstudio.com

GAMS: https://www.gams.com/download/

7. Administration

7.1. Participant limit

20 participants

7.2. Tasks

The lecturers will deliver information and tasks to be completed as preparatory work when providing the course material. Participants are required to familiarize themselves with the subject matters thoroughly.

7.3. Performance

Solving algebraic problems independently using GAMS, estimating demand models with the software R. The results must be submitted by July 31, 2021.

7.4. Credits

The course corresponds to a scope of 6 LP/ECTS if the participants complete the course successfully.

8. Working Hours

Working Hours	**Stunden**
Preparations	40 h
Active participation	32 h
Performance	108 h
SUMME	**180 h**