BAYESIAN BELIEF NETWORKS FOR INTEGRATED ECOLOGICAL MODELLING TO ASSESS COMMUNITIES AND ECOSYSTEM SERVICES

Lecturers:
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Brief description of the course content

The course aims at giving insights into the strengths and potential applications of BBN networks to model and analyze species distributions, communities as well as ecosystem services. The course is aimed at participants with basic ecological and modelling knowledge, but even participants with limited computer background should be able to follow. Every aspect of the hands-on exercises is learned from scratch, and no experience is needed with programming or particular software packages. Slides, texts and databases will be on-line disseminated at the start of the course.

Important is to bring a laptop, preferably will a loaded battery, on which the free version of Netica is installed. You can download this software for free at:
https://www.norsys.com/download.html . Versions are available for both Windows as Mac.

Schedule: 9h-10h30

The first part will consist of a short and practical introduction about the BBN techniques, as well as an overview of applications and main challenges.

- Introduction
- Some theoretical basics about BBN networks
- Educational examples
- Example applications
- Strengths, weaknesses and challenges of BBN networks

Schedule: 11h-12h30

In the second part, an introduction will be provided of the Netica software that will be used during the hands-on training part. This second part will consist of the introduction of the main features in the software, and in particular how a BBN model can be setup from scratch (introducing the variables and their linkages), and be linked to a database. Some short exercises will allow the participants to make themselves familiar with these functions. After that, also the model evaluation, sensitivity analyses and simulation options will be introduced. The morning session will end with the introduction of the exercises.

- Netica software: advantages and main features

- BBN network development: introducing variables, class allocations and relations, and linking a BBN network to a database
- Hands-on part to get familiar with the basic functions in the software
- Model evaluation, sensitivity analyses and making simulations: introduction and short hands-on exercises
- Introducing the exercises of the afternoon session

Lunch break: 12h30 – 13h30

Schedule: 13h30 – 15h

Exercises related to species distribution modelling and analysis will be provided in two parts: a first exercises will introduce the integration and use of a habitat suitability model, followed by a similar model making use of historical species distribution conditions. The third exercise will be related to implementing and using a BBN network model for water quality assessment, with some insight exercises.

- Exercise 1: HSM modelling
- Exercise 2: HSM modelling based on historical distributions
- Exercise 3: BBN models for water quality assessment

Schedule: 15h30 – 17h

The last part will consist of a fourth exercise where the participants are requested to develop a model from scratch related to ecosystem services trade-off modelling and application, based on a mixture of data and information. The main idea of this exercise is to train the participant for a real and practical situation, where many decisions need to be made about what variables to use, how to use and combine them, etc. The participants are free to use the provided case-study, or bring their own case and get support for that one on the potential approach to develop and use a BBN network model. At the end of this part, the participants can indicate how they experienced and solved the main problems along this development path.

- Exercise 4: from text and data to BBN model and its evaluation and use
- Feedback on exercise 4: plenary discussion
- Closing discussion and feedback