

DE0901 Bayesian Networks in the Context of Functional Safety

Unlock the Power of Bayesian Networks:

Dive deep into probabilistic modeling and inference with practical exercises designed to elevate your data-driven decision-making skills.

You will learn about:

- **Foundations of Bayesian Networks**

Understand the core concepts: probabilistic reasoning, conditional independence, and graphical representation of dependencies.

- **Modeling and Inference Techniques**

Learn how to construct Bayesian networks, perform parameter estimation, and apply inference algorithms for real-world decision-making.

- **Hands-On Implementation in Python**

Explore practical examples using common Open-Source libraries to build, visualize, and query Bayesian networks

Prerequisites:

- Ideally a STEM-Background (Bachelor/Master)
- Hands-On: Laptop with Python installation (details will be provided in advance of the training)
- Hands-On: Basic understanding and, ideally, previous exposure to data science and programming

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Who should attend?

- ◆ Data Scientists / Machine Learning Experts
- ◆ Automotive SOTIF responsible persons
- ◆ Functional Safety Engineers – who want to understand how they can model complex systems with uncertainty
- ◆ Technical Leads developing autonomous systems

Duration:

2 days (or in-house, jointly agreed, please contact us for more information)

Language:

Depending on the participants the training will be given in German or English. The training material will be in English

Location:

exida.com GmbH office
Prof.-Messerschmitt-Str. 1
85579 Neubiberg / Germany or online

Certificate:

Each participant gets a letter of attendance.

For more information, please contact:

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Agenda and Content

- ◆ Mathematical background on probabilistic graphical modelling
- ◆ Fundamental concepts of Bayesian Networks (BNs)
- ◆ Strategies for developing and using them
- ◆ Practical Examples
- ◆ Connections to Functional Safety
- ◆ Application of BNs for quantitative risk assessment

Module 1 (1,5 days):

You will learn when and why probabilistic graphical models are used in practice. We will establish a robust foundation based on fundamental principles such as directed acyclic graphs, their relationship with conditional independence, and the integration of data with domain expertise.

Throughout this training, you will learn to develop effective strategies for building Bayesian networks from scratch. You will also learn how to identify variables and understand what matters in practice.

Building on this theoretical foundation, we will discuss the connection to functional safety and how Bayesian networks and other probabilistic frameworks can be used to drive quantitative inference.

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Module 2 (0,5 day) (Hands-on + advanced topics):

This module consists of an interactive session where you will implement Bayesian Networks yourself. The running example will be in the automotive context using real-world data. You will learn how to use data, what pitfalls await, and how to effectively tackle typical problems in your own projects.

Additionally, you will learn about some advanced modeling strategies, established libraries, and their application in practice.

