INACON GmbH

AI, ML & Deep Learning
in the Evolution of 5G & 6G

Duration: 1 full day or 2 x ½ day (6 hours)

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Chapter 0: Before we start...

- **De-Mystification:** $y = f(x)$ and how it relates to AI

- **Asking Chat-GPT a few questions** / (1) tell me a joke, (2) what can AI do for cellular radio?

- **Some Look at LLMs:** Large Language Models and their use cases

- **Types & 1st rough Classification of Neural Networks:** Types of Artifial Intelligence, History & Future

Chapter 1: Back to the Roots: AI Basics

- **Basic Termology** or: What everybody already knows :-)

- **Perceptron, Neuron & Activation Function** / operation principles, inputs/features, weights, activation function with examples (sigmoid, binary step, tanh, ReLU)

- **Life Cycle of any AI-model**

- **Classification of Neural Networks...**

    ...by Architecture

  ...by Types of Learning

Chapter 2: Hands in the Mud: Handwriting Recognition

- **Overview & Task Description**

- **Presentation of our Neural Network**

- **A Look at the Command Line**

- **Training & Test Error Results**

Chapter 3: In Medias Res I => AI in 3GPP Cellular

- **Collaboration Levels on the Radio Interface as defined by 3GPP**

- **AI Lifecycle Management according to 3GPP (NG-RAN)**

- **3GPP Work Items Part 1: AI in NG-RAN**

- **3GPP Work Items Part 2: AI on NR-Radio Interface**

- **Overview: AI-related study/work items in 3GPP Rel 18 & 19**

- **Detailed Look at CSI Feedback Enhancement**

  - Overview of CSI Operation
  - CSI Feedback Compression

- **Detailed Look at Positioning Enhancement**

Chapter 4: In Media Res II => AI beyond 3GPP Cellular

- **AI in Open RAN**

- **AI-based non-linearity compensator for UE PA**

- **6G: Neuronal Receivers for an AI-native Radio Interface**