AI ADVANCED

Background knowledge in informatics or mathematics is required.
Target group: MINT teachers and secondary school students (e.g. technical high school) with some background and a lot of interest in the field but also apprentice and re-train people who are already in daily business.
The objective is to create elite, highly educated graduates in this subject. The goal is to enable people to understand technology and implement applications.

The graduate of the AI Advanced training…

1. Is familiar with different AI areas and frameworks and is aware of ethical, social and legal implications of AI systems.

   - I can understand technical, social, economic ethical and legal implications of the application of AI on a broader basis.
     - Ethics and technological impact and risk assessment,

   - I am able to describe the different AI areas and their fundamental challenges and questions behind.
     - Natural Language Processing – the ability of computers to communicate with people in natural language.
       - Speech/voice recognition and natural language processing: how to process speech (auditory input) and language
     - Computer Vision: how to process visual input; the analyzing of images to find features of the images; object recognition
     - Machine Learning
     - Big Data
     - Knowledge based systems – Systems that contain a ‘database’ of knowledge and can help in finding information, making decisions and planning.
       - Knowledge Representation and Reasoning: how to represent the world and reason about it efficiently
     - Planning
     - Common sense knowledge

   - I am aware of the most common frameworks in those AI areas

2. Masters the required mathematical basics and is able to understand and describe basic AI concepts.

   - I am aware of the fundamental mathematical concepts and I am able to solve specific tasks by using those concepts.
     - Probability/statistics (Bayesian network/graphical model, neural nets)
     - Calculus (derivatives for gradients)
     - Basic Algorithms (complexity comparison)
     - Logic (both first order and propositional)
     - Computer science (relations, programming, databases, etc.)
- Study of algorithms (completeness, optimality, etc.)
- Discrete mathematics
- Linear algebra (vector, matrices, multidimensional spaces, solving equations, etc.): e.g. for supervised/unsupervised learning, …

- I can describe the basic AI concepts and I am able to solve certain tasks by using those concepts.
  - problem solving by search (discrete mathematics, completeness, optimality, …)
  - logic and reasoning (logic)
  - data driven (statistic)
  - artificial neural networks

3. Is able to describe problems, which require an AI-related solution, in a formal way, and furthermore, is able to efficiently solve those problems by applying adequate algorithms.

- I am able to analyze and understand a problem.
- I am able to select appropriate representations for the problem.
- I am able to use this representation to represent the problem.
- I can solve the problem by applying an adequate algorithm.

4. Knows the fundamental properties of problems, representations and algorithms.

- I know the fundamental properties of representations and algorithms.
  - runtime, memory, completeness, correctness
- I can derive the properties of a given problem.
  - complexity, predictability

5. Is able to analyze, configure, maintain and integrate an existing AI tool and is able to systematically design and practically implement an AI system for a given application.

- I can understand and apply AI tools which already exist.
  - e.g. applying AI libraries, frameworks, combining technologies,…
- I can extend already existing tools
  - e.g. road traffic regulation for autonomous cars