

Advanced Introduction to C++ Scientific Computing and Machine Learning

Claudius Gros
Institute for Theoretical Physics, Goethe University Frankfurt, Germany
summer term 2024

Preliminary Content

Linux - Basics

- C++ A First Glance
- C++ Data Types
- C++ Pointers & Memory
- C++ Control Flow
- C++ Functions & Templates

- NM Summation, Recursion and Stability
- C++ Object-Oriented Programming (OOP)
- C++ Streams & Files
- NM Numerical Integration of Differential Equations
- NM Numerical Evaluation of Integrals
- C++ Containers & Utilities
- NM Elimination
- NM Finding Eigenvalues
- C++ Processes, Threads & Plotting
- NM Monte Carlo & Metropolis Sampling

- ML Machine Learning - Linear Classifier
- ML Support Vector Machines - Basics
- ML SVM - Soft Margins & Kernel Trick
- ML Decision Trees
- ML Neural Networks
- ML Boltzmann Machines
- ML Deep Learning
- ML Generative Architectures