ScimBa Feel++

CSMI1

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Introduction

This project aims for the coupling of ScimBa and Feel++. This involves integrating the capabilities of both tools.
This integration would allow users to leverage the advanced features of each of these libraries and use them synergistically to solve complex problems.

ScimBa

gathers tools for scientific machine learning, mainly focusing on solving partial differential equations (PDEs) and related tasks in scientific computing.

- ScimBa blends machine learning with scientific computing.
- ScimBa offers PDE solvers as a core feature.

Feel++

is a C++ implementation that combines Galerkin methods, including finite element and spectral element methods, to tackle partial differential equations across 1D, 2D, and 3D domains.

- Feel++ includes toolboxes for solving physics-based problems like fluid mechanics, solid mechanics, and heat transfer.
- provides a Python interface (pyFeel++) for manipulating mathematical objects and solving PDEs with Python.

Coupling

Tight Coupling

Modules are highly dependent on each other. Changes in one module often require corresponding changes in other modules.

Loose Coupling

Modules are relatively independent and have minimal dependencies on each other.

Starting Points

Objective:

- Analyze ScimBa and Feel++ functions to find integration points.
- Use Feel++ for simulations and scientific computing to create diverse datasets.
- Establish clear interface and protocols for seamless communication between libraries.

References

- Feel++ Documentation
- ScimBa Documentation
- Coupling