Digital Twin for the Azores Free Technological Zone (DATAz)

Project Proposal – Bernardo Chagas, 103639

Context

This project is part of my master's thesis, carried out within the Digital Twin for the Azores Free Technological Zone (DATAz) initiative. The overarching objective is the development of a Digital Twin of the Ocean (DTO). Given the scale of this endeavor, the work has been divided into three main tasks:

- Infrastructure and Data Preparation
- Digital Twin Development
- Testing, Validation & Operationalization

Objectives

At this early stage, I do not yet have access to the project data. However, it is expected that I will receive the necessary resources and define my main research focus in the coming week.

My anticipated contribution is the research and development of data-driven models that can be integrated with Computational Fluid Dynamics (CFD) simulations. The goal is to reduce the computational cost of these simulations by leveraging efficient surrogate modeling techniques.

Approach

Data Preparation – Since the performance of data-driven models depends heavily on data quality, part of the work will involve understanding, preprocessing, and adapting the datasets.

Model Development – I will explore AI and machine learning approaches to complement CFD simulations, with the aim of better analyzing, defining, and refining suitable methods as the project evolves.

Integration & Validation – The developed models will be tested and validated as components of the DTO framework.

Supervisors: Prof. João Sousa e Prof. Miguel Martins