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I am currently working as an engineer on the Défi Project, which focuses on developing innovative methods for detecting and analyzing sediment transport in river systems, with an emphasis on gravel bars in alpine rivers. My role centers on leveraging software development and computational techniques to advance sediment detection and modeling capabilities.

Through my role, I contribute to INRAE's mission of advancing sustainable riverine management by delivering scalable, efficient, and scientifically robust software solutions tailored to environmental challenges.

My Contributions:

Algorithm Development:
Designing and implementing algorithms for sediment detection and classification using image processing and machine learning techniques. These solutions enable high-precision identification and analysis of sediment dynamics.

Data Processing Pipelines:
Developing robust and efficient data pipelines to handle large datasets from field investigations, including high-resolution imagery and hydrological measurements. These pipelines ensure seamless data preprocessing, feature extraction, and model training.

Software Tools and Automation:
Building custom software tools to automate sediment analysis workflows. This includes developing user-friendly interfaces and APIs to streamline data visualization, parameter adjustments, and result generation for interdisciplinary teams.

Numerical Simulations and Modeling:
Implementing and optimizing numerical models to simulate sediment transport processes. These models integrate geospatial and hydrodynamic data to predict sediment behavior under various hydrological scenarios.

Collaborative Development:
Utilizing version control systems and collaborative coding practices to maintain and enhance the project's software repository. Ensuring code quality through unit testing, documentation, and performance optimizations.

Technologies and Tools:
Programming Languages: Python, MATLAB, JavaScript.
Data Processing and Analysis: NumPy, SciPy, Pandas, OpenCV.
Geospatial Analysis: GDAL, QGIS, and custom geospatial libraries.
Modeling Frameworks: Hydrodynamic and sediment transport models integrated with custom computational tools.

For more details on the Défi Project, visit: [Défi Project GitLab](#)