APPy, Petrophysics Evaluation Software in Python: Current status and Next Features

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Introduction.

APPy is a modern software solution for petrophysical evaluation, developed since 2018 to meet the evolving demands of geoscience and energy industries. Designed to well log data interpretation and management, APPy distinguishes itself through a transparent, modular architecture that prioritizes flexibility and scientific integrity. It enables users to engage directly with the mathematical underpinnings of petrophysical analysis via Stoneforge, an open-source Python module integrated within the platform. As subsurface data continues to increase in volume and complexity, APPy provides a robust environment for both academic researchers and industry professionals seeking to derive reliable geological insights from well logs and seismic data.

Method and/or Theory

APPy leverages a microservice-based client-server architecture to deliver a scalable and maintainable ecosystem for subsurface data processing. Each functional unit, referred to as an "APPy command," operates as an independent microservice. These services are hosted on a Python-powered backend, while the user interface is built using JavaScript. The core computational engine is the Stoneforge Python library, which provides well-documented functions for calculating key reservoir petrophysical parameters such as shale volume, porosity, and water saturation, enabling the identification of productive zones through metrics like net pay and reserves. APPy also includes a rock physics module for seismic interpretation, offering tools such as fluid substitution modeling and granular media simulations. Machine learning methods support classification and regression to estimate lithologies or facies, enhancing geological interpretation. The software is being refactored to use HDF5 exclusively for data handling, improving performance and compatibility, and a new command-line interface is in development to support programmatic workflows.

Results and Conclusions

Since its inception, APPy has matured into a versatile tool for subsurface evaluation, supporting a range of petrophysical and geological analyses. Its modular design allows continuous evolution, while open-source principles promote transparency and community engagement. Ongoing developments include DLIS import, merging of discontinuous logs, and new image and matrix processing tools to improve data quality and analysis. APPy continues to evolve through both technical improvements and collaborative initiatives. This presentation will highlight its current status, key features, and ways contributors can engage with or access the software.