

# Machine Learning-Augmented Well Log Data Processing to Predict and Generate Missing Sonic DT Log Values Using Available Well Log Data

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## Background

In the upstream oil and gas industry, well log data (open-hole, cased-hole and production logs) plays a crucial role in petrophysical analysis, reservoir characterization, well placement & drilling optimization and production optimization. However, it is not uncommon for certain well log measurements, such as sonic DT, to be missing or incomplete due to factors like measurement challenges, wireline tool malfunctions, or environmental conditions.

Predicting missing sonic DT values can be a valuable tool for downstream analyses, including porosity estimation, lithology classification and time-depth conversion.

By applying the supervised learning technique of Random Forest Regression to a dataset from nearby or offset wells where both sonic and other well log measurements e.g. gamma ray, resistivity, and density are available, we can predict and generate the missing sonic DT values.

Please note that this ML-Augmented method can complement existing petrophysical analysis and specialized software-based modeling by offering a more automated, scalable solution for missing data imputation, which can be validated and integrated into broader geological models.

To see how this technique works in practice, feel free to explore my sample generate\_SonicDT\_log\_x-val script on GitHub  <https://lnkd.in/d2XqjXGv>

The script is freely available under the MIT license. Let's improve the reliability of well logging data together!

## How to Use the generate\_SonicDT\_log\_x-val Script & Requirements

### 1. Download the Script

Get the script from GitHub: <https://lnkd.in/d2XqjXGv>.

### 2. Install Dependencies

The script requires Python's Scikit-learn library to perform Random Forest Regression, a supervised learning technique.

If you don't have Scikit-learn installed, you can install it with the following command:

- Using pip:

```
pip install -U scikit-learn
```

- Or using conda:

```
conda install -c conda-forge scikit-learn
```

### 3. **Run the Script**

In a Python-enabled terminal, execute the script with the following command:

```
python generate_SonicDT_log_x-val.py
```

(Note: the script will generate a file named: well\_log\_data\_WELL\_2\_SonicDT\_added.csv)

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