Machine Learning Applications for Well Data Prediction/Quality-Control

RCP RESERVOIR CHARACTERIZATION PROJECT
COLORADO SCHOOL OF MINES
Harrison Schumann

Objective

- Evaluate ML prediction ability for various feature/label combinations in well data
- Determine relationships within data
- Assess the performance of different ML models
- Compare ML to other methods
- Automate well log prediction/QC

Data

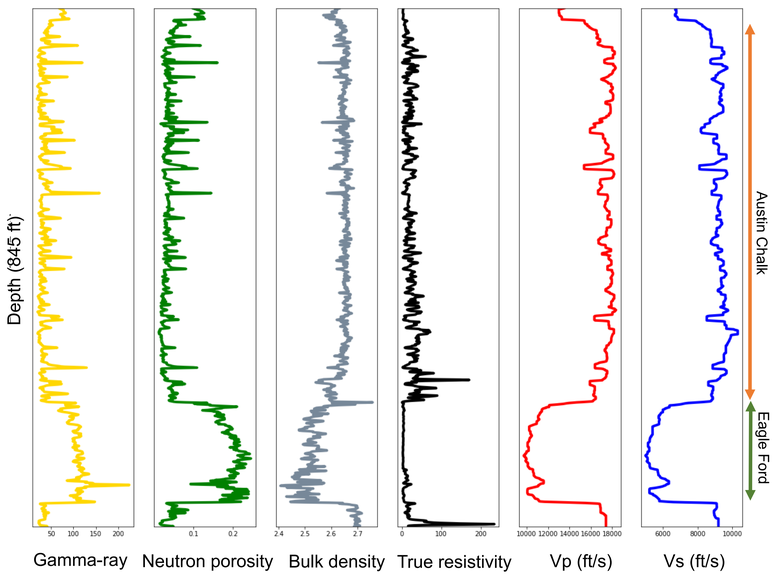


Figure 1. Well logs and seismic velocities from the Austin Chalk and Eagle Ford formations. We used the four well logs (our features) to assess the abilities for ML to predict P- and S-wave velocities (our targets).

Preliminary Results

Austin Chalk and Eagle Ford

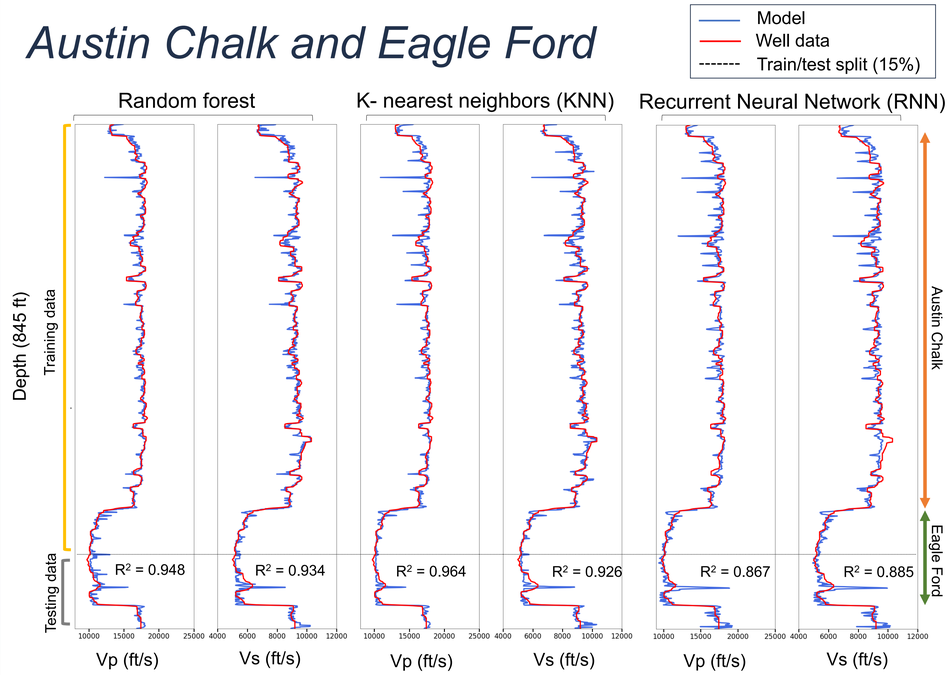


Figure 2. P- and S-wave velocities predicted by several ML models using only the four well logs shown in Figure 1.

Eagle Ford Comparison

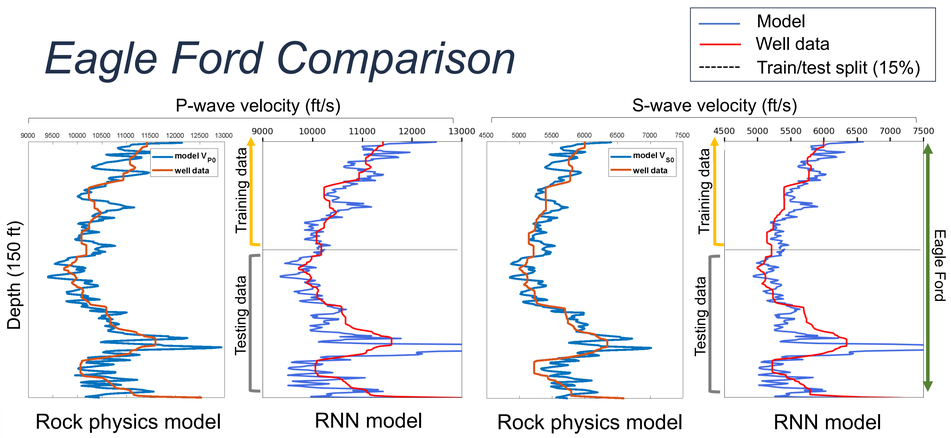
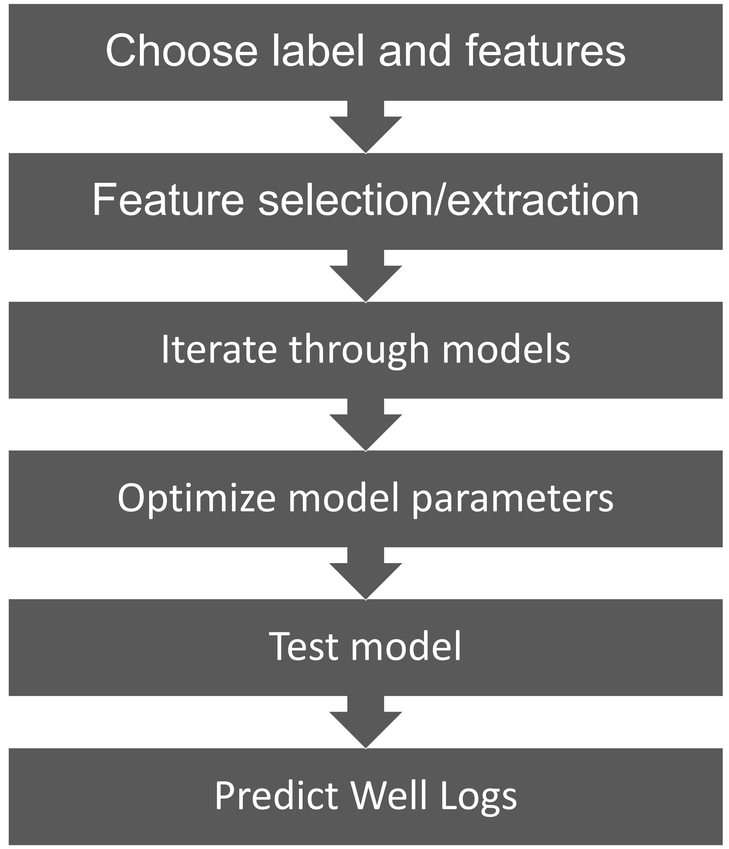


Figure 3. Comparison between a rock physics model (Durmus, 2019) and the RNN model (shown in Figure 2) on the Eagle Ford section only. The rock physics model is calculated from mineralogy, kerogen, water saturation, and porosity data.

Proposed Workflow



Future Work

- Evaluate performance of other ML models
- Apply method to other datasets (Chalk Bluff)
- Use ML to understand relationships in well data
- Develop proposed workflow for automated well log prediction/QC