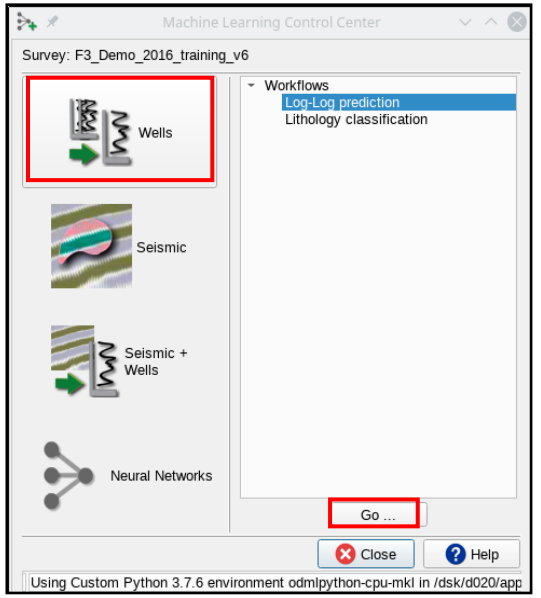
Exercise objective:

We can predict missing logs using the log-log prediction tool, which is part of the machine learning plugin. In this exercise, we want to predict the Density log.

Well data Preparation
Well(s) used as input data need to be available in the survey. If they are not: **import** wells (track, logs, markers, optionally time-depth curve or checkshot).

Workflow:

1. **Open** the Machine Learning Control Center with the  icon.
2. **Click** on Wells.
3. **Select** Log-Log prediction, and **Hit** Go.



Workflow cont'd:

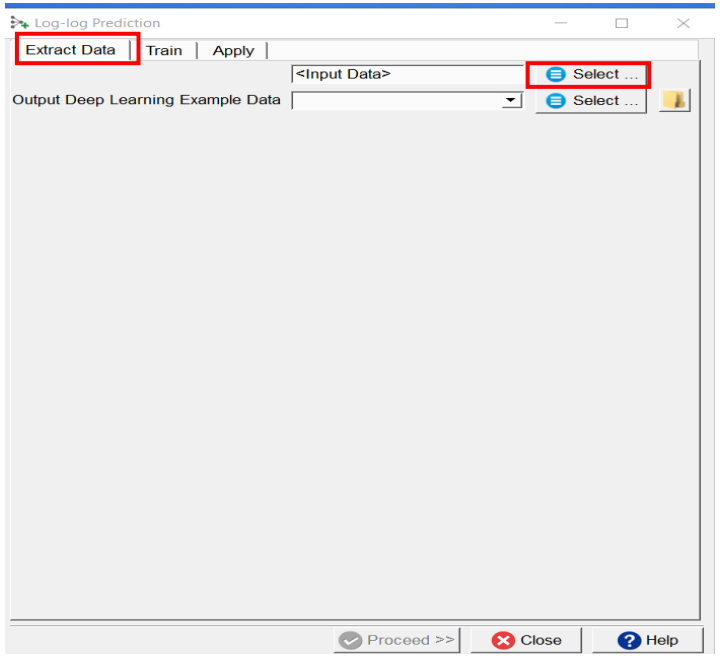
In the **Extract** Data tab

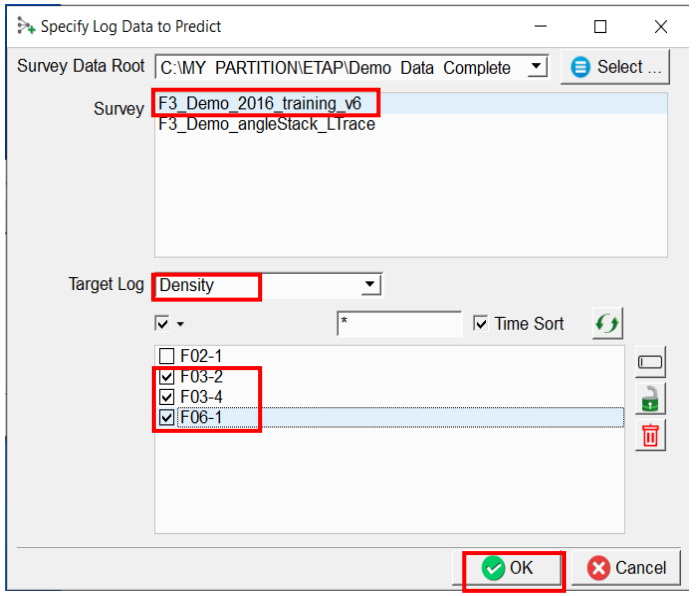
4. **Press** Select - <Input Data>

5. In the *"Specify Log Data to predict" window* that then pops up, **Select** the *Survey* of interest, *Target Log (e.g. Density)*, and the *Wells that will be used for the data extraction.*

6. **Press** OK.

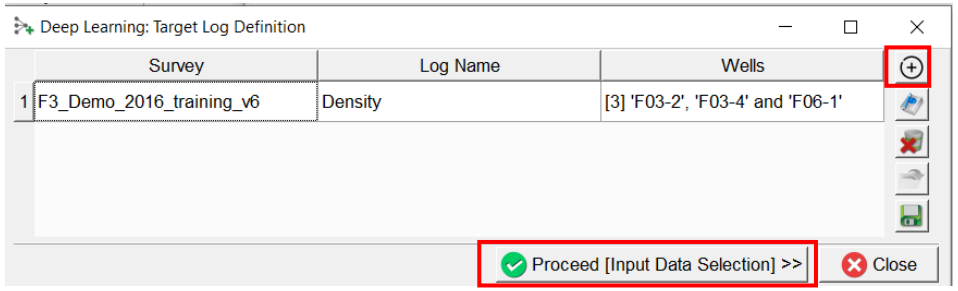
The well F02-1 is not selected, and will be used as a blind well.





Workflow cont'd:

7. The "Deep Learning: Target Log definition'' window pops up next.



New data from different survey can be added by clicking on icon. ⊕

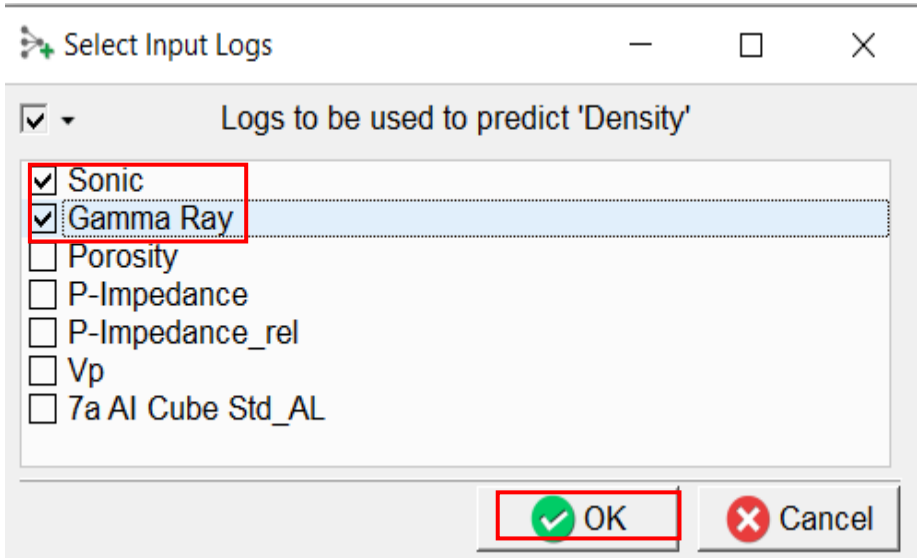
Once we are satisfied that we have enough data for training,

8. **Press** Proceed [Input Data Selection].

At this point we select the logs that we will use to predict the Density log.

9. In the ''Select Input Logs'' window, **Select** logs that will be used to predict 'Density' log (e.g. *Sonic and Gamma Ray).*

10. **Press** OK.



Workflow cont'd:

11. *"Input Log Selection"* window pops up.

Input Logs can be modified in here. Keep the default parameters as indicated in this window.

12. **Type** a new name for the *Output Deep Learning Example Data (e.g. DL_Example_Data_Density_st10).*

13. **Press** Proceed.

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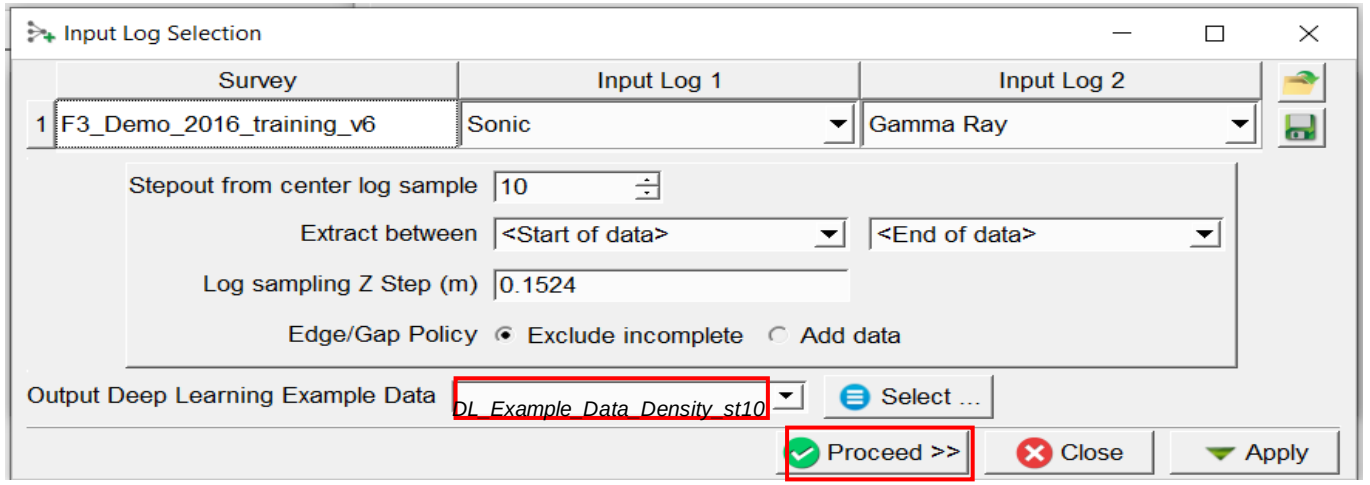


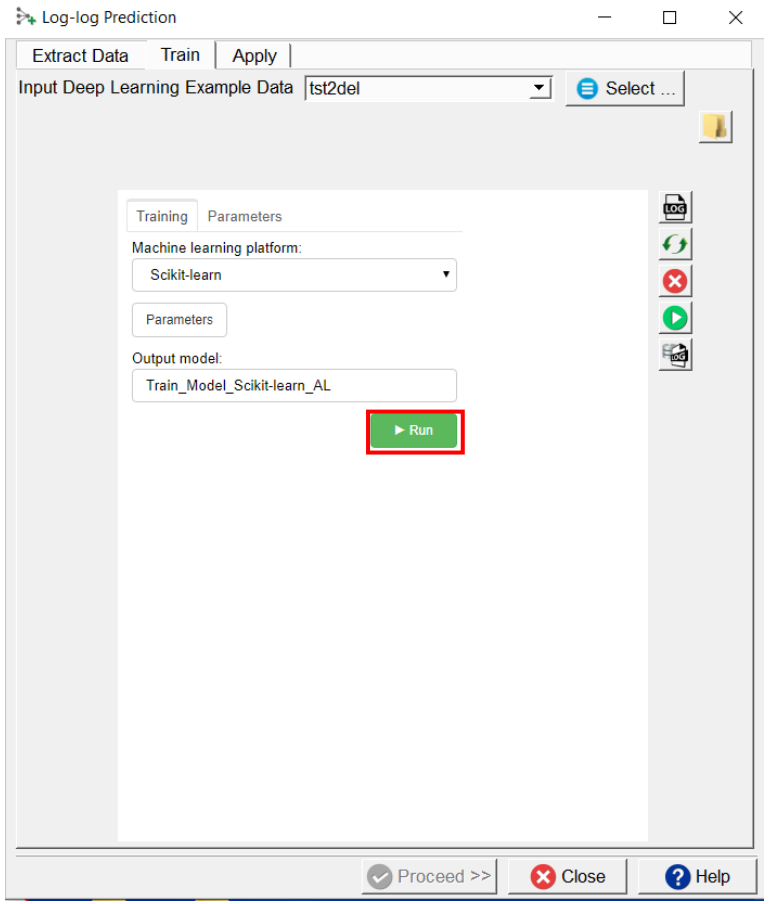
Workflow cont'd:

14. The *Train* tab get activated. Train the extracted examples data using suitable learning algorithm. **Select** Scikit-learn / Random forests.

Different machine learning platforms and parameters can be tested. Keep the defaults parameters.

15. **Specify** a new *Output mode*l name (e.g. Train_Model_scikitLearn_RandomForest).

16. **Press** Run.

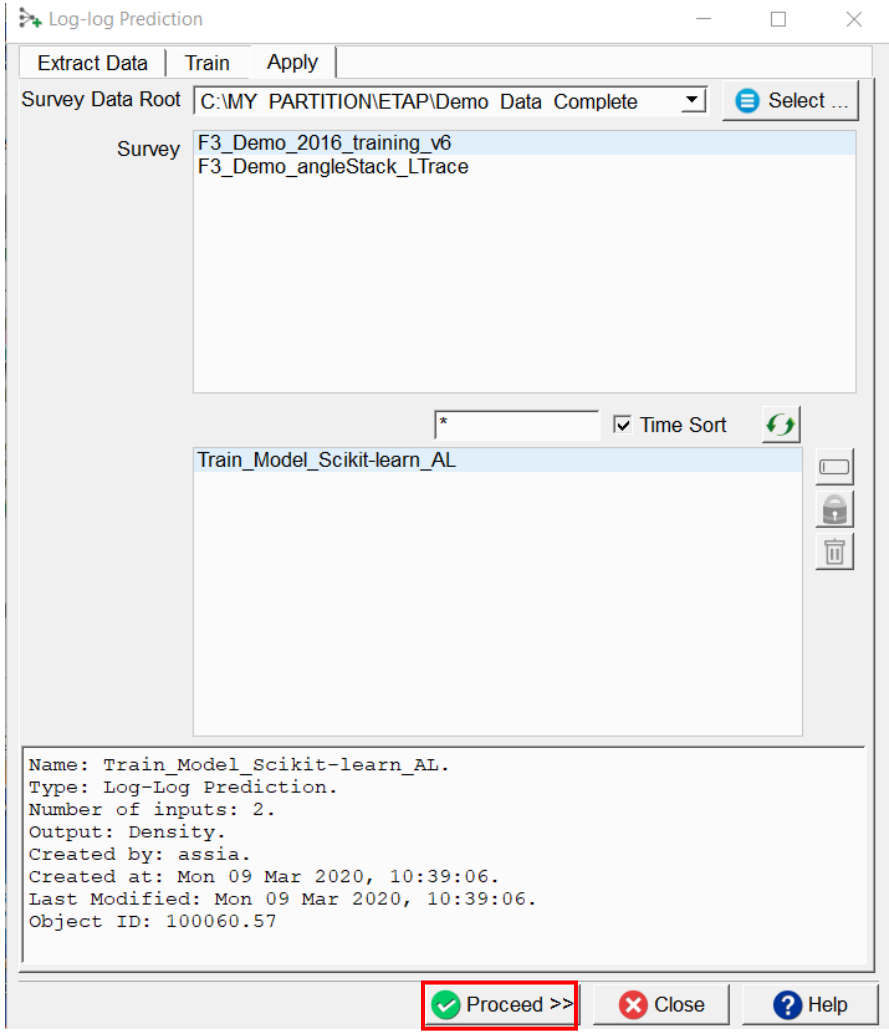


Workflow cont'd:

17. **Select** the "Apply'' tab
    Check all the selected default parameters are Ok.

The Survey and Training model can be modified in here.

18. **Press** Proceed.



Workflow cont'd:

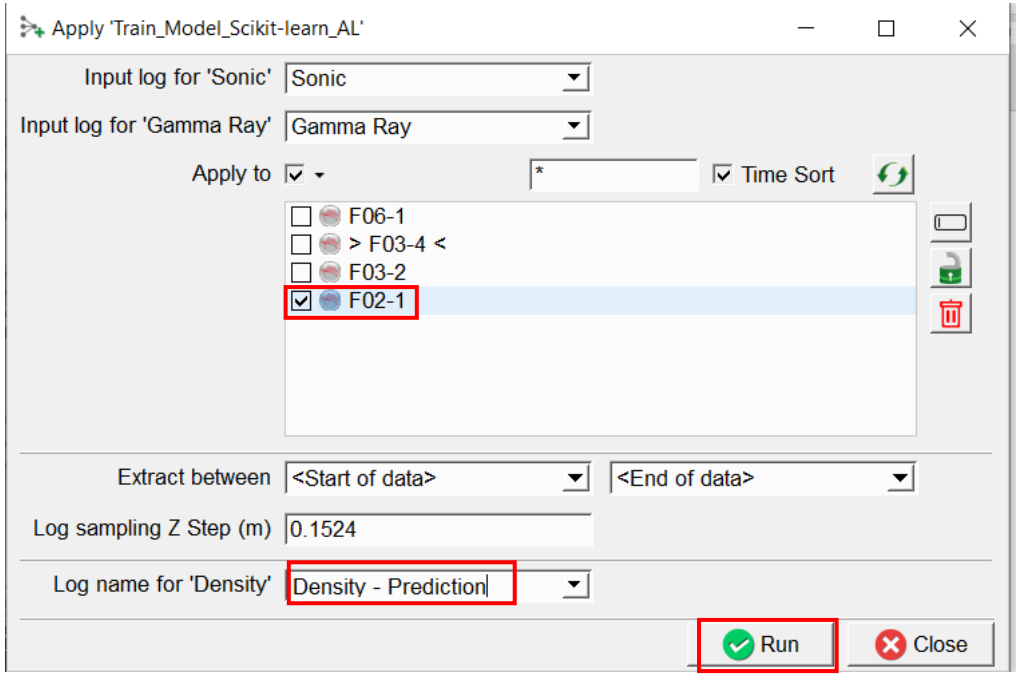
19. The "Apply" training model' window pops up.

In this window we will select a log (or logs) on which we will apply the trained model and predict the target log.

20. Apply the trained model to a blind well. **Select** F02-1.

21. **Type** a new name for the predicted log (e.g. Density_Predicted).

22. Keep default parameters and **Press** Run to continue.



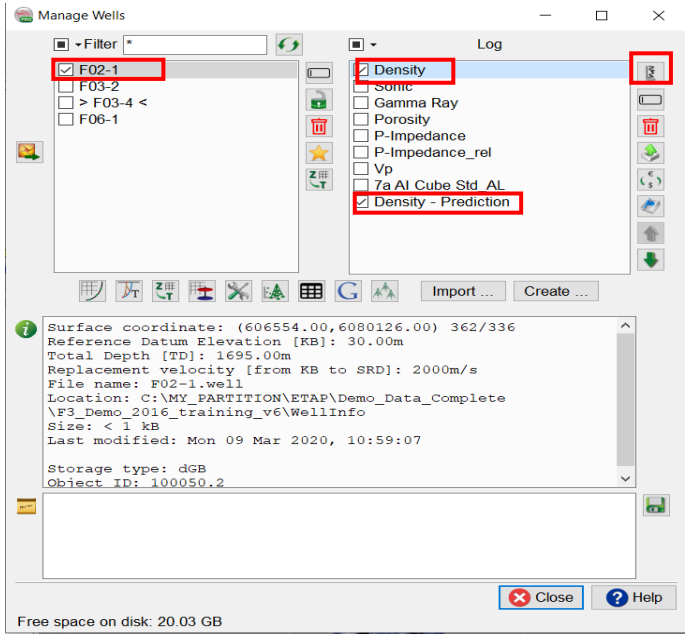
Workflow cont'd:

We can QC prediction results by displaying the predicted log adjacent to the recorded input log:

23. **Click** on the Well Manager icor .

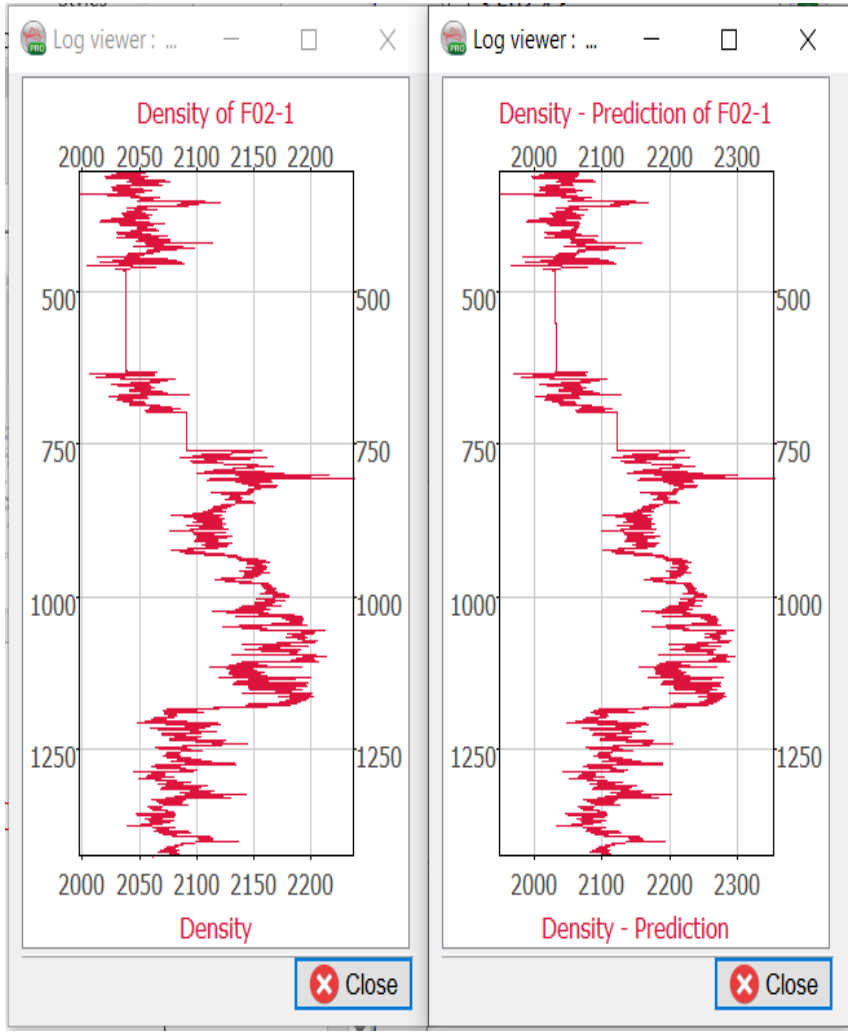
24. **Select** the well ''F02-1'' and the logs ''Density'' and ''Density-Predicted''.

25. **Click** on view logs icor .



Density

Density-Predicted



Workflow cont'd:

If the results are satisfactory, go back to the ''Apply training'' window, and apply the trained model to all the wells where you want to predict density log.

27. **Select** all wells.

28. **Type** a new name (e.g. Density_ Predicted). Keep default parameters and **Press** Run to continue.