

What is *Esteem*?

Esteem is a module to the Windows® based *LESA* software that allows the user to generate data, or produce pseudo data from known good data. Using the *Esteem* module, you can select multiple input curves from one or more wells to be used to predict the values of one or more output curves.

Using a neural network type approach, the input values of a “training set” are used to predict the values of the output curves within the “training set”. Once the neural network has completed training, the results can be applied to other wells with similar input curves to predict the desired outputs. The technique may be used, for example, to predict sonic curves from other logs, such as the GR, Resistivity and Density logs. *Esteem* may also be used for rock typing. The presentation of resultant rock types on application allows quick identification of new rock types that were not provided to the training set.

There are several parameters the user may define when setting up the training, including the number of iterations the net will run and the number of neurons in each layer of the net. You also have the ability to specify a random cross validation set, which will prevent *Esteem* from over-training itself. Over-training occurs when the neural net begins to break down and the results actually diverge from the desired output curves. This random set allows the net to learn information across the entire data set, not just selected points.

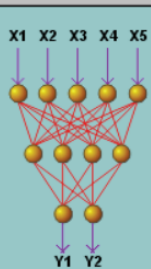
Esteem also offers the capability to train multiple neural networks simultaneously in what is called a “committee”. Each committee will use a different random set of cross validation points. When applying the net to a data set, the results at each datum from each net in the committee are averaged and used as the result. This gives a more “reasonable” and reproducible answer and a more stable neural network.

If you wish, you can set up multiple cases for the training. The user can set up different cases to remove one of the input curves, change the number in a committee, change the number of iterations the net runs or change the amount of data in the cross validation set. You can then run all the cases and compare the results; this gives you a chance to learn the effect of different options or inputs and to perform sensitivity analysis within *Esteem*. Any or all resultant networks can be saved for future use. The comparisons can help you understand how your input curves might affect the generated output.

How to Order *Esteem*

Esteem is sold as an add-on to *LESA*. If you do not already own *LESA*, you will need to purchase it prior to being able to run *Esteem*. Multiple copy discounts and network licenses are available – Please contact either Digital Formation your local reseller for details – Digital Formation may be reached at 888-747-5372 (US & Canada), or 303-770-4235.

Esteem Training : Setup the Cases



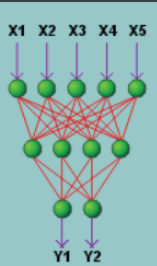
You may now setup multiple cases if you wish.
 This is useful for determining how different options affect the n training, and can be used to understand the ramifications of th to perform sensitivity analysis.

Setup multiple cases to learn the effects of the different options, or to perform sensitivity analysis.

| | Case #1 |
|---------------------|---|
| Mtbr8.las Well | <input checked="" type="checkbox"/> Mtbr8.las |
| GR Input | <input checked="" type="checkbox"/> GR |
| RILD Input | <input checked="" type="checkbox"/> RILD |
| RHOB Input | <input checked="" type="checkbox"/> RHOB |
| DT Output | <input checked="" type="checkbox"/> DT |
| # in Committee | 3 |
| % in Validation Set | 0.00 |
| # of Ep | |
| # in Hidder | |
| # in Hidder | |
| # in Hidder | |

Train the network with data from multiple wells, or apply a network to multiple wells in batch.

Esteem Application : Select the Wells

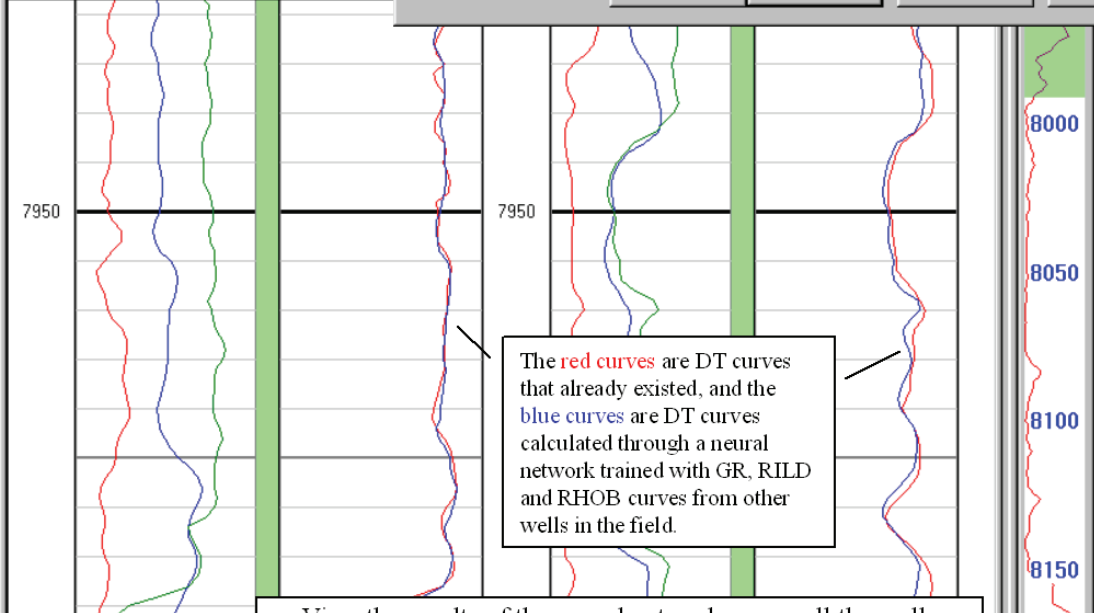


Select the wells to apply this neural network to.
 When applying multiple wells, each well must have similar curves for the inputs. The exact curve names do not need to match, but you will have to verify the proper curves are selected.

- Edn45.las
- Mtbr8.las

Data Editing - [Mtbr8.las]

| Key Values | Mtbr8.las | Mtbr8.las |
|------------|-----------|-----------|
| | GR | DT |
| 0 | GAPI 200 | 140 US/ |
| | RILD | Case #1 |
| 0.2 | OHMM 2000 | 140 US/ |
| | RHOB | |
| 2 | G/C3 3 | |



The red curves are DT curves that already existed, and the blue curves are DT curves calculated through a neural network trained with GR, RILD and RHOB curves from other wells in the field.

View the results of the neural network across all the wells selected, and for all the cases established, in a single view.

Mtbr8.las Edn45.las