`NETWORK`: Opens the network setup panel. This panel allows the specification of several options to control the way the network is printed.

The variables that can be set here include:

1. **x-min**, **y-min**, **x-max** and **y-max** describe the section to be printed.
2. **Unit size**: `FIXED`: All units have the same size.
   `VALUE`: The size of a unit depends on its value.
3. **Shape**: Sets the shape of the units.
4. **Text**: `SOLID`: The box around text overwrites the background color and the links.
   `TRANSPARENT`: No box around the text.
5. **Border**: A border is drawn around the network, if set to 'ON'.
6. **Color**: If set, the value is printed color coded.
7. **Fill Intens**: The fill intensity for units on monochrome printers.
8. **Display**: Selects the display to be printed.

4.3.10 Help Windows

An arbitrary number of help windows may be opened, each displaying a different part of the text. For a display of context sensitive help about the editor commands, the mouse must be in a display and the key `h` must be pressed. Then the last open help window appears with a short description.

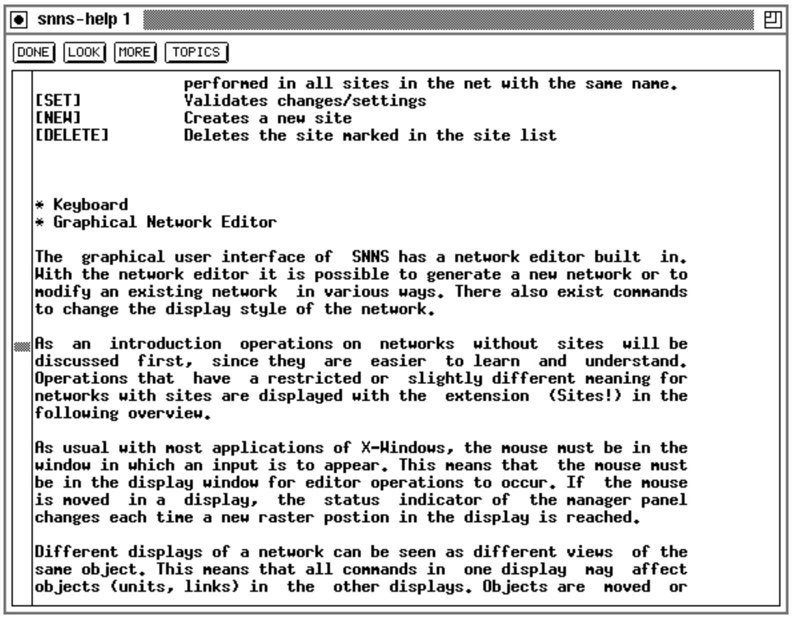

Figure 4.20: Help Window

A special feature is the possibility of searching a given string in the help text. For this, the search string is selected in the text window (e.g. by a double click).

1. LOOK: After clicking this button, SNNS looks for the first appearance of the marked string, starting at the beginning of the help document. If the string is found, the corresponding paragraph is displayed.
2. MORE: After clicking this button, SNNS looks for the first appearance of the marked string, starting at the position last visited by a call to the help function. If the text was scrolled afterwards, this position might not be on the display anymore.

Note: All help calls look for the first appearance of a certain string. These strings start with the sequence ASTERISK-BLANK (`* `), to assure the discovery of the appropriate text position. With this knowledge it is easy to modify the file `help.hdoc` to adapt it to special demands, like storing information about unit types or patterns. The best approach would be to list all relevant keywords at the end of the file under the headline "`* TOPICS`", so that the user can select this directory by a click to TOPICS.

4.3.11 Shell window

The window of the shell from which SNNS is invoked is used for the output of protocol messages.

These protocols include:

- Messages about the success or failure of the loading or saving of a file.
- Information about the settings of SNNS when the INFO button in the control panel is pressed.
- Error messages of the pattern file parser when the pattern file does not correspond to the required grammar.
- Learning error values (see below)
- Validation set error values

When learning is started, the error of the output units is reported on this window after each epoch, i.e. after the presentation of all patterns.

To save the window from being flooded on longer training runs, the maximum number of reported errors is limited to 10. Therefore, when 20 learning cycles are specified, the error gets printed only after every other cycle. This error report has the following form:

```
Learning all patterns:
  epochs   : 100
  parameter:  0.80000
  #o-units : 26
  #patterns: 26

   epoch:        SSE           MSE           SSE/o-units
```

```
Train  100:      57.78724       2.22259          2.22259
Train   90:      24.67467       0.94903          0.94903
Train   80:      23.73399       0.91285          0.91285
Train   70:      22.40005       0.86154          0.86154
Train   60:      20.42843       0.78571          0.78571
Train   50:      18.30172       0.70391          0.70391
Test    50:      25.34673       0.97487          0.97487
Train   40:      16.57888       0.63765          0.63765
Train   30:      14.84296       0.57088          0.57088
Train   20:      12.97301       0.49896          0.49896
Train   10:      11.22209       0.43162          0.43162
Train    1:      10.03500       0.38596          0.38596
Test     1:      11.13500       0.42696          0.42696
```

The first line reports whether all or only a single pattern is trained. The next lines give the number of specified cycles and the given learning parameters, followed by a brief setup description.

Then the 10-row-table of the learning progress is given. If validation is turned on this table is intermixed with the output of the validation. The first column specifies whether the displayed error is computed on the training or validation pattern set, "Test" is printed for the latter case. The second column gives the number of epochs still to be processed. The third column is the Sum Squared Error (SSE) of the learning function. It is computed with the following formula:

$$SSE = \sum_{p \in patterns} \sum_{j \in output} (t_{pj} - o_{pj})^2$$

where t_{pj} is the teaching output (desired output) of output neuron j on pattern p and o_{pj} is the actual output. The forth column is the Mean Squared Error (MSE), which is the SSE divided by the number of patterns. The fifth value finally gives the SSE divided by the number of output units.

The second and third values are equal if there are as many patterns as there are output units (e.g. the letters network), the first and third values are identical, if the network has only one output unit (e.g. the xor network).

If the training of the network is interrupted by pressing the $\boxed{\text{STOP}}$ button in the control panel, the values for the last completed training cycle are reported.

4.3.12 Confirmer

The confirmer is a window where the graphical user interface displays important information or requires the user to confirm destructive operations. The confirmer always appears in the middle of the screen and blocks XGUI until a button of the confirmer is clicked (see figure 4.21).