

QView

Version 1

User Manual

1 Contents

1	CONTENTS	2
2	BEFORE YOU BEGIN	3
2.1	STRUCTURE OF THIS GUIDE.....	3
3	INTRODUCTION TO QVIEW	3
4	USING QVIEW	4
4.1	STARTING WITH QVIEW	4
4.1.1	<i>QView program window</i>	4
4.1.2	<i>Dialog boxes</i>	5
4.1.3	<i>QView menu</i>	5
4.1.3.1	FILE Menu	5
4.1.3.2	Model Menu	5
4.1.3.3	View Menu	5
4.1.3.4	HELP Menu	6
4.2	WORKING WITH QVIEW	7
4.2.1	<i>Creating new model</i>	7
4.2.2	<i>Working with files</i>	7
4.2.2.1	Loading model from file.....	7
4.2.2.2	Saving model files	7
4.2.3	<i>Algorithm execution and results</i>	7
4.2.3.1	Setting input function	7
4.2.3.2	Controlling algorithm execution.....	8
4.2.3.3	Viewing algorithm result.....	8
4.2.3.4	Viewing vector	8
4.2.4	<i>Viewing matrixes</i>	8

2 Before you begin

Following conventions are used in the text of the manual:

`Courier font` indicates program interface objects, like menu items, windows, pages and so on.

BOLD Courier indicates words or characters you type.

Important terms are selected with **bold** font.

2.1 Structure of this guide.

Section **3 Introduction to QView** gives you basic information about optimization algorithms available in QView.

Section **4 Using QView** is devoted to work with QView interface. First part of this section **Starting with QView** describes basic interface principles. **Working with QView** tells you how to use QView to perform different optimization tasks and how to view and edit your model.

3 Introduction to QView

QView is a software tool for the visualization of quantum algorithm operation on classic computer. It makes possible visualization of four quantum algorithms: Deutsch-Jozsa, Simon, Shor and Grover.

4 Using QView

4.1 Starting with QView

Main module of QView is a Win32 application, called qview.exe. It can be used in Windows 95, 98, NT, Me, 2000 and XP environments.

In order to start the program you should type “qview” in command prompt or by double-click on QView icon in windows explorer.

After you start QView following dialog will appear:

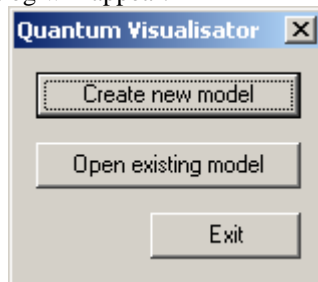


Figure 4.1.1. QView start dialog

In this dialog you should select desired operation (to create new model or to open previously saved one). After you will press one of the buttons you will be prompted with additional options. Please see descriptions of new and open operations later in this guide for more information.

4.1.1 QView program window

After you create new model or load old one you will see main program window of QView, as shown on the figure 4.1.1.1.

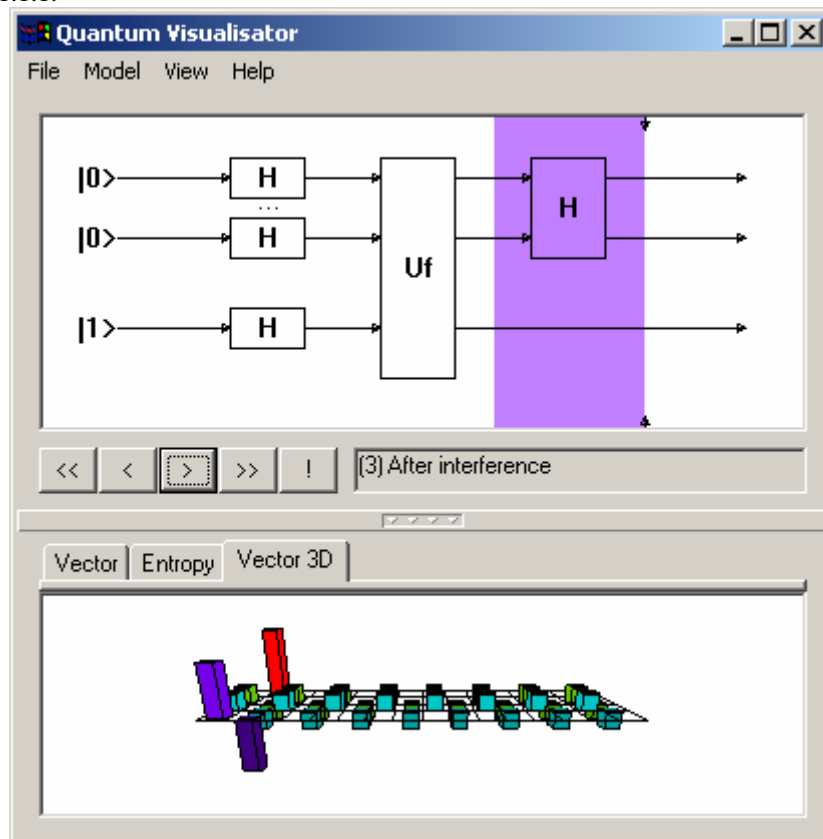


Figure 4.1.1.1. QView program window.

QView window is divided into three parts. On the top of the window there are menu. It is used to control QView operation.

Central part of the window displays Quantum gate. Below the table there are buttons, which control algorithm execution.

Bottom part of the window displays various graphics, which shows the result of algorithm execution.

4.1.2 Dialog boxes

When you choose a command having options, QView shows a dialog box. A dialog box may contain fields in which you can enter text, numbers or select some items. Typical dialog box will have OK button, which you should press after filling all fields in order to activate the command, and CANCEL button, which will abort command execution. You can also use ENTER key on the keyboard to activate the same function as OK button and ESC as CANCEL.

4.1.3 QView menu

QView has standard window menu, displayed on the top of program window. To choose a command with the mouse or keyboard, first select the menu and then choose command you want. Each underlined character in menu and command names corresponds to the key you can press to select a menu or to choose a command.

To choose a command by using the mouse you should first click the menu name containing the command you want and then click the command name in the pop-up menu.

To choose a command by using the keyboard, first press the **ALT** key. The File menu appears selected. Use left and right arrow keys to select required menu and then press down arrow or **ENTER** to open pop-up menu. Use up and down arrows to select desired command and press **ENTER** to activate it. You can also press one of the underlined characters to quickly select desired menu or command.

4.1.3.1 FILE Menu

QView allows project files to be managed by the means of commands in the FILE Menu.

The following items are available in this menu:

- New: closes actual model and starts creation of new model.
- Open: open existing model from disk file.
- Save: save actual model to the file it was loaded from.
- Exit: closes QView.

4.1.3.2 Model Menu

Model menu allows to change QView model options:

- Input Function: allows changing of an input function for algorithm.

4.1.3.3 View Menu

Model menu allows to view matrixes and vectors of the current model:

- Superposition matrix: view superposition matrix.
- Entanglement matrix: view entanglement matrix.
- Interference matrix: view real part of interference matrix.
- Interference matrix (Imaginary part): view imaginary part of interference matrix.
- 3D vector: 3D view of current vector.

4.1.3.4 HELP Menu

Help menu currently have only one command – About, which displays version information of QView.

4.2 Working with QView

4.2.1 Creating new model

Select File/New from menu to start creation of the model. Dialog box (Figure 4.2.1.1) will appear where you should enter parameters of new model. When you create new model you current model (if any) is closed. Please save you changes before creating new model.

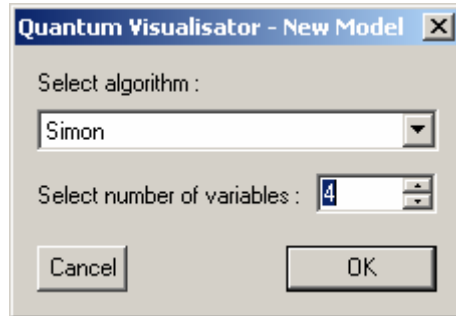


Figure 4.2.1.1 Create Map dialog

In the dialog you should choose quantum algorithm and input dimension. After you press OK new model will be created. Press CANCEL to abort creation of new model.

4.2.2 Working with files

4.2.2.1 Loading model from file

If you have a file with previously saved model you should select File/Open command. Standard windows File Open dialog box will appear. Select file with you model and press Open button.

4.2.2.2 Saving model files

You can use File/Save command to save you model file. Standard windows File Save dialog box will appear. Select file to save you model and press Save button.

4.2.3 Algorithm execution and results

4.2.3.1 Setting input function

You can set input function by activating Model/Input function menu item. The following dialog will appear:

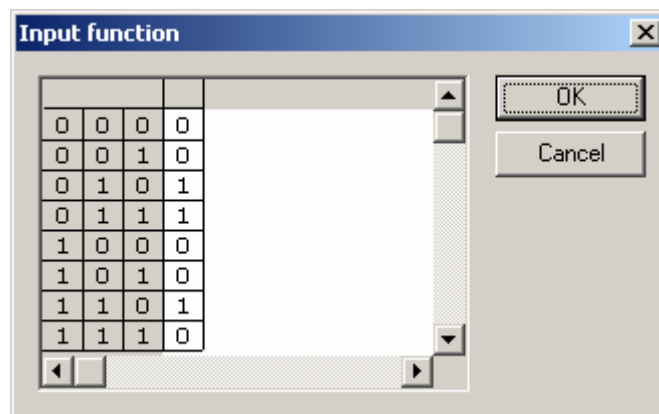


Figure 4.2.3.1.1. Input function dialog.

Table in this dialog represent algorithm input function. The left part (grayed) is an input of a function, and a right part (white) is output. You can change output part by clicking mouse on corresponding cells.

When desired input function is entered press OK. Press CANCEL to abort operation.

4.2.3.2 Controlling algorithm execution

Current algorithm position is shown in `gate display` with colored background. To control the current position you can use four buttons located below the `gate display`:

- << - Return to first position (input vector is shown)
- < - Return to one step back.
- > - Execute single step forward.
- >> - Execute steps until result is collected.

Current algorithm position and name is also shown in text field right to the control buttons.

4.2.3.3 Viewing algorithm result

You can view currently achieved results by pressing ! button below the `gate display`. Message box will appear, showing currently achieved result or message that result is not yet ready. Exact message depends on selected algorithm and calculation step.

4.2.3.4 Viewing vector

Vector display is positioned at the lower part of the window. Three display modes are available, selectable with a tabs above vector display:

- Vector - 2D vector of current state is displayed
- Entropy - Shannon entropy graph is displayed. The graph shows entropy change during the whole calculation. You can review the step when given entropy value was achieved by clicking on a graph.
- Vector 3D - Displays 3D view of current vector. 3D view can be manipulated as described later in this guide.

To view a whole set of vectors produced during calculations select `View/3D vector` menu item. 3D view of vectors will be displayed in a separate window. 3D view can be manipulated as described in **4.2.4. Viewing matrixes.**

4.2.4 Viewing matrixes

You can view algorithm matrixes by using various items in `View` menu. To view a matrix select a corresponding item in a menu. The following dialog will appear:

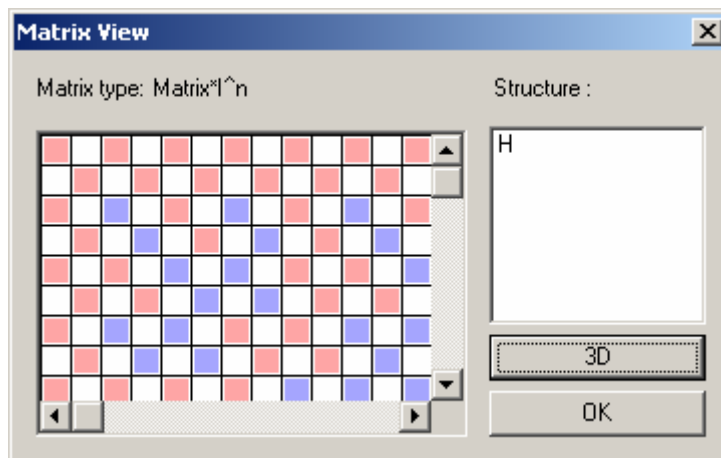


Figure 4.2.4.1 Matrix view dialog.

Matrix values are displayed in the table by the color. White cells correspond to 0, red – to positive numbers and blue to negative. Values with greater absolute value are shown with more saturated color.

If a matrix is composed from smaller matrixes, than those matrixes are shown in the structure list. You can view them by double-clicking corresponding items in the list.

There is also an option to view a matrix as a 3D diagram. To activate this mode, press 3D button. 3D diagram will be shown in a new dialog, like one shown in figure 4.2.4.2:

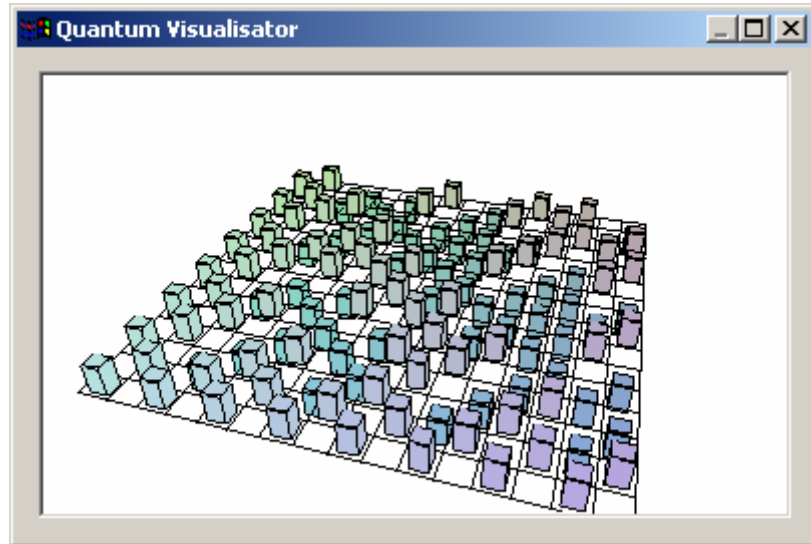


Figure 4.2.4.2. 3D matrix view

You can manipulate 3D view with the following keyboard keys:

- Arrow keys - rotate image.
- Page Up - zoom out.
- Page Down - zoom in.
- Home - reset view to default position.

Color of the cell depend on coordinates in matrix and cell value.

By default, cell (1,1) of matrix is displayed in far left corner of the 3D view.

4.2.5 Using separator

QView window central and bottom part is divided with the help of separator control. By manipulating this control relative sizes of window parts can be changed. You can manipulate separator control in the following ways:

- Click with a mouse on the central part of control (which shows four arrows) to hide/show bottom part.
- Click and drag on other part of control to move separator up/down.
- You can use keyboard to move separator when it has keyboard focus: use up and down arrows to move control and space to hide/unhide bottom part.