Group-project

CELLmicrocosmos 3.0

Summer Semester 2007

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1 Motivation

In view of modern medical and biotechnological research there are a lot of possibilities of drug developing. But the increasing costs and human aspects are still two big problems. So it's necessary to find some ways to avoid them. The CELLmicrocosmos 3.0 Cell Editor is the first step to provide an environment for biologists to assemble the cell for simulating the procedures in it.

2 Purpose

The purpose of the program is to provide a cell editor, which allows the user to create a cell he wants to research.

3 Program application

The program should enable the user to generate a model of any cell. The result will be a in detail documented open source solution which will be usable in this manner without juridical restrictions for biologists and biology information scientists, who represent the target group of Cellmicrocosmos3.x. Besides, the modeled cell is compatible to the diploma work of Marion Zysik *"VipVaP"*.

4 Program service

4.1 What can the program perform

The program Cellmicrocosmos3.0 can open the vrml-file, xml-file and save the project in one of these formats. With a click on the cell component in the main window, you can move, rotate and zoom them. You can move, rotate and zoom the cell components together with the mouse by pressing the key A. Pressing the key S allows you to move, rotate and zoom the cell components separately.

4.2 System requirement

The program Cellmicrocosmos3.0 Cell Editor is written in Java and it is platform independent. JDK (Java Development Kit) of the company Sun in the version 1.5.0 (Java 2) or higher is required. Therefore the program can be run under UNIX and Windows.

4.3 Program installation

The installation depends on the choice of your operating system and on it resultant creation of the workplace. Copy the archive, which contains the program, on your hard disk and unpack it. This happens under Unix with the command *tar gzvf archive.tgz*. The zip-files can be opened under Windows XP automaticly. Change to the directory, in which you unpacked the archive and compile the program by typing "javac Cellmicrocosmos.java".

4.4 Import and export

Cell components in the form of vrml files can be imported, so that they can be used in Cellmicrocosmos3.0. The export of a whole cell as a vrml file allows that the whole cell can be viewed in current cell editors.

The whole cell model can be saved in xml file and can also be loaded in current cell editors. Thus it should be possible to save the whole cell model to allow the Cell Explorer to show the suitable cell and in addition to give the possibility for the user to change the cell model with the cell editor.

4.5 Navigation

The cell components can be moved, rotated, enlarged and reduced by intuitive mouse motion.
For moving: Move mouse with right mouse button pressed.
For rotation: Move mouse with left mouse button pressed.
For zoom: Move mouse with middle mouse button pressed.
Key A: By pressing Key A, you can rotate, move or zoom all the cell components

in the main window together.

Key S: By pressing Key S, you can rotate, move and zoom a single cell component you have chosen.

## 4.6 Placing of cell components

4.6.1 Based proceed

Outer cell components like capsule, cell wall or cell membrane are placed at the origin. Their inner radius provides a basis for the placing of other components, that are placed at random locations. For this purpose the program generates a possible 3D-point for the component to be set. Then the collision detection starts. The loaded cell components are assumed to be locked in spheres. If there is no collision between them, then the cell component will be placed at that point, otherwise another 3D-point will be produced and checked.
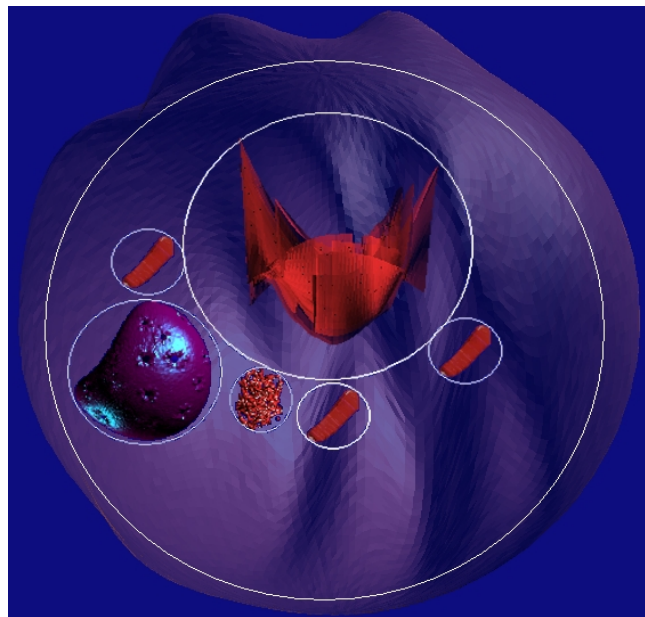
4.6.2 Exceptions

After 1000 failed attempts to find an acceptable 3D-point, the program assumes that there are more components,than the cell membrane can include. The user will be informed and gets the possibility to choose a bigger cell membrane. Otherwise the cell components will be placed without collision detection.

5 Use of the GUI
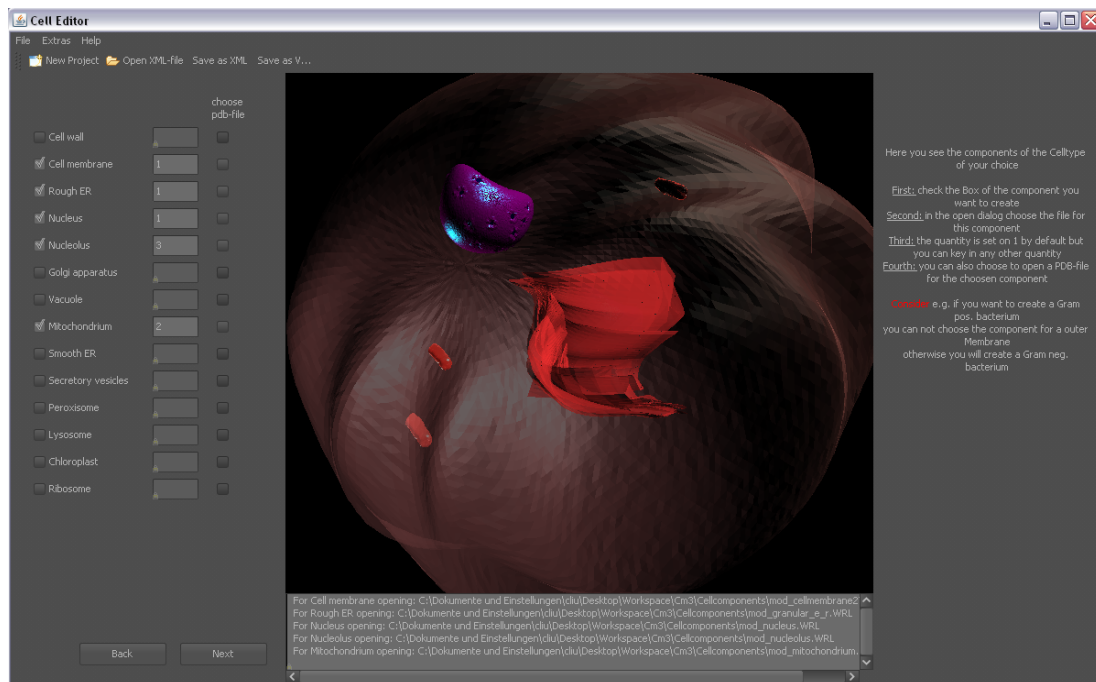
5.1 Description of the GUI

menu bar

At the top of the interface is the menu bar with File, Extras and Help menu. You can choose to open and edit the image file in main window.

main window

In the middle of the interface is the main window for loading the vrml or xml files.

Help pane

At the right of the main window is the Help pane, which contains useful information.
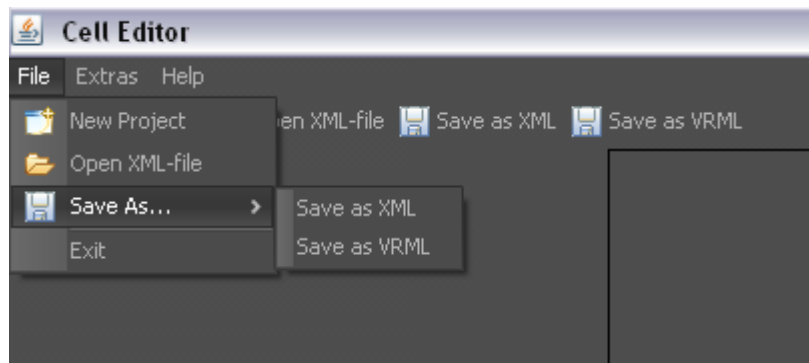
Selection pane

At the left of the main window is the Selection pane, where all cell components are listed.

Console pane

Under the main window is the Console pane with information about the location of the vrml or xml files.

5.2 Explanation of the menu elements

File

New Project

Open a new project window.

Open XML-file

Open a XML-file in the main window.
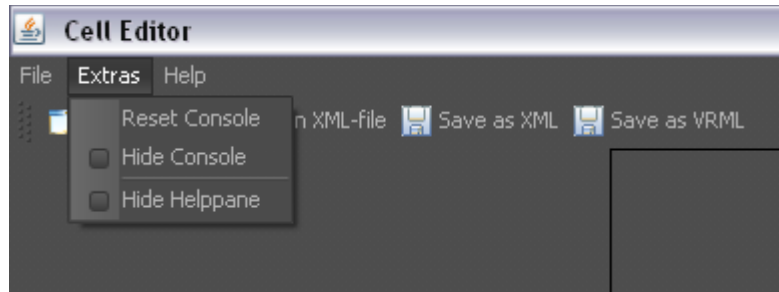
Save as XML

Save the current project as a XML-file.

Save as VRML

Save the current project as a VRML-file.

Exit

Close all Cellmicrocosmos3.0 Cell Editor windows and exit it completely.

Extras

Reset Console

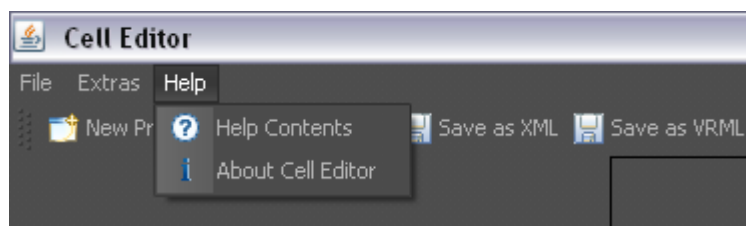Clean the console pane which is under the main window.

Hide Console

Hide the console pane which is under the main window.

Hide Help pane

Hide the help pane which is right of the main window.

Help

Help Contents

Contains useful information explaining how to use and edit the vrml and the xml files.

About Cell Editor

A dialog box with information about Cellmicrocosmos3.0 Cell Editor, including the current version and the members of the group project.

6 Group member

Projectmanager: Björn Sommer

Programmers:
Ufuk Aydin
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