



Jihočeská univerzita
v Českých Budějovicích
University of South Bohemia
in České Budějovice



BioWes

www.biowes.org

Visualization framework

Project supported by the Technology Agency for the
Czech Republic



Technology Agency
of the Czech Republic

... from ideas to applications

Module description



- The framework is a versatile tool for creating specialized visualization modules that perform display of raw experimental data such as friction, scatter plot, the correlation plot. Software includes a demonstration module to display a trend of measured data for fish mortality for a particular experiment.
- Visualization framework has defined user interface that enables the creation of plug-ins from third parties, which then can be used in the system BioWes. Framework provides functions to access protocols and data (experimental data + metadata) through which it can proceed to the protocols according to the user's privileges.
- The usage of the Framework is demonstrated by the module for raw data plotting. The data are from the particular experiment focused on fish mortality.

Module interface



- The module is a DLL library in managed code
- The library class has to contain these methods:
 - Constructor:
 - `public DemoModuleForm(IAppFramework appFramework, BioWes.DataLayer.Client.Protocol protocol)` – protocol is a link to opened protocol
 - Methods:
 - `private void CreateRibbon()` – code for creting of menu items
 - `private void ShowDemoModule_Executed(object sender, System.ComponentModel.HandledEventArgs e)` – code for actions after module execution
 - `private void ShowDemoModuleForm(bool activate, BioWes.DataLayer.Client.Protocol Protocol)` – code after module form show
 - `private void DemoModuleForm_Activated(object sender, EventArgs e)` - code after DemoModuleForm is activated
 - `private void DemoModuleForm_Deactivate(object sender, EventArgs e)` - code after DemoModuleForm is deactivated
 - `private void _demoModuleForm_FormClosed(object sender, FormClosedEventArgs e)`
- DLL has to be placed into main BioWes directory
- BioWes.exe.Config file has to extended by the definition of the module:

```
<module type="BioWes.Sdk.DemoModule.DemoGuiModule, BioWes.Sdk.DemoModule" name="MyDemoModule" startMode="StartImmediately" />
```

Graphical user interface



The screenshot shows the FishModule - BioWes application window. The interface includes a navigation pane on the left with 'Protocols' and 'Protocol templates' options. The main area displays a list of protocol files under the heading 'Protocol files'. A table lists seven files, all of which are selected with checkmarks. To the right of the table are 'Select all' and 'Deselect all' buttons. Below the table, there are two checkboxes: 'Top view - detected objects' and '3D fish tank position', both of which are checked. The 'Top view - detected objects' checkbox is linked to a camera view showing a top-down perspective of a fish tank with numerous small, numbered fish. The '3D fish tank position' checkbox is linked to a 3D wireframe model of a fish tank with colored arrows indicating the position of the fish. At the bottom of the interface, there is a 'Run' button and a green progress bar. Red callout boxes with white text provide instructions for each key element: 'Select images to be processed' points to the file list, 'Execute processing' points to the Run button, 'Progress bar' points to the green bar, and '3D position of the fish in the tank' points to the 3D model.

Name	Description
<input checked="" type="checkbox"/> inten_274630883.tiff	Experimental file
<input checked="" type="checkbox"/> inten_274630946.tiff	Experimental file
<input checked="" type="checkbox"/> inten_274631055.tiff	Experimental file
<input checked="" type="checkbox"/> inten_274631164.tiff	Experimental file
<input checked="" type="checkbox"/> inten_274631273.tiff	Experimental file
<input checked="" type="checkbox"/> inten_274631367.tiff	Experimental file
<input checked="" type="checkbox"/> inten_274631460.tiff	Experimental file

Select images to be processed

Execute processing

Progress bar

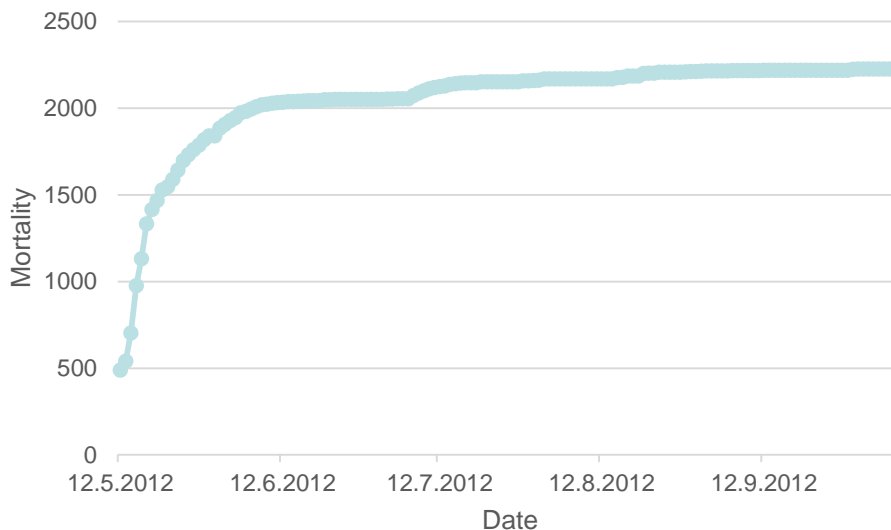
3D position of the fish in the tank

Detected fish with unique ID

Testing data – fish mortality analysis



- **Scaling experiment**
 - One of the important problems in the transfer of research results to the practice is the up scaling. The research focused on the optimization of conditions for fish growth is done in small and middle size tanks but the fish farms operate large tanks only. Therefore the large study focused on the influence of up scaling from small to large and vice versa is explored.
 - One aspect of the study is fish mortality after the changes of tank size. The protocol used for testing of visualization module contains the data of accumulative fish mortality for different tank scaling.
 - Visualization of accumulative mortality is the simple but effective tool for immediate analysis of scaling influence.



Accumulative fish mortality in 7M tank

Module testing



- Module testing
 - Testing data and protocol are prepared under testing account at public BioWes local repository
 - Run the software Protocol Manager and log in using this credentials:
 - Login: test@test.cz
 - Password: test
 - Go to Protocols menu and select Fish example – visualization
 - Click on Visualization sample icon in the main menu