FAKULTÄT FÜR !NFORMATIK
Faculty of Informatics

Diplomarbeitspräsentation

Integration of Web-Based Information Visualizations into a Scientific Visualization Environment

Master's Degree:
Medical Informatics

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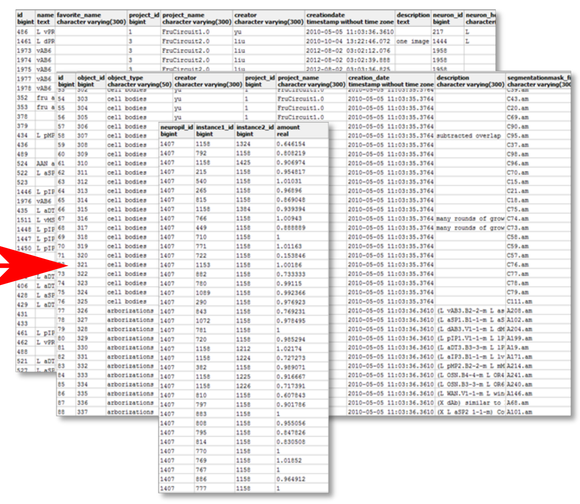
Problem Statement

Volumetric image of the brain of a **Drosophila Melanogaster** fruit fly

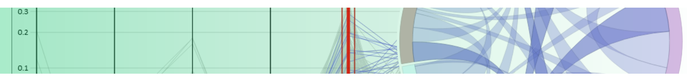


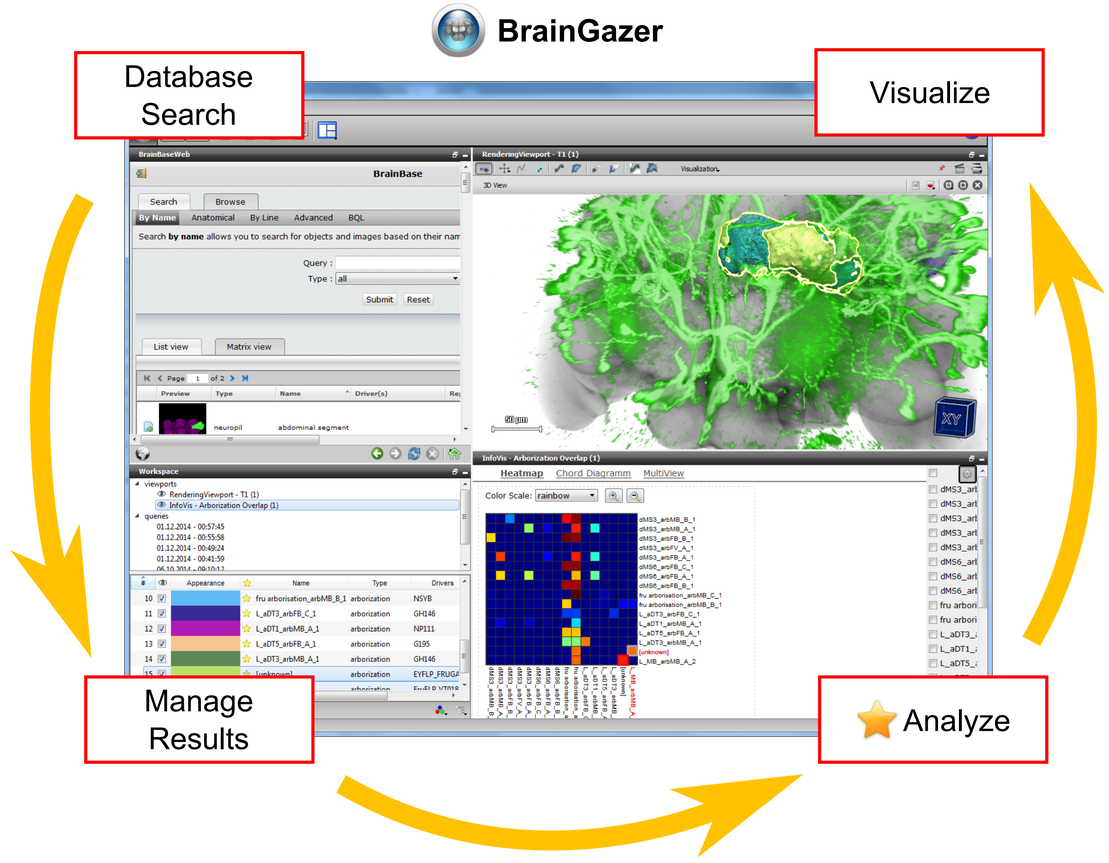
BrainBase Database:
Contains related numeric and semantic data related to volumetric images and neurobiological objects

To study the function of **neural circuits** of the Drosophila Melanogaster neurobiologists have acquired large amounts of **volumetric images** of fly brains together with related **scientific data** stored in the **BrainBase** database. For their work they use **BrainGazer,** a scientific visualization application which offers features to visualize the three dimensional images together with neurobiological objects.

- When images or neurobiological objects are visualized by a 3D view the connection to the related scientific data gets lost.
- A solution to establish a **link between the volumetric images and the related scientific data** is needed.

Methods





This thesis proposes a **software design concept** to extend BrainGazer

- It introduces information visualization views to visualize related numeric and semantic data.
- It uses linking and brushing techniques to connect visualizations of volumetric images and information visualizations.
- **Visualization worksheets**, use case specific sets of visualization which allow the user to acquire visualization data directly from the BrainBase database for a user defined set of workspace items and provide different types of visualizations in a single viewport.

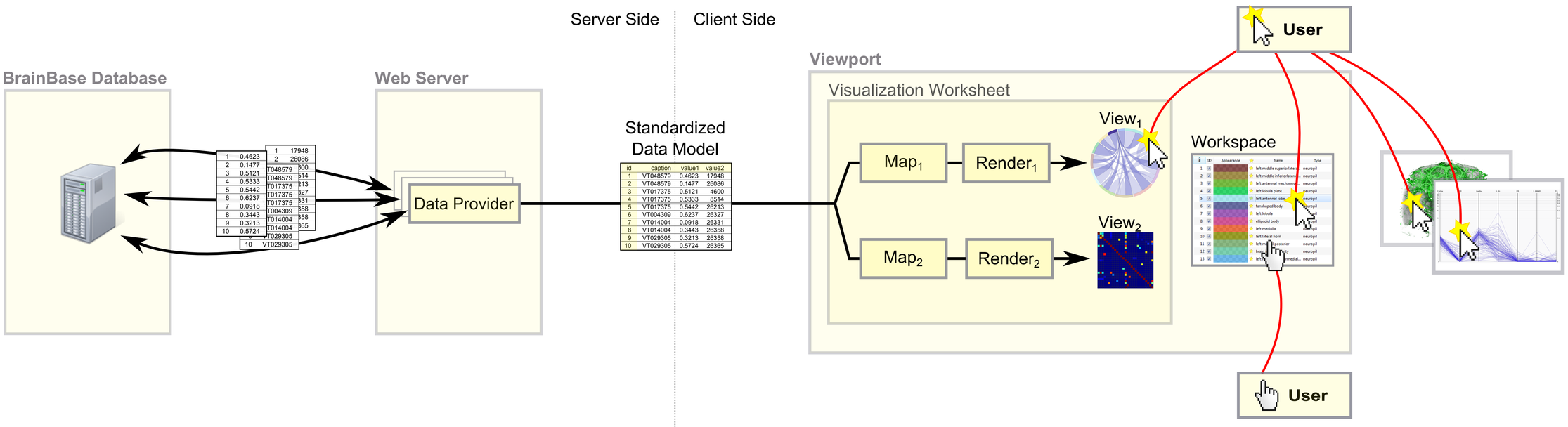
Implementation

Data Providers are server-side interfaces which provide use case specific visualization data for clients on demand.

The software environment is divided into a **client** and a **server side**. In this design concept the server is a single entity but can be accessed by multiple clients.

A **visualization worksheet** hosts multiple information visualizations. The user can select between the views or display them simultaniously.

If the user selects an item in a viewport or in the workspace the same item is selected by the **linking mechanism** in every other BrainGaze viewport.



The **BrainBase database** includes data about images and different related neurobiological objects.

The database returns a dataset which is, depending on the use case, related to the workspace items.

The visualization data is sent to the client in a **standardized data model** to allow clients to visualize the dataset by different types of information visualizations.

If the user drags workspace items into a viewport the client initiates the pipeline by requesting visualization data from a specific data provider on the server.

Conclusion

- The proposed software design concept extends an existing scientific visualization application by introducing information visualization views. These views can be used to visualize related scientific data stored in the BrainBase database together with three-dimensional visualizations of volumetric images.
- Information visualizations views are integrated in the user interface by supporting existing linked-view features.
- The used developing framework reduces the implementation effort for new views to a minimum.
- The worksheet concept enables views to acquire specific visualization data according to the workspace items and their object types.

Acknowledgement: This work has been funded by the FFG Headquarter Project "Molecular Basis" Grant number: 834223.

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