

Enterprise Solution for Neuroinformatics in Vision Science

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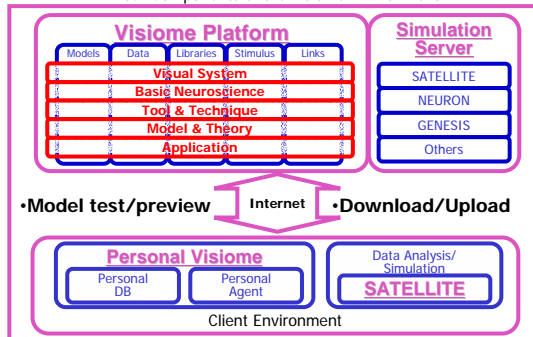
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Visiome Environment

Overview

- Understanding the brain function requires integration of diverse information from the level of molecule to the level of neuronal networks. However, the huge amount of information is making it almost impossible for any individual researcher to construct an integrated view of the brain. To solve this problem requires to make useful neuroinformatics tools for information storing, maintenance and sharing. In the present study, we constructed an integrated system for vision neuroscience named "**Visiome Environment**" as a test bed for useful neuroinformatics tools.
- The Visiome Environment will realize a virtual environment for global electronic collaborations by providing to researchers with useful tools for simulation and data analysis with reusable models and data.

Four Components of the Visiome Environment



Visiome Platform

<http://platform.visiome.org>

Visiome Platform is the neuroinformatics portal that provides access to mathematical models, experimental data, analysis libraries and related information. The basic concept of the Visiome Platform is to make a web site integrating mathematical models, experimental data and related information.

What is available in the Visiome Platform?

- Research Resources
 - Model Programs/Scripts
 - Result/Stimulus Data in Numerical text/Image/Movie Formats
 - Programs/Scripts for Data Analysis
- Educational Resources
 - Electronic Presentations
 - Movies/Pictures
- Historic/Review Papers' information
- Historic Books' information
- URLs/News etc.

Available Item Types in the Visiome Index

Item Type	Description
Model	Model Programs/Scripts
Data	Result Data in Numerical text/Image/Movie Formats
Tool	Programs/Scripts for Data Analysis
Stimulus	Stimulus Data in Numerical text/Image/Movie Formats
Simulator	Simulator programs
Reference	Historic/Review Papers' information
Book	Historic Books' information
URL	URL of internet resources

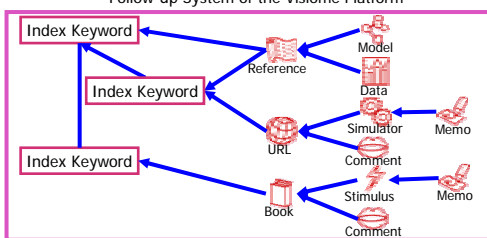
What research fields are covered in the Visiome Platform?

- Research fields covered in the Visiome Platform are integrated as the **Visiome Index**.
- The Visiome Index
 - Provide novel tree-structure indexing system
 - Research field of the visual system specially oriented to the model studies
 - Based on neuronal and cognitive functions
 - Help to understand the visual system from the aspect of visual functions
 - Help to construct models formulating their own hypotheses

Top Categories of the Visiome Index

Top Category	Field of view
Visual System	visual pathway from eye to central visual system
Basic Neuroscience	psychological or higher order functions
Model & Theory	physical substance from molecule to cell levels
Tool & Technique	physiological functions
Application	modeling and theoretical methodology
	experimental and analytical methods
	technical applications of vision research
	bio-inspired device

Follow-up System of the Visiome Platform



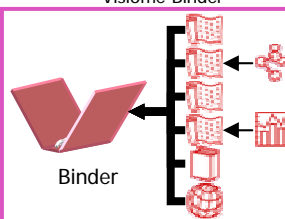
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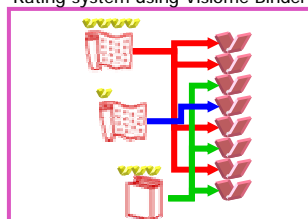
Special Features of the Visiome Platform

- Visiome Binder
 - Contents collection for specified themes or interests
 - Suggestive readings, Reference list for lectures/books etc....
- My PDF (Designed by Dr. Izumi Ohzawa)
 - PDF reprint collection management system

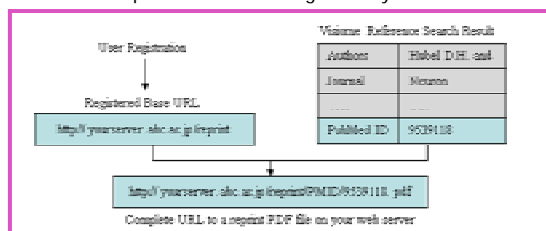
Visiome Binder



Rating system using Visiome Binder



PDF reprint collection management system



How can researchers make use of the Visiome Platform?

- As a resource archive
 - Download and reuse models/data
 - See how the models work
 - Compare their own results
 - Improve or integrate models
 - Formulate their own hypothesis
 - Register their own models, data, and libraries
- As a research management tool
 - Register/Search necessary information
 - Obtain latest information
 - Integrate papers/models/data related to their own research
- As an educational tool
 - Introduce historic papers/books (to students)
 - Grasp research fields (new comers)
 - Reuse electronic presentations/Movies/Pictures



Visiome Simulation Server

(Coming soon ... announce on Visiome Platform)

Visiome Simulation Server is a high-performance engine that offers neuroinformatics researchers the computing, analyzing and simulation power for mathematical models.

What can a researcher do with the Visiome Simulation Server?

1. Control simulation tasks and view results through the web browser
2. Execute simulation of large and complex models
3. Verify responses of model script on the *Visiome platform* without installation of software
4. Reuse of models which are running on rare computers

Registration

- **SATELLITE** scripts registered on the *Visiome platform* can be used on the simulation server by synchronization of both database contents. Model program written by any programming language (C, Fortran, etc.) can be registered with **SATELLITE** script for execution control.

Run

- Simulation of registered script or program can be started by clicking "run" button. Simulation results are displayed on the browser.

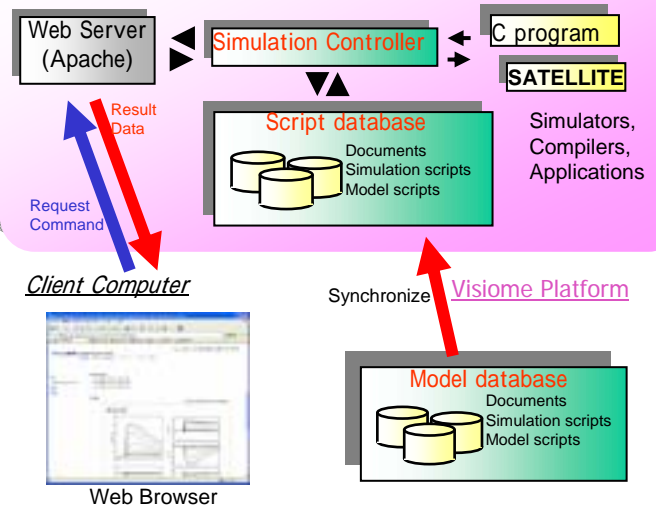
Modification

- Model parameters and simulation conditions (calculation interval, stimulus etc.) can be modified interactively on parameter setting window. Model program which is not be opened, but allowed to use might be registered and executed with this parameter modification function.

Download

- Results of simulation can be download and stored in the client computer.

Visiome Simulation Server



Personal Visiome

(Coming soon ... announce on Visiome Platform)

Personal Visiome is a laboratory edition of the Visiome Platform. The basic concept of the Personal Visiome is to make a groupware combining database sharing information in a laboratory and internet search agent.

Groupware for Laboratories

- The Personal Visiome stores electronic materials for investigation in the laboratory (e.g. PDF / PostScript files, photos, figure images, experimental data, model scripts, URL Links etc.)
- Modifiable index tree system allow users to construct their own tree structure reflecting their own research field.

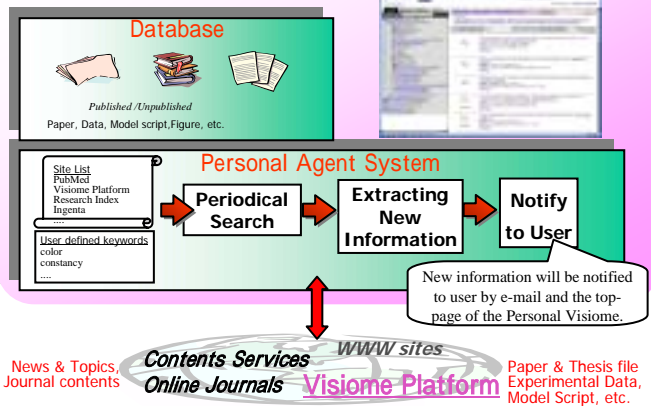
Internet Search Agent

- Personal Agent System searches contents service and online journal sites, automatically and periodically. Users can select search conditions: target web sites, search period and keywords.

Cooperation with the Platform

- The Personal Visiome can synchronize with the Visiome Platform. Users can select items to be displayed in the Personal Visiome.
- Users can easily upload their items in the Personal Visiome to the Platform.

Personal Visiome



SATELLITE

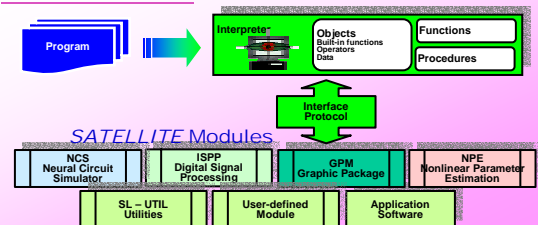
<http://www.visiome.org/satellite/> (tentatively in Japanese only)

It is generally agreed that the biological system is one of the most complex and sophisticated mechanisms on the earth. Since there are few systematic theories for approaching such systems, trial and error studies based on knowledge of physiology, psychology, etc., have to continue. Environment to support and realize the ideas of scientists could be very important to advance the research. We assert that the establishment of **SATELLITE** (System Analysis Total Environment for Laboratory - Language and Interactive Execution) is relevant to this tools.

SATELLITE Modules:

- **ISPP** (Interactive Signal Processing Package) is a core module of SATELLITE. Processing functions are represented by commands, which cover the methodology of the digital signal processing such as windowing, FFT, spectrum analysis by linear prediction models, filtering, etc.
- **GPM** (Graphic Package Module) provides various graphic functions for making charts, contour maps, bird's-eye pictures, etc. The images can also be printed.
- **NPE** (Nonlinear Parameter Estimation) is a module to solve the problem of optimizing a target function using optimization algorithms, e.g., SIMPLEX, BFGS, Conjugate Gradient, etc.
- In **NCS** (Neural Circuit Simulator) module, characteristics or connecting states of cells are described using an exclusive model description language. It is possible to efficiently carry out simulations under various conditions without rewriting the model description.

SATELLITE



Screen shot of the SATELLITE

