The Virtual Brain

Toronto Meeting

April 29th, 2012

Attendees:

Randy McIntosh Steve Small Skype:

Viktor Jirsa Ana Solodkin Lia Diomide

Olaf Sporns Mary Pat McAndrews Michael Breakspear

Nancy Lobaugh Jochen Mersmann Lice Gheraldi

Erin Gibson Duke Shareen

Hadj Meziane Gleb Bezgin

Tanya Brown Natasa Kovacevic

Bratislav Misic Tanya Schmah

Babak Afshin-Pour Maher Quarran

*Randy*

Welcome attendees

--focus of this meeting is to discuss workflow within the TVB framework

*Jochen’s presentation*

Latest implementations to TVB:

(1) Connectivity editor:

* Sub network viewer in the connectivity editor
* Display full connectivity matrix (Natasa)

(2) Burst Cockpit:

This should become the core functional element, as it adopts a user-friendly environment as a project accumulates simulations/analyses.

3) Project organization:

* Clean up the operation history and tracking
* Two lists of operation processes are proposed
  + Full history
  + Relevant history
  + Implement ‘trash can’ /hide button for unwanted data

\*\*stated a need for a tool to keep track and easily identify previously run processes (e.g. text box to provide brief explanation of operation in addition to labels/filenames

\*\*Stimulation operations

*Olaf’s presentation*

* Group’s most significant problem – tabs were tedious
* Time series formats have to be clearly laid out on multiple scales with units provided.
* Give user control of data formats coming out of the simulation.
* Dynamic transient in the beginning needs to be controlled
* Batch processing feature:
  + Various functionality
    - Run it multiple times
    - Save data or not, just preserve the post-processed feature
* Develop the battery of metrics
* Throw out irrelevant time series in Monitors, keep only biophysically relevant ones
* Delete /kill a process that you have submitted
* Estimates of run time – progress bar
* Clean up simulator with regard to meaning of everything (local versus global coupling
* Different types of normalizations of coupling strength
* Disappear local coupling when region-based modeling
* Introduce workflows that allow to reproduce results from published papers
* Save simulation parameters in one file that can be shared (respect version tracking)
* Develop a good interface for users to add new modules, etc to the open source platform
* Disclaimer is necessary to protect TVB for misuse and publication there of
* Validation is required

*Breakspear*

* Too much variability/options for parameters causes more confusion ~ limit parameters and provide **documentation**
* Publish papers (e.g. How to replicate Model x with TVB)

*Ana’s presentation*

* Load up experimental functional data
* Give guidelines to user what models to work with in the beginning…
* **Documentation**: integrate a “best practices” section into documentation
* Example workflow with parameters along examples
* How will we know if a simulation is correct? Algorithmic checks can be provided.
* **Import – Export** needs to be really good….
* Consider the option of dealing with the workbench of the Connectome Project
* Find ways to project a lesion of a patient into the TVB and visualize it directly on the brain (using the new connectivity editor). Consider the lesion mapping software from SPM.
* Add regions to default connectivity matrix (e.g. basal ganglia & thalamus, or retina tracts)

*Mary-Pat’s presentation*

* Add a HELP button
* Parameter documentation (defined by type of user –computational vs clinical)
* Add references to implemented models
* Make file format transparent – EXPORT-IMPORT
* Adding a command line version is a good idea?
* Forum of TVB users (PHPBB group for instance, J-forum)
* Ability to load personal connectivity matrix
* Offline tools that link to TVB

*Erin’s presentation*

* User do preprocessing themselves using standard procedures
* We will provide solid example of how we preprocess DTI data, but the process will remain flexible for users
* As far as Erin and Steven Strother is concerned, the Virtual Box is finalized, and now Lia should build the Interface
* Not yet satisfied with measure of connection strength; this requires more work

**Day 1 Summary**

**TVB Key Topics:**

* Export-Import
* Data format
* Documentation

-many methods of providing this…

-help desk

-download manual from website

-provide scroll over help boxes within TVB

-help forum

-FAQ

-who will prepare this?

-audience (clinical vs computational; expert vs naïve)

-Best Practice\*\*

* Discussion forum
* Connectivity Editor – this seems to be improved and functioning well
* Simulator
* Project organization
* Burst Cockpit

Day 2

**April 30, 2012**

--review main topics from yesterday

1. **Export/Import Functions**
   1. data (DTI); virtual box requirements, pipeline is ready to be used
   2. parameter settings
   3. ROI connectivity editor; this type of parcellation enables one to study isolated networks
   4. limitations of cocomac connectivity matrix
2. **Documentation** (Tanya) ---ready by JULY Marseille meeting
   1. quick start guide (Best Practices)
   2. will require feedback from group before publishing
   3. expert manual in addition
   4. hyperlink
   5. developer documentation; separate (Jochen) ---long term
   6. wiki formats (traits already in this format)

\*\*Viktor has html format documentation of model/parameter details (will send it upon requests, even though not useful for me at this point- required now for reference only)

1. **Data Format**
   1. Decide on format compatibility for purposes of import/export (cifti, cff)

--Maintain 100% OPEN SOURCE --

1. **Project Organization**
   1. Project Page –filenames are more descriptive
   2. Burst Cockpit may take over responsibility of project organization
   3. Tree diagram allows project reorganization
   4. From developer point of view; this is easiest to change later
2. **Simulator**
   1. Adding more models
   2. Stimulation of nodes
   3. Parameter heterogeneity across the brain nodes
   4. Transmission speed heterogeneity of individual fibers
   5. DTI module
   6. Plasticity (post-July)
   7. CURRENT VISION– build own stimulus (define center point of smoothed stimulus on timeline and able to vary magnitude, ISI, etc and feed into any arbitrary selection of nodes, outward gradient of stimulus activity
   8. Different types of stimulation (excitatory/inhibitory, strength, network characteristics, etc.)
3. **Discussion Forum**
   1. PHPBB
4. **Burst/Blast Cockpit**
   1. Fewer clicks to get to desired screen/process
   2. 1 click = all visualizations in one screen + list of other burst + parameter settings
   3. *primary TVB interaction*
   4. parameter space exploration
   5. add 1 more tab for ‘configurator’ for batch jobs (id parameters and launch in background)
   6. add analyzer option to burst cockpit
   7. esthetics –parameter section too wide
   8. progress bar added for timeseries simulations
   9. kill process capability
   10. stimulus parameters explorer & editor/ task related sweeps \*not in cockpit (Viktor’s suggestions)
   11. timeseries (array); temporal architecture is adaptable
   12. stimulus and connectivity edits occur outside cockpit (build—run set up)

*Mary Pat*

-new study with Alzheimer’s patients

-imaging collected @ baseline, 6 and 9 months

-resting state fMRI; DTI, T1, T2

-implanted electrodes; so DTI & T2 post baseline may be problematic (heating issue)

-eeg not possible