Report on INCF-funded Summer school "Towards an integrative computational neuroscience: Modelling across scales of analysis" held in Edinburgh, 26th August-2nd September 2012

Organisers: Matt Nolan, Michael Herrmann & David Sterratt

Programme

Each day of the programme (see Appendix) had a theme that connects data acquired at multiple levels, such as genetic, proteomic, electrophysiological, neuronal ensembles, imaging, and behavioural. Morning lectures were followed in the afternoon by directly related hands-on tutorials, with instructors and PhD demonstrators present. Keynote presentations in the evening highlighted recent high profile studies and in one case, was a stimulating "Dialogue" on the merits of "high-level" versus "low-level" modelling. This course gave a practical introduction into how to use modelling and simulation tools and how to decide on an appropriate level of abstraction when modelling.

We had a strong line-up of instructors:

- Douglas Armstrong (Edinburgh)
- James Bednar (Edinburgh)
- Upi Bhalla (Bangalore)
- Angela Bongaarts (Allen Brain Atlas)
- Robert Cannon (Textensor Ltd.)
- Padraig Gleeson (UCL)

- Richard Morris (Edinburgh)
- Sacha Nelson (Brandeis)
- Matt Nolan (Edinburgh)
- Astrid Prinz (Emory)
- Arnd Roth (UCL)
- Peggy Series (Edinburgh)
- Barbara Webb (Edinburgh)

Most talks were videoed; we are in the process of editing and publishing the videos.

Participant statistics

Location of Institution	Number of Participants
United Kingdom	11
Australia	1
Finland	1
France	1
Greece	1
India	1
Italy	1
Portugal	1
Slovenia	1
Turkey	1
Total	20

Participant Demographics

other; 5%
Faculty; 10%
Postdoc; 10%
PhD student; 75%
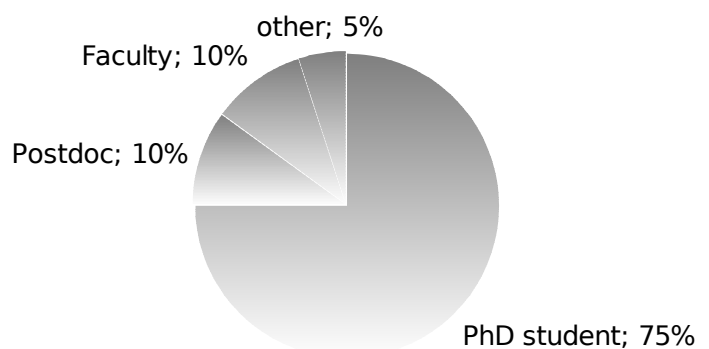
Budget

We covered all student accommodation costs and provided a midday meal. We also gave all students travel bursaries, with each student having a maximum allowance depending on their projected travel costs.

Expenditure

Student accommodation	£5960
Student travel	£4032
Instructor accommodation	£1278
Instructor travel*	£3605
Catering (including tea, coffee, lunches and social events)	£4189
PhD student demonstrator costs	£550
Admin support*	£995
Video capture*	£770
Advertising	£130
Total	**£21509**

* Some figures still provisional

Income: One student was eligible for SICSA (Scottish Informatics Computer Science Alliance) funding of £500. The Neuroinformatics DTC contributed £1000.

The net funding required from the INCF is therefore around £20,009.

Feedback & Review

This review is based on the perceptions of the organisers and the responses to our feedback forms. In general, the school seemed to work very well. The students all seemed content at the end of the week. The main ingredients seemed to be:
- Good speakers
- Good catering
- Good structure: Time in schedule for people to talk and digest lectures
- Good range of tools covered.
- All students and instructors staying in the same accommodation.
- Some social events.

Some aspects were particularly successful:
- A group of four students have formed a collaboration to model *C. elegans* circuits.
- The "Dialogue" between Upi Bhalla and Barbara Webb was very lively. It helped having free beer beforehand! We should maybe hold similar events locally in the future.
- Participants generally felt that the range of topics was good, even if there wasn't much time to go into depth. One comment was that this was an excellent course for a first year PhD student.

We felt some aspects could be improved on:
- At the start the students were a bit quiet. We thought of the following ideas to try to improve

the interaction:

- Get the students talking earlier. We had asked students to bring posters, which were on display throughout the week. This helped to get students talking a bit, but we could have made more use of them.
- Each student could give a very brief introduction or "poster spot", perhaps including one slide.
- Maybe we could organise more social events. Perhaps a local PhD student could help with this, or we could at least have a list of suggested activities.
- Would having a smaller (e.g. 12) or larger (e.g. 30-40) number of students improve the interaction? The organisers couldn't agree on this.
- Project time was a bit difficult to define: in a summer school of this duration there is not really enough time to do much project work. Some students suggested we should have more project time, others that we should have less, and others suggested we should ask students to work in groups. Nevertheless, we felt that having a project in mind gave students a focus, and also helped with the selection of students.
- Wireless access using visitor accounts was a bit tricky to set up:
  - We should encourage people to use eduroam beforehand.
- We could perhaps have given a bit more information about Edinburgh in advance and suggested to students that they stay a bit longer to have time to enjoy the city.

We learned some things along the way:

- It's good to have at least one of the organisers go out for dinner with the instructors in the evenings. This allows for feedback from the instructors.

Some other comments made by students (that haven't been addressed above):

- Could there be more information about the talks, e.g. slides or references, posted somewhere whilst the school is on?
- More notice was needed to produce the posters.
- More information about other participants in advance would be useful
  - not sure if this is possible due to data protection; hopefully the ideas about getting students talking early might help with this.
- The connection between levels wasn't very apparent
  - This is a fair point, though it is also part of the point to show students how much work there is left to do.
- Could the school be longer, do allow time for a better project?
  - Yes, but it would be a di#erent type of summer school.
- Could there be a Bayesian lab?

Appendix: Final Programme of the iCNS summer school Edinburgh 2012

Sunday 26th August

18:25	Meet at Reception at Polock Halls of Residence	All
18:30	Start walk to The Sheep Heid Inn	All
19:00	Welcome reception at The Sheep Heid Inn	All

Monday 27th August: Systems biology meets neuroscience

09:00	Registration at Informatics Forum (IF)	All
09:15	Welcome (Informatics Forum, room G.07)	David Willshaw
09:30	Talk: Gene expression data mining I	Angela Bongarts
10:30	Coffee Break	
11:00	Talk: Gene expression data mining II	Angela Bongarts
12:00	Lunch	
13:30	Tutorial 1: Allen institute tools	Angela Bongaarts
15:30	Coffee & Cake	
16:00	Attendee Project Time	
17:30	Evening Lecture: Bioinformatics meets neuroscience	Douglas Armstrong

Tuesday 28th August: Intracellular modelling

09:30	Talk: Principles of intracellular modelling, especially in neurons I	Upi Bhalla
10:30	Coffee Break	
11:00	Talk: Principles of intracellular modelling, especially in neurons II	Upi Bhalla
12:00	Lunch	
13:30	Tutorial 2: Using MOOSE to simulate intracellular pathways	Upi Bhalla
15:30	Coffee & Cake	
16:00	Attendee Project Time	
17:30	Lect: Mapping the relationship between gene expression and neural function	Sacha Nelson

Wednesday 29th August: From single molecules to neurons.

09:30	Talk: Ion channels and neural computation	Matt Nolan
10:30	Coffee Break	
11:00	Talk: Relations between structure and function of dendrites	Arnd Roth
12:00	Lunch	
13:30	Tutorial 3: PSICS	Robert Cannon & Matt Nolan
15:30	Coffee & Cake	
16:00	Attendee Project Time	
17:30	Evening Lecture: Homeostasis in neuronal circuits	Astrid Prinz
20:30	Dinner at Blonde	

Thursday 30th August: From networks to maps

09:30	Talk: Visual cortex maps I	Jim Bednar
10:30	Coffee Break	
11:00	Talk: Visual cortex maps II	Jim Bednar
12:00	Lunch	
13:30	Tutorial 5: Topographica and NEST	Jim Bednar
15:30	Coffee & Cake	
16:00	Attendee Project Time	
17:30	Dialogue: How should we try to understand the brain: low-level or high-level models?	Upi Bhalla & Barbara Webb

Friday 31st August: From neurons to networks

09:30	Talk: Cerebellar networks: Theory and experiment	Padraig Gleeson
10:30	Coffee Break	
11:00	Talk: Parameter non-uniqueness and ensemle modeling	Astrid Prinz
12:00	Lunch	
13:30	Tutorial 4: Neuroconstruct	Padraig Gleeson
15:30	Coffee & Cake	
16:00	Attendee Project Time	

Saturday 1st September: From circuits to psychophysics

09:30	Talk: From circuits to psychophysics with Bayesian methods I	Peggy Series
10:30	Coffee Break	
11:00	Talk: From circuits to psychophysics with Bayesian methods II	Peggy Series
12:00	Lunch	
13:30	Workshop: Student presentations	All
15:30	Coffee & Cake	
16:00	Course review	All
18:00	Farewell social event	All
20:00	Close	All

All talks are at the Informatics Forum G.07, all tutorials are at the Appelton Tower AT 4.12 (except on Monday: at Greenfield Suite)