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What is Neuroinformatics?

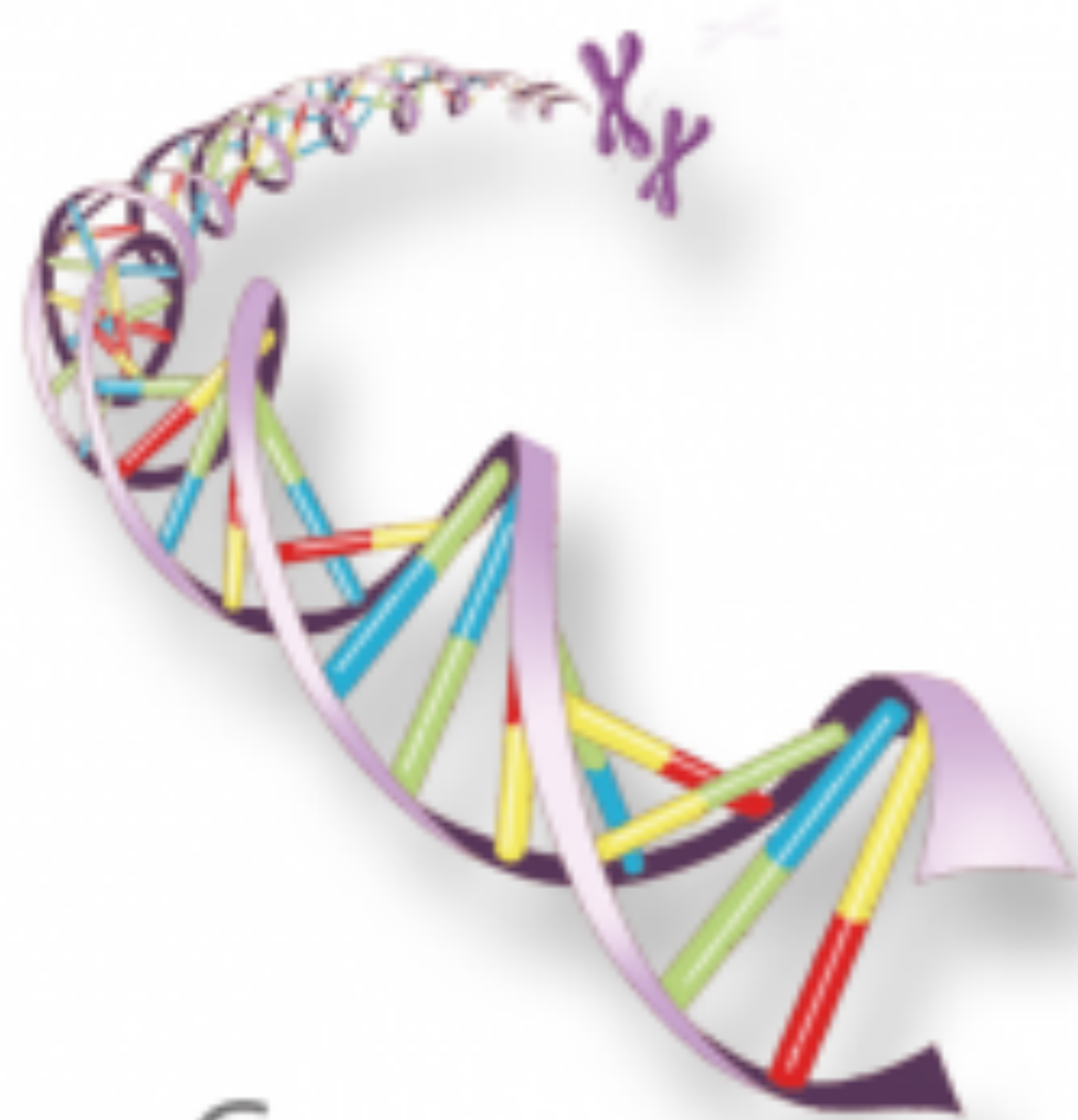
Neuroinformatics is informatics applied to neuroscience. This includes processing and sharing of data (of many types). It can also mean neuroscience applied to informatics, seeking novel paradigms for computing.

Why Neuroinformatics?

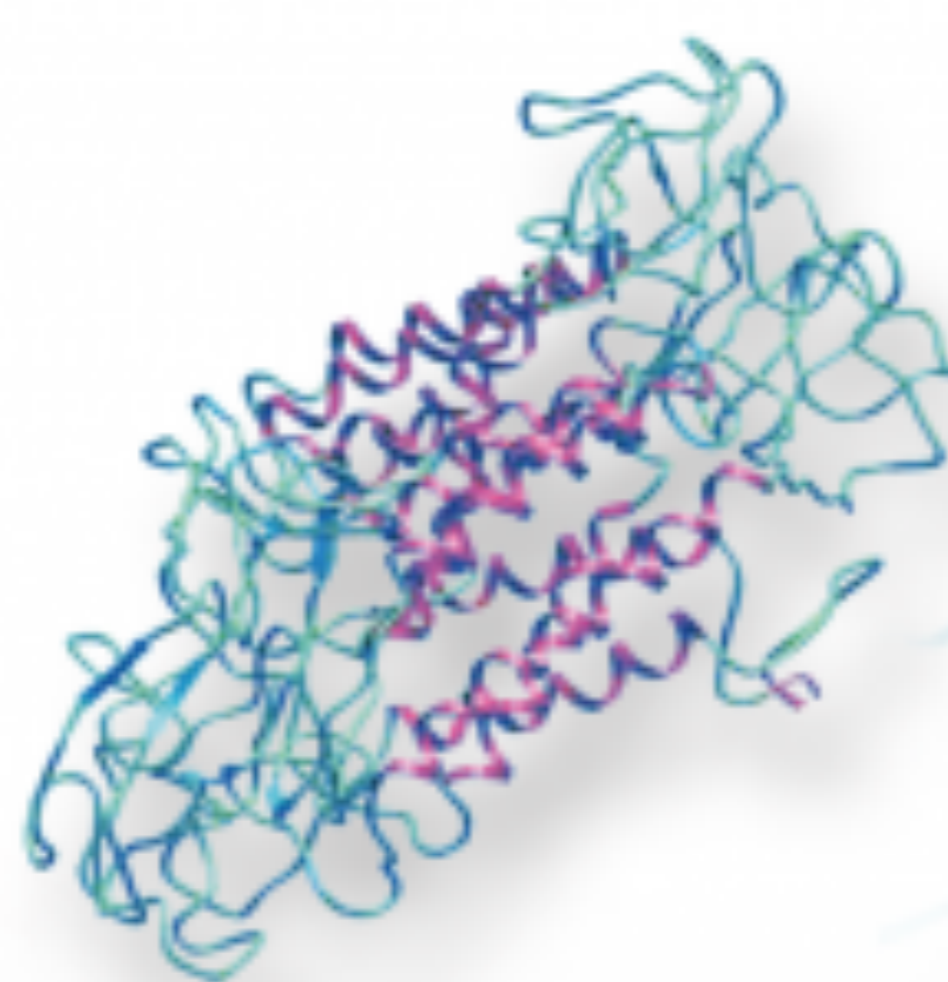
Collaboration between neuroscientists and computer scientists is necessary to make both new and old neuroscience data more accessible and more useful to the research community, and to advance our understanding of the brain at a much faster rate than previously possible. It may also enable better brain-like information processing.

What are the aims of Neuroinformatics?

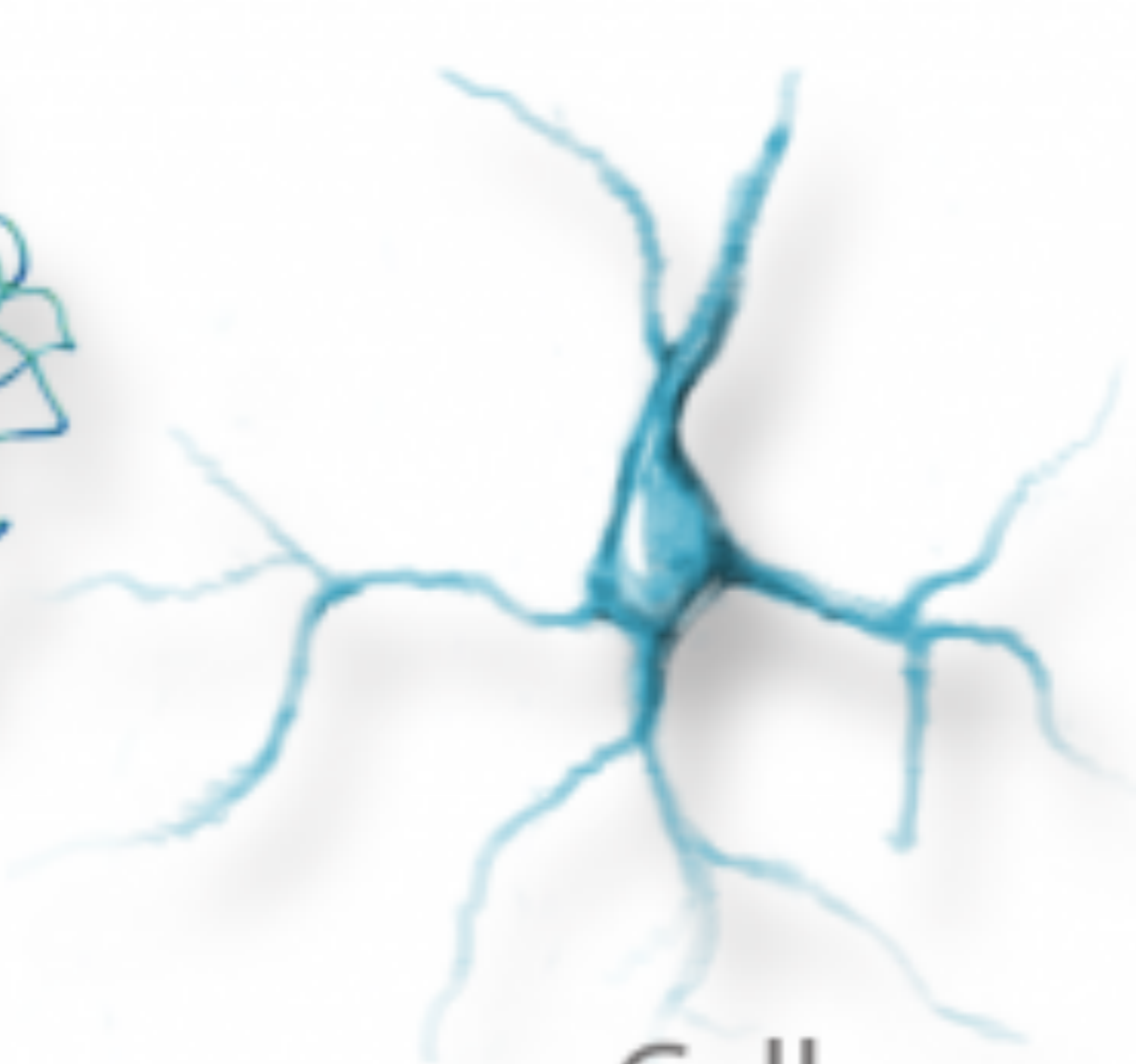
Neuroinformatics aims (i) to enable re-use of data and analysis tools in neuroscience, enabling reproducibility of analyses, and (ii) to enhance collaboration between neuroscientists and informaticians in all areas of neurally related endeavour.



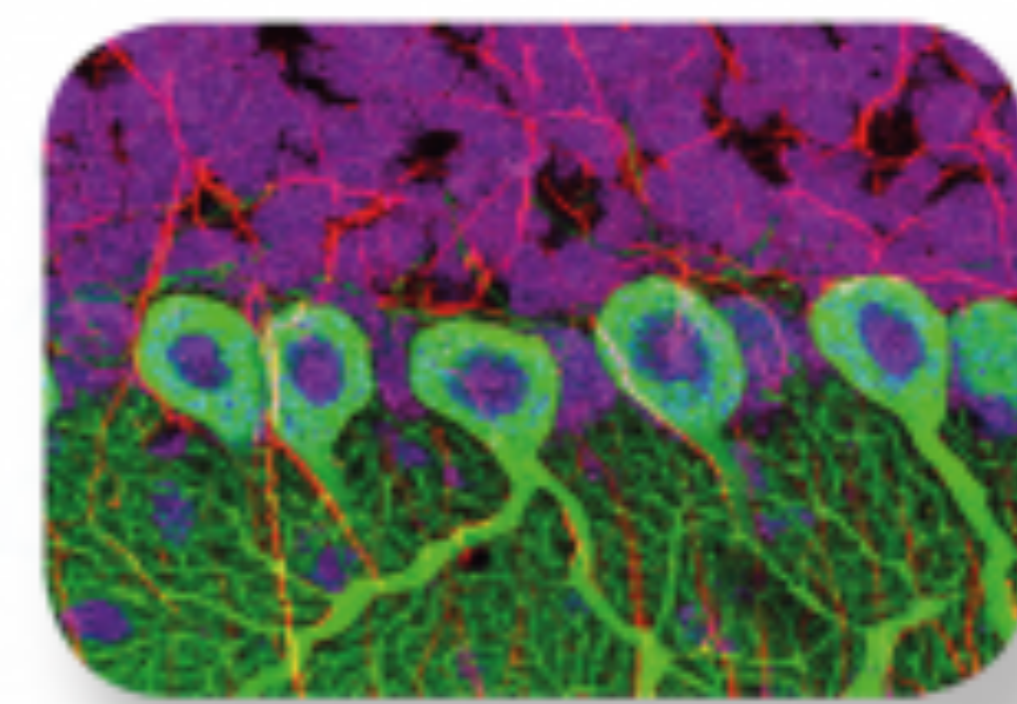
Gene
expression



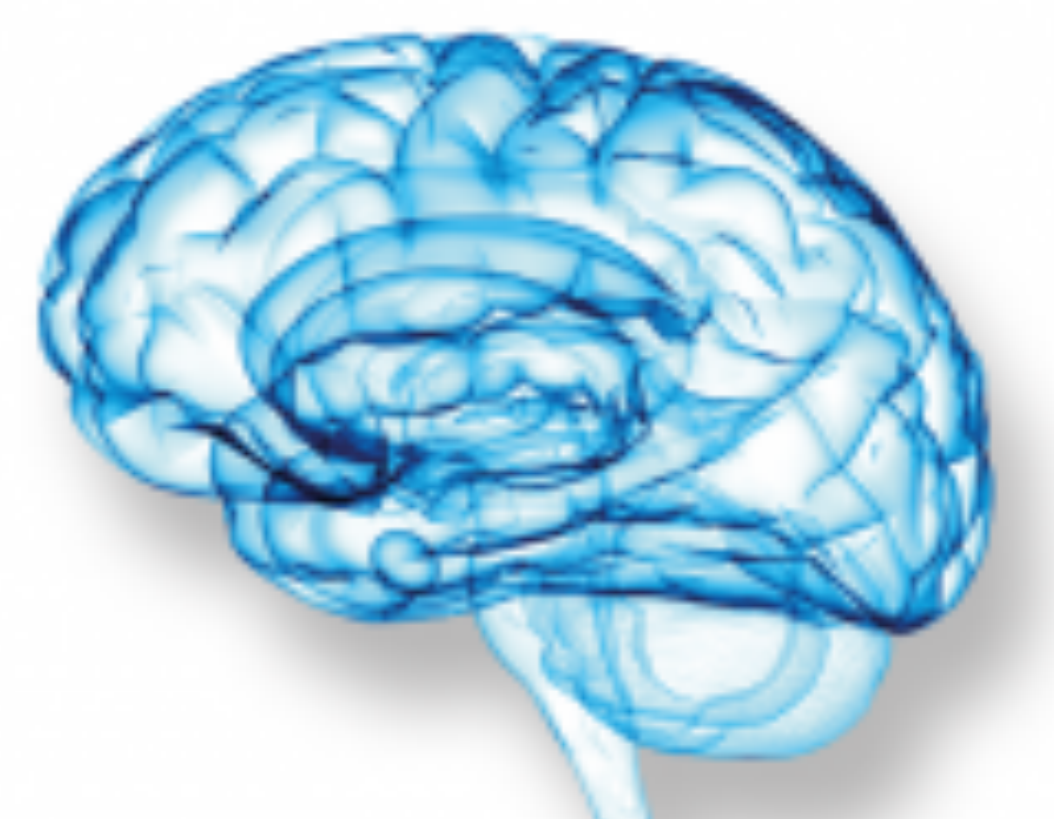
Molecular
structures



Cell
morphology



Imaging
data



Whole
brain

Neuroinformatics integrates information across all levels and scales of neuroscience

(image courtesy of INCF)

Neuroinformatics is both national and international

The UK Neuroinformatics Network was set up following a workshop on UK Neuroinformatics in Edinburgh in 2005. In January 2008, it became the UK node of the International Neuroinformatics Coordinating Forum (INCF) which is headquartered in Stockholm.

As well as taking an active part in the activities of the INCF, the UK Neuroinformatics Node organises meetings which aim to bring together wet (experimental and clinical) neuroscientists, and neuroinformaticians interested in helping with data sharing and analysis. We share the INCF's aim of *developing collaborative neuroinformatics infrastructure and promotes the sharing of data and computing resources to the international research community.*

Replicability and re-use

Experiments whose results cannot be replicated present serious problems. In neuroscience, no experiment is ever repeated precisely, but it should always be possible to replicate the *analysis* of the results. The UK Neuroinformatics works to try to ensure that this is the case, by encouraging sharing of data and of analysis techniques across neuroscience. We enable and encourage both multiple methods of analysis of new and existing datasets, and the application of multiple analysis tools to new and existing datasets, in order to extract the maximum amount of useful information from data. Using multiple analysis tools, tested on multiple datasets will increase confidence in the results of data analyses.

Training

Training in methods that enable effective collaboration, effective use and re-use of data and analysis tools, as well as cross disciplinary education that enables collaboration between informaticians and neuroscientists is critically important. Courses have been organised (with INCF), most recently in Reading, in September 2016.

Neuroinformatics in the UK now:

A new special interest group on Neuroinformatics is being set up by the British Neuroscience Association. This reflects the range of Neuroinformatics work ongoing in the UK.

Here are some examples of this work:

Neurological issues: specifically traumatic brain Injury, and Issues on Neuroinformatics and critical care (post TBI)

David Menon & Ari Ercole, Department of Medicine, University of Cambridge

Neural activity during natural behaviour

Rasmus Petersen group, Neural Coding Laboratory, Faculty of Life Sciences, University of Manchester

Neuroinformatics opportunities and challenges in in vivo and ex vivo imaging of neural circuits

Simon Schultz group, Bioengineering, Imperial College London

Open code initiatives

Stephen Eglon, Cambridge (working with Wellcome)

Atlasing for embryonic animals

Albert Burger (Heriot-Watt, Edinburgh), Richard Baldock (London)
Working with Elixir (EU project: sharing data in the life sciences)

Portal-based co-laboratory for data sharing, code sharing in neuro-electrophysiology

Jim Austin (York), Evelyne Sernagor (Newcastle)

Neuromorphic engineering: biologically inspired circuitry:

Piotr Dudek (Manchester).

Neuroinformatics in targetting epilepsy surgery

Marcus Kaiser et al (Newcastle)

Neuro-computational modelling in Psychiatry

Peter Dayan et al (Gatsby and UCL, London)

Synapse atlas of the brain

Seth Grant, Genes2Cognition

MRC Brain dynamics group

Rafal Bogacz, Oxford.

Connections to Bioinformatics

Anne Smith, St Andrews, Armstrong, Edinburgh (integrative physiology)