



From Bioinformatics to Astroinformatics curriculum : A French experience

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BigSkyEarth Cost Action meeting
Sorrento (Italy), October 24-25, 2016

Summary

- Goal
- Bioinformatics education
 - France
 - Worldwide
- Outcome : Lesson learned

Goal

Objective of the meeting :

« ... will address the question of **how to train** a new generation of **astronomy** and **Earth observation** scientists in the age of interdisciplinarity driven by big data.

Modern data-intensive research requires natural science students trained in software engineering, algorithms, and data mining, data management and visualization.

These trends challenge the current paradigm of what constitutes **education in astronomy or Earth observation.** »

Goal

- No
 - Define a curriculum for Astroinformatics
 - Compare Bioinformatics to Astroinformatics courses
 - Looking to research in both disciplines
- Yes
 - Can lessons learned in Education from Bioinformatics contribute to Astroinformatics ?

Goal

- Biology

-

- ...

- Bioinformatics

- ...

- Physics

-

-

- Astronomy

- ...

- ...

- Astroinformatics

- Physico-informatics

- ...

Goal

- Podcast of Pauline Barmby (Department of Physics And Astronomy at Western University in London, Ontario, Canada), May 6, 2012

« ... Astroinformatics is the sub-field of astrophysics that involves organizing, describing, classifying, visualizing, and mining astronomical data.

It's similar to bioinformatics in biology, which arose out of the need to deal with the large volume of data produced by *molecular* biology (e.g., genome sequencing). ... »

Goal

- Podcast of Pauline Barmby (Department of Physics And Astronomy at Western University in London, Ontario, Canada), May 6, 2012

« While astrophysicists have often had to deal with large quantities of data, the idea of **astroinformatics as a separate research area is relatively new.**

Like bioinformatics some years ago, astroinformatics is currently in something of a boundary area between astrophysics and computer science, and the methods of doing things are still being sorted out.

The reason that astroinformatics has emerged as its own research area is that we are experiencing a major change in the kind of **observational data** that's become available. ... »

Bioinformatics Education

A brief history of genome research and bioinformatics in France

Article in *Bioinformatics* 16(1):65-75 · February 2000 with 10 Reads

DOI: 10.1093/bioinformatics/16.1.65 · Source: PubMed



1st [Antoine Danchin](#)

48.66 · Institute of Cardiometabol

Abstract

The development of *in silico* genomics has progressed slowly in France for a number of political reasons. Two administrative organizations, the Groupement de Recherche sur les Génomes (GREG) and the Groupement de Recherche 1029 (GDR 1029) of the Centre National de la Recherche Scientifique (CNRS) have been established. These organizations have created the dynamics that hopefully will place France (which coordinated consortia that completed several of the first large microbial genomes) among the developed nations that support Large-Scale Biology.

Bioinformatics Education

- History in France :
 - Before 1985 :
 - Already research in Bioinformatics
 - Some significant events :
 - Increase of Biological data bases (GenBank, SwissProt, ...)
 - Efficient programs (Alignment, ...)
 - **Industrial interest**
 - ...
 - 1985 : Need for education
 - No academic program (Bachelor, Master)
 - PhD Student (Self-training or specialized courses)

Bioinformatics Education

- History in France :
 - After 1985 : 3 periods
 - First period : (til 1991)
 - Master Program :
 - » CS courses in Biology program → Biologist with CS background
 - » Biology courses in CS program → CS scientists with Bio background
 - » 1987 : « Master in Bioinformatique » ---- 1st in Europe
 - Second period : (1991-1997)
 - ...
 - Third period : (1997-)
 - Master Program :
 - » Bio & CS courses : Need for a bioinformatician profile
 - Undergraduated program

Bioinformatics Education

Example : Bachelor in Biology, speciality Bioinformatics

Semestre S5			Semestre S6		
		crédits			crédits
UE 1	Biologie moléculaire	6	UE 1	Bio-informatique	3
UE 2	Génétique	3	UE 2	Projet Professionnel 3	3
UE 3	Métabolisme	3	UE 3	Génomique fonctionnelle et génétique	3
UE 4	Programmation I	6	UE 4	Travaux Pratiques	3
UE 5	Algorithmique	3	UE 5	Programmation II	6
UE 6	Base de données I	3	UE 6	Bio-statistiques avancées	3
UE 7	biostatistique	3	UE 7	Modélisation de systèmes biologiques	3
UE 8	Anglais scientifique	3	UE 8	UE de spécialisation	6

Bioinformatics Education

- In France :
 - Academic program (<https://jebif.fr/fr/bioinformatique/les-formations/>)
 - Bachelor
 - **Master**
 - PhD
 - Specialized courses / Training
 - But, not a discipline → Interdisciplinarity
 - Biology
 - Computer science

Bioinformatics Education

French Bioinformatics Platforms Network (RENABI)

RENABI gathers 13 french bioinformatics platforms, 8 of them depending on the corresponding genopole. These 13 platforms are : the platform of the genopole of Lille the platform of OUEST-Genopole the platform of the genopole Grand-Est (Strasbourg) the Computing Center of Pasteur Paris the Paris Resource in Structural Bioinformatics (Ressource Parisienne en Bioinformatique Structurale, RPBS) the MIG (Mathematics Computing and Genome) unit of INRA Jouy-en-Josas Genoplante-Info, maintained by the URGI (Genomic-Info Research Unit) unit of INRA in Evry. the Genoscope, national DNA sequencing center in Evry the Rhône-Alpes Bioinformatics Center, PRABI (Lyon-Grenoble) the Bioinformatics Center of Bordeaux (CBiB) the platform of the genopole of Toulouse the IGS (Genomic and Structural Information) platform of the genopole of Marseille-Nice the IMGT (ImMunoGeneTics) platform and other servers in association with the genopole Montpellier Languedoc-Roussillon They provide: computing capacity, storage capacity (for local users mainly), access to the most used software and to the new tools developed locally, support for these software and tools, teaching and training in bioinformatics.

Bioinformatics Education

Welcome to the French Institute of Bioinformatics.

The French Institute of Bioinformatics (referred to as IFB hereafter) is a national service infrastructure in bioinformatics that was created following the call for proposals, "National Infrastructures in Biology and Health", of the "Investments for the Future" initiative (ANR-11-INBS-0013).

This project gathers together the bioinformatics platforms of the main French research organizations, **CNRS**, **INRA**, **INRIA**, **CEA** and **INSERM**, as well as **CIRAD**, the **Pasteur** and **Curie** Institutes, and the French universities. There are currently 30 **platforms** grouped into six regional centers that span the whole of France.

IFB's principal mission is to provide basic **services** and resources in bioinformatics for scientists and engineers working in the life sciences.

IFB is the French node of the European research infrastructure, **ELIXIR**.

IFB's partners in the French Bioinformatics community are the **French Society of Bioinformatics** (SFBI) and **the CNRS network for Bioinformatics research** (GdR BIM). A list of French laboratories having a Bioinformatics activity is available **here**.

Bioinformatics Education


- Worldwide :
 - Recommendation from the Curriculum Task Force of the ISCB Education Committee, **of curricular guidelines for those who train and educate** bioinformaticians.



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MESSAGE FROM ISCB

Bioinformatics Curriculum Guidelines: Toward a Definition of Core Competencies

Lonnie Welch , Fran Lewitter, Russell Schwartz, Cath Brooksbank, Predrag Radivojac, Bruno Gaeta, Maria Victoria Schneider

Published: March 6, 2014 • <http://dx.doi.org/10.1371/journal.pcbi.1003496>