

Introduzione al corso di Bioinformatica e Biostatistica AA 2016-2017

Docente: Andrea Benazzo
bnzndr@unife.it

Programma (Teoria)

- I. Trasferimento dell'informazione genetica**
- II. Organizzazione dei genomi**
- III. Tecniche di sequenziamento di nuova generazione**
- IV. Output di un sequenziatore di nuova generazione**
- V. Assemblaggio di un genoma *de-novo***
- VI. Identificazione di polimorfismi usando un genoma di riferimento**
- VII. Tecniche di rappresentazione ridotta di un genoma (Rad Seq)**
- VIII. Concetti di Statistica teorica & applicata con R**

Esercitazione di laboratorio

Scopo: Identificazione di SNP e INDEL in un organismo eucariote

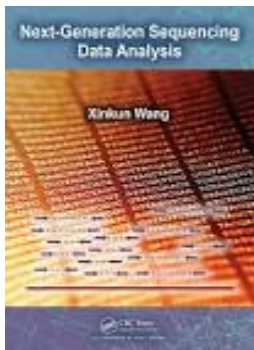
- Preparazione di un genoma di riferimento
- Controllo della qualità delle reads
- Allineamento delle reads al genoma di riferimento
- Identificazione e rimozione dei duplicati di PCR
- Identificazione della posizione dei polimorfismi e chiamata dei genotipi
- Interpretazione dei risultati mediante analisi statistica

Possibili test di riferimento

- Bioinformatica, Pascarella e Paiardini, Zanichelli

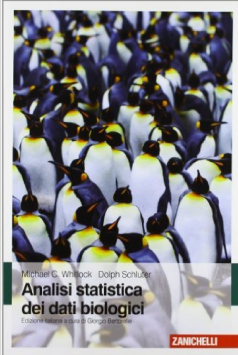


- Next-Generation Sequencing Data Analysis, Xinkun Wang, CRC Press



Possibili test di riferimento

- Analisi statistica dei dati biologici, Whitlock & Schluter, Zanichelli



Orario

Orario generale: Lun 14.30/16.30 - Mar 11.30/13.30

Attenzione alla 6-7-12° settimana

Discipline trattate I

Genomics

Genomics is a discipline in **genetics** that applies recombinant DNA, DNA sequencing methods, and bioinformatics to **sequence, assemble**, and analyze the **function** and **structure** of genomes (the complete set of DNA within a single cell of an organism)

Bioinformatics

Bioinformatics is an **interdisciplinary** field that develops methods and software **tools** for understanding biological data. As an interdisciplinary field of science, bioinformatics combines **computer science, statistics**, mathematics and engineering to study and process biological data.

Discipline trattate II

Biostatistics

Biostatistics is the application of **statistics** to a wide range of topics in biology. The science of biostatistics encompasses the **design of biological experiments**, especially in medicine, pharmacy, agriculture and fishery; the **collection**, **summarization**, and **analysis of data** from those experiments; and the **interpretation** of, and inference from, the results

Bioinformatics

The field of science in which **biology**, **computer science** and **information technology** merge into a single discipline

Biologists

collect molecular data:
DNA & Protein sequences,
gene expression, etc.

Bioinformaticians

Study biological questions by
analyzing molecular data

Computer scientists

(+Mathematicians, Statisticians, etc.)
Develop tools, softwares, algorithms
to store and analyze the data.



Produced by the Science/AAAS Custom Publishing Office

An Explosion of Bioinformatics Careers

Big data is everywhere, and its influence and practical omnipresence across multiple industries will just continue to grow. For life scientists with expertise and an interest in bioinformatics, computer science, statistics, and related skill sets, the job outlook couldn't be rosier. Big pharma, biotech, and software companies are clamoring to hire professionals with experience in bioinformatics and the identification, compilation, analysis, and visualization of huge amounts of biological and health care information. With the rapid development of new tools to make sense of life science research and outcomes, spurred by innovative research in bioinformatics itself, scientists who are entranced by data can pursue more career options than ever before. **By Alaina G. Levine**



Spotlight on Bioinformatics

[Search science jobs in United States](#)

NatureJobs (2016) doi:10.1038/nj0478







Published online 06 April 2016

Biology goes digital

A new species of biologist is beginning to thrive in the niche created by recent genomic and computational advances.

THERE ARE two paths to careers in bioinformatics, both of which require learning a new language. Computer scientists must become fluent in the life science terminology of genetics, genomics and cellular biology. Biologists must pick up skills in data analysis, including statistics, logic and programming. When the field was developing, fledgling bioinformaticians often taught themselves. Now, more institutions are offering formal training, and the field is maturing rapidly.

The skill set needed by a bioinformatician continues to evolve. In the early days of the human genome project, it was sufficient for scientists to find homologous genes of one organism in the genome of another. Now, bioinformaticians routinely compare multiple genomes, analyse regions that don't code for DNA, and incorporate a host of proteomic information in their analysis. Both the type and amount of information continues to expand, as biological techniques continue to improve.

-  print
-  email
-  download pdf
-  order reprints
-  rights and permissions
-  share/bookmark

" It's important to enjoy your job and be motivated: the best ideas come whilst I'm in bed, or walking my dog, or having a coffee with colleagues. "

Federico Abascal