Advanced Bioinformatics Workshop

Date: Monday, August 20th – Friday, August 24th, 2018
Venue: Adriatico Guest House - Denardo Lecture Hall
International Centre for Theoretical Physics
Trieste, Italy
Course URL: http://www.codata.org/datatrieste2018
Material: https://codata-rda-advanced-bioinformatics-2018.readthedocs.io

Description

This advanced bioinformatics course will provide an overview of the current status of different NGS workflows (variant calling, RNA-Seq, ChIP-Seq, etc), and combine them with the appropriate Machine Learning and Data Mining approaches. The course will heavily rely on hand-on exercises and tutorials, and attempt to provide a strong foundation on the underlying theory.

Instructors

- **Fotis Psomopoulos**, Institute of Applied Biosciences (INAB|CERTH) / ELIXIR GR
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- **Amel Ghouila**, Institut Pasteur de Tunis / H3Bionet
- **Gabriele Schweikert**, Cyber Valley Initiative, University of Tuebingen, DE / Computational Biology, University of Dundee, UK

Course Schedule

	Topic
Day 1	
11:30 – 12:30	Experiments: Design and Analysis
14:00 – 15:00	Components of an Experiment. What is a good experiment design?
15:00 – 16:00	Data Distributions and Multiple Hypotheses Adjustment Methods
16:15 – 18:00	Introduction to basic NGS pipelines
Day 2	
09:00 – 10:00	Introduction to basic NGS pipelines
10:00 – 11:00	Short read quality and trimming (part 1)
11:30 – 12:30	Short read quality and trimming (part 2)
14:00 – 15:00	Mapping
15:00 – 16:00	Variant calling (part 1)
16:15 – 18:00	Variant calling (part 2)
Day 3	
09:00 – 10:00	Introduction to DM and ML, Machine Learning basic concepts
10:00 – 11:00	Taxonomy of ML and examples of algorithms
11:30 – 12:30	Applications of ML in Bioinformatics
14:00 – 15:00	RNASeq analysis in R
15:00 – 16:00	RNASeq analysis in R to be continued
16:15 – 18:00	RNASeq analysis in R to be continued

Day 4	
09:00 – 10:00	Introduction to ChIP-Seq, ATAC-Seq, BS-Seq
10:00 – 11:00	Hands-on application: ChIP-Seq workflow (part 1)
11:30 – 12:30	Hands-on application: ChIP-Seq workflow (part 2)
14:00 – 15:00	Hands-on application: ATAC-Seq
15:00 – 16:00	Hands-on – Apply algorithms to own dataset
16:15 – 18:00	Hands-on
Day 5	
09:00 – 10:00	Introduction to Regression
10:00 – 11:00	Hands-on application: regression algorithms - pros and cons
11:30 – 12:30	Closing, Final Remarks, Post-workshop survey