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

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
- **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 Machine Learning and Data Mining
10:00 – 11:00	Taxonomy of Machine Learning algorithms
11:30 – 12:30	Taxonomy of Data Mining algorithms
14:00 – 15:00	Hands-on lab: NGS pipelines
15:00 – 16:00	Hands-on lab: NGS pipelines
16:15 – 18:00	Hands-on lab: NGS pipelines
Day 3	
09:00 – 10:00	Introduction to Supervised algorithms
10:00 – 11:00	Hands-on Application to supervised algorithms
11:30 – 12:30	Hands-on Practical Topics in ML/DM Part 1
14:00 – 15:00	Hands-on Clustering Part 1
15:00 – 16:00	Hands-on Clustering Part 2
16:15 – 18:00	Hands-on - Apply algorithms to own dataset
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	Evaluation of different regression algorithms: pros and cons
11:30 – 12:30	Hands-on application to categorical cases
14:00 – 15:00	Hands-on application to numerical cases
15:00 – 16:00	Discussion on Regression
16:15 – 18:00	Closing, Final Remarks, Post-workshop survey