Mohamad Ballan

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Bologna, Italy

WORK EXPERIENCE

15/03/2019 – 15/01/2020
BIOINFORMATICIAN – INTERNSHIP AND MASTER THESIS

Bioinformatician – Internship and master thesis
Laboratory: Animal and Food Genomics Group (DISTAL, University of Bologna)
Supervisor: Prof. Luca Fontanesi
The activities focused on the analysis of genomic big data of different livestock. Datasets included genome and phenotype information of Italian pig breeds, Italian cattle breeds, and Italian rabbit breeds/lines. In particular, activities regarding the implementation of several different bioinformatics pipelines that included data storage and management, data curation, data analysis, and interpretation. The following activities were carried out:

- Quality control of genome and phenotype information (pigs, cattle, and rabbits). Curated database and reports were returned as a result;
- Identification of haplotypes from genome data (pigs, cattle, and rabbits);
- Genome-wide association studies (GWAS) analysis of production traits. Analyses were carried out considering both DNA markers and haplotypes (pigs);
- Genome-wide association studies (GWAS) analysis of reproductive traits. Analyses were carried out considering both DNA markers and haplotypes (pigs);
- Genome-wide association studies (GWAS) analysis of hematological traits. Analyses were carried out considering haplotypes and different statistical approaches (pigs);
- Identify the putative lethal genetic variant affecting production and reproductive traits in Italian pigs populations (pigs and cattle);
- Detection of Runs of Homozygosity Analysis (ROH) and ROH Island from genome data (cattle);
- Copy number variant (CNV) detection in pigs;
- Functional annotation of genome regions/variants. Different biological databases were used in this part of the workflows, including the Animal QTL database;
- Functional annotation of protein variants;
- Presentation of results during laboratory meetings.

Activities were carried out in the frame of Systems Biology applied to big data analysis in livestock. Acquired skills comprised the management and integration of different data and meta-data.

EDUCATION AND TRAINING

28/11/2017 – 29/05/2020 – Bologna, Italy
INTERNATIONAL MASTER'S DEGREE IN BIOINFORMATICS (LM-6) – University of Bologna

Master thesis: Genome-wide haplotype-based studies of reproductive traits in pigs: focus on homozygous allele deficiency
Supervisor: Prof. Luca Fontanesi
Subjects / occupational skills covered
■ Laboratories of Bioinformatics, the courses required the implementation of three projects:
1. Machine learning approaches for predicting the secondary structure of proteins

2.Modeling of protein 3D-structures based on the building by homology approach

3.Development of a profile HMM for the recognition of a protein domain

- Programming for Bioinformatics
- Algorithms and data structures for computational biology
- Applied genomics
- Proteomics and Interactomics
- Systems and in silico biology
- Biomedical databases
- DNA/RNA dynamics

LANGUAGE SKILLS

Mother tongue(s): **ARABIC**

| | UNDERSTANDING | | SPEAKING | | WRITING |
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	B2	B2	B2	B2	B2
ITALIAN	A2	A2	A2	A2	A2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

PUBLICATIONS

Publications

- ○ **Peer-reviewed article**:
Bovo S, <u>Ballan M</u>, Schiavo G, Gallo M, Dall'Olio S and Fontanesi L (2020). *Haplotype-based genome-wide association studies reveal new loci for haematological and clinical-biochemical parameters in Large White pigs*. [**Animal Genetics**, *in press*, DOI: 10.1111/age.12959]
    - ○ **Submitted publications**
Samuele Bovo, Giuseppina Schiavo, Anisa Ribani, Valerio J. Utzeri, Valeria Taurisano, <u>Mohamad Ballan</u>, Maria Muñoz, Estefania Alves, Jose P. Araujo, Riccardo Bozzi, Rui Charneca, Federica Di Palma, Graham Etherington, Ana I. Fernandez, Fabián García, Juan García-Casco, Danijel Karolyi, Maurizio Gallo, Kristina Gvozdanović, José Manuel Martins, Marie-José Mer-cat, Yolanda Núñez, Raquel Quintanilla, Čedomir Radović, Violeta Razmaite, Juliette Riquet, Radomir Savić, Martin Škrlep, Graziano Usai, Christoph Zimmer, Cristina Ovilo, Luca Fontanesi (2020) Variability in pig (Sus scrofa) genes coding for receptors and priming proteins involved in SARS-CoV-2 and other coronavirus infections [**submitted**]

HONOURS AND AWARDS

Honours and awards

The Italian Ministry of Foreign affairs and International cooperation scholarship (MAECI) (2018-2019)

COMPUTATIONAL AND TECHNICAL SKILLS IN BIOINFORMATICS FIELD

Computational and technical skills in Bioinformatics field

Ability to communicate and work in a team, especially in heterogeneous groups that require knowledge in different disciplines such as bioinformatics, genetics, statistics, and animal science.
General informatics skills Knowledge of:
- ○ Windows and Unix Ubuntu as operative systems
- ○ Office and OpenOffice suites

Technical skills:
- ○ Working in a Linux environment (server)
- ○ Shell scripting
- ○ Programming skills in R and Python
- ○ Knowledge of scikit-learn tool for Machine Learning in Python
- ○ PLINK and SHAPEIT software for estimation of haplotypes from genotype or sequencing data
- ○ GEMMA for genome-wide association studies (GWAS) and other large-scale data sets
- ○ Biological and Genome databases : (Ensembl, Animal QTLdb, GeneCards, UniProtKB)
- ○ PennCNV for Copy Number Variation (CNV) detection from SNP genotyping arrays
- ○ Bedtools for genome feature extraction
- ○ HMMER for bio sequence analysis using profile HMM
- ○ MODELER for protein structure homology modeling and protein structure inspection

● WORKSHOPS AND COURSES

Workshops and Courses

- ○ **High-performance bioinformatics**, December 2018, Cineca Rome - Verified at https://drive.google.com/file/d/1Bwc67txsOz5pfnWgJ3bPzgnK_H0fglW1/view
- ○ **Data carpentry workshop**, University of Milano-Bicocca, February 2019 - Verified at https://drive.google.com/file/d/13vW6Tv0sJY_d8Jt45DTiUGtRK75aLxJr/view
- ○ **Advanced one week course: "Protein-protein interaction and docking"**, February 2018 under Prof. Allegra Via, University of Bologna
- ○ **"19th Bologna Winter School -Big Data and Bioinformatics"** February 2018, Bologna, Italy
- ○ **Advanced course: "Cracking the disease code: mapping genomes to pathogenesis pathways"**, May 2018, Bologna, Italy
- ○ **Special Advanced Course on "RNA Analysis". Prof. Cedric Notredame -Centro de Regulacio Genomica-Barcelona** September 2018, Bologna, Italy
- ○ **Using Python for Research on the edX platform** online course - Verified at https://courses.edx.org/certificates/a179f011b315474ca66825a8d4e3bb06
- ○ **"Data Science Methodology" by IBM on Coursera** online course - Verified at https://www.youracclaim.com/badges/7dc5b0d8-b3ec-43c6-b9bb-fe4edd6c2a2d/public_url
- ○ **"Data Science Orientation" by IBM on Coursera** online course - Verified at https://www.youracclaim.com/badges/f236cd93-255d-40ef-b041-d2ad70a74830/linked_in_profile