

COURSE TITLE: Machine Learning with Python (Andrea Bizzego, 10 hours - 2 cfu)

PERIOD: March 2024

COURSE CONTENTS, OBJECTIVES AND LEARNING OUTCOMES

Description of activity and topics:

The course will introduce the fundamentals of machine learning, with practical sessions based on scikit-learn, and other Python packages. The course will adopt the flipped-classroom approach: reading material, resources and homeworks will be assigned before each class, which will be dedicated to the discussion of the results and of scientific aspects. In particular, the course will focus on the use of machine learning as a data-driven, exploratory framework for hypotheses generation and extraction of knowledge from big datasets. The recent developments of the explainable Artificial Intelligence trend will be also discussed.

Specific learning objectives (i.e. specific knowledge and skills that the participants in the activity will acquire):

- Know what is a machine learning model, what are the weights, parameters and hyper-parameters;
- Know the key procedures to train machine learning models and implement it using Python
- Know the key approaches to evaluate the performance of machine learning models
- Develop a machine learning project for exploratory analysis

DUBLIN DESCRIPTORS (Indicate the learning objective(s) that the activity aims to achieve, exercise and/or consolidate)

- systematic understanding of a field of study and mastery of the skills and methods of research associated with that field;
- ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity;
- ability to make a contribution through original research that extends the frontier of knowledge by developing a substantial body of work, some of which merits national or international refereed publication;
- ability to critically analyse, evaluate and synthesise new and complex ideas;
- ability to communicate with their peers, the larger scholarly community and with society in general about their areas of expertise;
- ability to promote, within academic and professional contexts, technological, social or cultural advancement in a knowledge based society;

ENTRANCE REQUIREMENTS (Indicate any specific knowledge and/or skills that the student must have in order to participate in the activity)

- Basic computer science knowledge.
- Basic coding skills (some introductory materials will be shared).
- Students are required to setup a working Python software development environment before the beginning of the course. Instructions will be provided in advance..

TEACHING AND LEARNING METHODS AND ACTIVITIES

Flipped classroom, project based learning

ASSESSMENT OF THE ACHIEVEMENT OF LEARNING OBJECTIVES (Possibly an activity carried out independently by the student functional to his/her research activity)

The assessment will be based on the presentation of a personal project that the student will develop during the course.

BIBLIOGRAPHY /STUDY MATERIALS (video-lessons, etc.) (Specificare se il materiale va letto, visionato, etc. prima degli incontri)

Resources and material to prepare the working environment and refresh some coding skills will be made available to students. The proposed activities must be completed before the first class.