WebValley
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WebValley 2021

A project of AI for Healthcare

August 16 - August 29, 2021

webvalley.fbk.eu

21st edition

WebValley 2021

WebValley is the international FBK summer school for data science and AI-based interdisciplinary research. Also this year the school is run on-line, adopting a distance learning approach as experienced during Covid-19 lockdown in 2020: participants will attend streaming courses and workshops held by experts and researchers, and they will be provided with multimedia learning material. Meanwhile, a head office will be set up at the Artigianelli high school in downtown Trento, in order to allow the team tutors to manage the scientific and educational activities of the students, who will be guided throughout the experience with effective work methodologies and cooperative tools.

The WebValley Lab provides computing resources to test new ways of exploring the principles of applied data science and predictive models. Students joining the school work in a lively, interactive and, this year, virtual environment together with a group of selected experts, also interacting with other labs.

Almost 400 students (17-19y old) have attended the WebValley camps since its first edition in 2001,

as true protagonists of a challenging research project. The school is sponsored by FBK, the FBK Trustees Board, and the partner organizations, providing human as well as computing and scientific resources, and venue for the head office. Each year, the team includes students from Trentino, nationals and internationals.

The requirements to participate are:
*   High School student (for Italy: 4th year completed)
*   Good knowledge of English
*   Enthusiasm in science and new technologies
*   Above-average school records
*   1 Student Motivation letter
*   1 Teacher's Recommendation letter

Applicants need to demonstrate their inquisitiveness, their programming skills and their interest in STEM domains or in the topic of the year. In addition, aptitude to teamwork is crucial requirements to participate. Candidates are scored both for background knowledge and for motivation to contribute to the project.

The 2021 Challenge

In 2021 the team of about 20 students, supported by FBK researchers and other tutors of international level will delve into a project of AI for Healthcare and Precision Medicine, in collaboration with FBK Digital Health and Wellbeing research centre and the DSH and eHealthLab research units.

Data Science and AI are pervasively spreading into the Life Science domain, opening the doors to a near future where algorithms are considered proper medical devices certified by institutional agencies. In this scenario, a growing number of prognostic tools are developed and tested to support physicians in their daily clinical tasks, with a particular interest in predictive systems raising red flags when signals of worsening conditions are detected. In particular, the WebValley 2021 Team will be involved in the development, implementation, and validation of

AI algorithms aimed at detecting the early onset of comorbidities in diabetic patients starting from their healthcare trajectories collected as personal Electronic Health Record. In details, the Team will delve into the computational tools needed to analyze and make sense of the data, i.e. data science and machine/deep learning solutions and high-quality software collaboratively produced by the participants, after having been provided with the essential domain knowledge and effective operative, communicative, and organisational tools.

Throughout the project evolution the students will develop technical skills in data science, acquiring working experience on machine learning and life science methodologies, including reproducibility, interpretability and privacy for AI solutions in health, and the basics of deploying models on the cloud.

The Format

In the first week, introductory courses in data science, visualization and AI (e.g. Python and machine learning) software are provided to the whole team, with an emphasis on the specific domain of the project (e.g. biomedicine, digital agriculture, etc.). Such initial concentration efforts provide a large spectrum of tools among which the participants can choose the most proper ones for developing the research project, including programming languages and AI frameworks such as Keras/TensorFlow and PyTorch for deep learning.

This second stage of the experience outlines a learning environment which is intentionally shaped, where the participants have the chance to work independently on the research project, typically divided in smaller groups that are formed on the basis of the students' personal interests and the specific tasks required to tackle the challenge. The teamwork sessions will be marked by interactive experiences designed with a specific methodology that aims to develop fundamental problem solving skills while setting the goals of the challenge, and to increase the quality of the cooperation among the teams.

As far as leisure time and informal on-line gatherings to let participants and tutors get to know each other, get inspired, and build a real team despite social distancing.

The Goals

1. Encourage smart students to be entrepreneurs in science
2. Interdisciplinarity
3. Transform internet into an innovation building environment
4. Develop teamwork, collaboration, fast-prototyping attitudes
5. Use sophisticated open source methods in an informal teaching environment
6. Expose to challenging research themes of strong ethical interest
7. Using high quality data from scientific or statistical institutions
8. Promote the adoption of standard formats and share data policies
9. Deduce innovative, efficient, and effective education and communication models to be reproduced within the Italian and, potentially, the European school system

The Program

- Data Science & Tools
- Unix + GitHub
- Python intro + clinic
- Numpy & Scipy
- Data Visualization
- Machine learning for the life sciences
- Basics of XAI: interpretability in artificial intelligence and data science
- Data science & privacy
- Data integration for Health
- DL theory, apps & implementations
- Longitudinal data and time series analysis and forecast
- The Electronic Health Record (EHR) data
- Diabetes: Symptoms, Causes, Treatment, Prevention and Comorbidities
- Project Data

SPECIAL EVENTS
- Meeting and brainstorming sessions with high school teachers
- Friday, Aug 27th - Final presentation of the results / of the project

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