BIG DIVE 8

Hacking Development, Visualization and Data Science

ABSTRACT

The "**Data Revolution**" is transforming irreversibly our society at a pace that we had not foreseen:

/   Data aims to become the **fuel for decision-making** processes at different levels: from (smart) cities to national governments.

/   In the private and the public sector, analysis of (BIG) Data is now a de-facto approach and **Data + Machine Learning** or **Data + Artificial Intelligence** are actually considered as the "new stack" to build effective value propositions.

On the other hand, the unexplored lands are still huge and the debate on data democracy, ethics, bias and human rights has never been so crucial and intense.
Leveraging the data-driven approach is often considered as an opportunity to improve processes, but what is the right trade-off between cost and safety, optimization and human experience, form and function, robustness and complexity?

The "**global picture**" is something difficult to tackle and we strongly believe that a holistic vision must consider the scenario in all its faces:

/   At the foundation level, we have the **infrastructure**. From the bare network interconnection to the most advanced analytics tools and data frameworks. The fast-growing decentralization trend is a prove of the existing gap between implementations and tomorrow's ICT infrastructures.

/   On the top of infrastructure, we build **data services**. Applied Data Science is tremendously affecting traditional services as well as it is enabling a new set of "products". Therefore, it is essential to stay up to date on the current state of the technologies and methodologies.

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/ Most of the data-driven products and services affect real people. Therefore, specific actions and monitoring tools are strongly required to preserve **people rights** while a proper comprehensive regulation is still under definition. At the same time, companies and governments are daily facing the challenge of building a co-design relationship and **trust** with people. The promise of data-driven decision making requires in fact that algorithmic decisions are then accepted and it relies on people participation (both in data creation and in services usage).

/ At the highest level, experts, scientists, policy-makers, philosophers and thinkers must keep the focus on **long-term trend evolution** instead of only on practical nowadays open issues.

Data gives scientists great Superpowers and with great power comes great responsibility.

This year BIG DIVE reaches its **8th edition**. It has kept improving every year: learning from past experiences, carefully integrating past alumni feedback and staying always up to date on the latest innovations and topics.

This is the reason why, beyond keep offering great teaching contents and top-class lectures from the most valuable experts, transferable for any discipline, we have also chosen to focus on one of the most crucial topic of our time.

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FOCUS ON EARTH OBSERVATION

The present challenges, from climate change to sustainability, from fighting poverty to improving the quality of life, raise **the importance to monitor our planet Earth from any point of view, including from space through satellite images**.

For this reasons we decided to partner with successful companies in the field that already got a glimpse of the potential in using Data Engineering, Network Science, Machine and Deep Learning to leverage the data acquired from instruments and sensors in order to come up with new insights and to improve existing solutions or to create new ones aimed at preserving our planet, being reactive in case of emergencies and optimising resources consumptions.

Furthermore, the above studies have also many **industrial applications**. Some of the example are the mobility, real estate and agriculture.

On-going researches show the promising use of micro-satellites and Machine Learning for environmental conservation, natural resource saving and human settlements and humanitarian crisis management [1], or even to quantify the impact of the environment on criminality [2] and to predict poverty [3].

Few years ago ESA launched a 'Space for Sustainability Award' for young students and researchers to raise awareness, stimulate the debate on space and sustainable development issues among the new generations [4].

Finally we can find examples on the space exploration itself regarding outer space data transmission, planet data analytics, space navigation and rocket landing [5].

[1] "Micro-satellite Data: Measuring Impact from Space" https://www.poverty-action.org/sites/default/files/publications/Goldilocks-Deep-Dive-Micro-satellite-Data-Measuring-Impact-from-Space_1.pdf
[2] "Using Deep Learning and Satellite Imagery to Quantify the Impact of the Built Environment on Neighborhood Crime Rates" https://www.researchgate.net/publication/320442006_Using_Deep_Learning_and_Satellite_Imagery_to_Quantify_the_Impact_of_the_Built_Environment_on_Neighborhood_Crime_Rates
[3] "Combining satellite imagery and machine learning to predict poverty" http://science.sciencemag.org/content/353/6301/790
[4] Space for Sustainability Award https://www.space-sustainability-award.com
[5] "The New Age of Discovery: Space Exploration and Machine Learning" https://medium.com/syncedreview/the-new-age-of-discovery-space-exploration-and-machine-learning-64883f7dc7f9

PARTCIPANTS AND PARTNERS

From our previous experience we noticed that even if most of our students have a scientific background, the common interest in Data Engineering, Network Science, Machine and Deep Learning can attract students and employees from a wide spectrum of sectors and education fields.

As usual, during the final week of BIG DIVE, the participants will be involved in group work to create a Data Science project from scratch. In particular the topic and the dataset offered in this edition will add a major value to professionals, BSc, Master and PhD students in the following fields:

/   Physics
/   Space Engineering
/   Geospatial
/   Social Impact (security and prevention)
/   Climate Change
/   Mobility

BIG DIVE 8 PRICING

STUDENT	NON-PROFIT	REGULAR
With proof of full-time student status at the time of application (PhD students are also eligible for this profile).	With proof of full-time / part-time employment at a non-profit organization at the time of application.	If you are not eligible for student or non-profit profiles.
Early Price (till Apr 7) **€750** *	Early Price (till Apr 7) **€1,000** *	Early Price (till Apr 7) **€1,250** *
Full Price (till June 2) **€950** *	Full Price (till June 2) **€1,300** *	Full Price (till June 2) **€1,500** *

(*) if you are eligible for VAT deduction (generally speaking, if you have a VAT Number), above prices will not include VAT.

THE PRICE INCLUDES
/   Access to all lessons
/   Access to all teaching materials (from previous editions too!)
/   Access to alumni network
/   Access to all special events
/   Solid employment opportunities
/   BIG DIVE gadgets

THE PRICE DOES NOT INCLUDE
/   Accommodation
/   Food
/   Local transportation
/   Travel expenses

BIG DIVE 8 TIMELINE

February 25	Registration opening
April 7	Early-bird expiring
June 2	Registration closing
June 17 - July 12	BIG DIVE 8
July 12	Closing event

EVALUATION AND ADMISSION PROCESS

After two weeks from registration opening the organizers start screening the received applications.

Candidates might be contacted by the organizers and asked to provide more information about skills or to attend an interview (in person or using a remote audio-video communication tool).

The selection process will continue till the official registration closure in order to create progressively **a class of maximum 20 Divers**.

Applicants selected before the official end of registration will be asked to pay **a deposit** (20% of the total due fee – according to the profile).

In case of missing deposit (deadline is one week after the request) the candidate will lose the priority in the selection queue.

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In case a selected candidate renounces to participate, a new DIVER will be selected.

The deposit formula allows the organizing staff to assign available seats to people really committed and interested in BIG DIVE and will be **not refunded** in case of waiver communicated after the closure of registration.

All the news about selection, exclusion and deposit request will be communicated by email through the email address inserted in the application form.

Candidates can communicate with the organizers through the address **info.bigdive@top-ix.org**.

MUST-TO-HAVE REQUIREMENTS

/ Solid statistics background.
- Measures of central tendency and measures of variability or dispersion (standard deviation).
- Correlation coefficients.
- Basics of Bayesian statistics.
/ Python (v3.6) will be used as the main development language. So it is required to know:
- Basic syntax and how to declare constants and functions.
- Numeric, sequence, text sequence, mapping types.
- Iterators and generators.
- Math and Boolean operators.
- Exceptions handling.
- Managing files, file-system operations and CSV and Json formats.
/ English is the teaching language in BIG DIVE, proper conversation and writing skills are required.
/ Practical knowledge about Linux / Unix terminal shell:
- Navigating file system.
- Basic file operations.
/ GIT basic knowledge (a personal account on GitHub is required):
- Cloning a repository and kipping local branch updated with the master.
- Pushing modifications to the master.
- Resolving conflicts.
/ Basics of database management and design:
- Creating table and inserting data in a SQL or no-SQL database.
- Querying and extracting data from a SQL or no-SQL database.

NICE-TO-HAVE REQUIREMENTS

/ Practical knowledge about HTML, CSS and Javascript.
/ Advanced statistics (inferential statistics, frequentist and Bayesian approaches).
/ Knowledge of Numpy, Pandas, Matplotlib, Scikit-learn libraries.
/ Previous experience with TensorFlow, Keras and other Deep Learning libraries.
/ Previous experience with MongoDB.
/ Previous experience with data frameworks (e.g. Hadoop, Spark,...).
/ Previous working experience in Data Mining, Natural Language Processing, Network Science projects.

Preparatory materials and online courses will be suggested at the time of registration confirmation.

BIG DIVE 8 SPONSORSHIP OPPORTUNITIES

DATA SPONSORSHIP	
LARGE CORPORATES	**We ask:**
	€4,500 + vat (*)
	A BIG-enough and well-prepared dataset (including explanatory documentation).
	The right to publish project results (after validation by the sponsor on texts and numbers) giving proper credits.
	To share the participation in BIG DIVE as sponsor on their own communication channels.
	We provide:
	Sponsor logo will be featured on the course website and all other promotional materials.
	Up to 3 tickets for the final events.
	Access to project output (results, code and documentation) produced by DIVERS and the right to share it internally or publicly by mentioning the BIG DIVE initiative and authors.
	Free access to the full course for one person (given that course MUST-HAVE requirements are satisfied). Class attendance is required as every other participant. Further participants will pay as Regular students.
STARTUP / SME	**We ask:**
	€ 2.500 + vat (*)
	A BIG-enough and well-prepared dataset (including explanatory documentation).
	The right to publish project results (after validation by the sponsor) giving proper credits.
	To share the participation in BIG DIVE as sponsor on their own communication channels.
	We provide:
	Sponsor logo will be featured on the course website and all other promotional materials.
	Up to 2 tickets for the final events.
	Access to project output (results, code and documentation) produced by DIVERS and the right to share it internally or publicly by mentioning the BIG DIVE initiative and authors.
	Free access to the full course for one person (given that course MUST-HAVE requirements are satisfied). Class attendance is required as every other participant. Further participants will pay as Regular students.

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DATA-FREE SPONSORSHIP	
CORPORATES OR OTHER ORGANIZATIONS	**We ask:**
	€2,500 + vat (*)
	To share the participation in BIG DIVE as sponsor on their own communication channels.
	We provide:
	Sponsor logo will be featured on the course website and all other promotional materials.
	Up to 2 tickets for the final events.
	Access to students list for hiring purposes.
	The chance to interview a set of students during the course and to receive a qualitative evaluation on them from teachers and organizers.

(*) TOP-IX as main BIG DIVE organizers has the right to choose the best datasets for training purposes and to apply discounts on sponsorship profiles in case of an higher dataset-quality evidence.

TECH PARTNERSHIP	
CORPORATES OR OTHER ORGANIZATIONS	**We ask:**
	€2,500 + vat (*)
	Technical support (e.g. free access to infrastructure resources, cluster or data tools for the participants) during the training event.
	(AND / OR)
	A technical (non-marketing) talk/workshop during the course.
	We ask:
	Partner logo will be featured on the course website and all other promotional materials.
	1 ticket for the final event.

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MEDIA PARTNERSHIP	
CORPORATES OR OTHER ORGANIZATIONS	**We ask:**
	To share news about the course on Social Media channels, website and newsletter.
	We provide:
	Partner logo will be featured on the course website and all other promotional materials.
	1 ticket for the final event.

BIG DIVE 8 ORGANIZER AND MAIN CONTACTS

BIG DIVE 8 is a project by **TOP-IX Consortium**. **Axant.it, ISI Foundation** and **TODO** are key partners of the project.

BIG DIVE 8 course will be held at TOP-IX Consortium Headquarters located in Via Maria Vittoria, 38 - 10123 Turin, Italy.

For further information about BIG DIVE, please contact us **info.bigdive@top-ix.org**.

You can also reach out us by phone at +39 011 8390191. As this is the TOP-IX office number, please specify that your call is related to BIG DIVE.

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