	A glimpse into the Arctic future: equipping a unique natural experiment for next-generation ecosystem research

PhD student - Early Stage Researcher (ESR13)
Scientific Machine Learning for complex ecosystem interaction analysis

About FutureArctic

The EU-funded Innovative Training Network FutureArctic aims to quantify how much carbon will escape from the Arctic in future climate. How do the multitude of ecosystem processes, driven by plant growth, microbial activities and soil characteristics, interact to determine soil carbon storage capacity? A group of fifteen PhD-students will study the Forhot ecosystem in Iceland, where a natural coincidence has provided us with the exceptional opportunity to actually look into the future.

Given the strong urgency of tackling and managing the climate challenge and the particularly important role herein of (sub)Arctic ecosystems, a rapid assessment of the ecosystem and ambient processes in this natural laboratory is essential. FutureArctic will achieve this challenge by adopting the fast advances made in the field of **machine learning and artificial intelligence** (AI), **unmanned aerial vehicles** (UAV) and (remote) **sensor technology** into **environmental research at the ecosystem scale**, into a new concept of an '**ecosystem-of-things**'.

FutureArctic thus aims to channel an important evolution to automated machine-assisted fundamental environmental research. This is achieved through dedicated training of researchers with profiles at the inter-sectoral edge of computer science, artificial intelligence, environmental and agricultural science, sensor engineering and communication and social sciences. FutureArctic training ensures the **development of unique enviro-technological job profiles**, all with their own specialty, embedded in holistic knowledge on connected high-data throughput ecosystem research, ready for machine-assisted environmental ecosystem science and modelling.

About the host organization

imec is the world-leading research and innovation hub in nanoelectronics and digital technologies. The combination of our widely acclaimed leadership in microchip technology and profound software and ICT expertise is what makes us unique. By leveraging our world-class infrastructure and local and global ecosystem of partners across a multitude of industries, we create groundbreaking innovation in application domains such as healthcare, smart cities and mobility, logistics and manufacturing, and energy.

University of Antwerp – imec IDLab Research group
The IDLab research group of imec and the University of Antwerp performs fundamental and applied research on internet technologies and data science. The overall IDLab research areas are machine learning and data mining; semantic intelligence; distributed intelligence for IoT; cloud and big data infrastructures; multimedia coding and delivery; wireless and fixed networking; electromagnetics, RF and high-speed circuits and systems. Within Antwerp, IDLab specifically focuses on wireless networking and distributed intelligence. IDLab has a unique research infrastructure used in numerous national and international collaborations.
IDLab collaborates with many universities and research centres worldwide and jointly develops advanced technologies with industry (R&D centers from international companies, Flanders' top innovating large companies and SME's, as well as numerous ambitious startups).

Task description

Your PhD project

The project is situated in the domain of scientific machine learning in which the overall method consists of automatically transforming the high-dimensional spatio-temporal data obtained from observation (such as the ecological data generated within the FutureArctic project) into predictive (closed-form) mathematical models without assuming the available data follows a given or even known physical law or model described by a system of partial differential equations (PDEs). To uncover the physical laws from the high-dimensional spatio-temporal data obtained from potentially noisy observations, the learning task consists of identifying and discovering the closed-form expression of the nonlinear PDEs that govern the dynamics and evolution of the observed spatio-temporal data.

To achieve these challenging objectives, the project aims at new advancements in mathematical machine learning. The techniques will be applied to specific problems and observation data related to ecology, impact from biodiversity and climate change, to understand and being able to mitigate negative effects that can be observed.

Secondments

You will embark on secondments to other FutureArctic partners (UNIVIE and UAntwerpen) to integrate the learning algorithms and eco-algorithms to develop sustainable development applications and to get hands on insight into the problem and the ecosystem-scale eco-science: learning the functioning of a subarctic grassland.

Benefits of working in an ITN

- You will be working within our international group of > 25 researchers

- You will get in contact with the other members of this international consortium and will benefit from the joint training platform to develop skills necessary for developing an "ecosystem-of-things".

Profile and requirements

- Applicants must hold a MSc or equivalent in the field of computer science, mathematics, environmental sciences or a related discipline
- Applicants can be of any nationality.
- Applicants must have an ability to understand and express themselves in both written and spoken English to a level that is sufficiently high for them to derive the full benefit from the network training.
- Applicants must be eligible to enrol on a PhD programme at the host institution (or at a designated university in case the host institution is a non-academic organisation).

In addition:

H2020 MSCA Mobility Rule: researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of the host organisation (Belgium) for more than 12 months in the 3 years immediately before the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status are not taken into account.

H2020 MSCA eligibility criteria: Early Stage Researchers (ESRs) must, at the date of recruitment by the host organisation, be in the first four years (full-time equivalent research experience) of their research careers and have not been awarded a doctoral degree. Full-Time Equivalent Research Experience is measured from the date when the researcher obtained the degree entitling him/her to embark on a doctorate (either in the country in which the degree was obtained or in the country in which the researcher is recruited, even if a doctorate was never started or envisaged).

Benefits

- You will be employed by the host organisation for 36 months.
- A competitive salary plus allowances. Moreover, funding is available for technical and personal skills training and participation in international research events.
- You will benefit from the designed training programme offered by the host organisation and the consortium.
- You will participate in international secondments to other organisations within the FutureArctic network and in outreach activities targeted at a wide audience.

Please, find additional information in the *Information package for Marie Curie fellows*

Application

Interested candidates are invited to apply for this position through the link below: https://jobs.idlab.uantwerpen.be

 Expected starting date: July 2019

More information and other vacant positions can be found on www.futurearctic.eu

Additional information

For additional information about the research project and this individual position, please contact:

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