Ph.D. position at the Basque Center for Applied Mathematics (BCAM, Spain) for the IN-DEEP European Doctoral Network
Real-time inversion using self-explainable Deep Learning driven by expert knowledge

Reference number: DC7
PhD research topic: Leveraging deep PDE solvers with adaptive strategies and Fourier-based loss function. Application in computational biosciences.
Host institution: Basque Center for Applied Mathematics (BCAM), Bilbao, Spain.
PhD Enrolment: University of the Basque Country (UPV/EHU), Bilbao, Spain.
Main Supervisor: Dr. Judit Muñoz-Matute, Basque Center for Applied Mathematics, Spain, jmunoz@bcamath.org
Co-supervisor: Dr. Giancarlo Sangalli, The University of Pavia, Italy, giancarlo.sangalli@unipv.it

Scientific tasks:
1. Design and assess a loss function in the Fourier domain for deep PDE solvers.
2. Develop and implement a posteriori estimators-based adaptive strategies to reduce the computational cost in deep PDE solvers.
3. Implement and validate the proposed techniques for learning nonlinear operators in computational biosciences.

For more information on the IN-DEEP Doctoral Network, please visit https://www.in-deep.science

Expected outcomes:
1. An efficient deep PDE solver that combines Fourier-based loss function and adaptive strategies.
2. Comparison (efficiency, optimality) of the novel algorithm against conventional solvers.
3. Algorithm for a reaction-diffusion model in space-time arising in computational biosciences.
4. 2+ peer-reviewed publications.
5. 2+ participation in relevant international conferences.

Eligibility Criteria:
- Mobility: At the time of recruitment, the researcher must not have resided or carried out his/her main activity (work, studies, etc.) in Spain for more than 12 months in the 36 months immediately before the recruitment date. Time spent as part of a procedure for obtaining refugee status under the Geneva Convention or compulsory national service are not taken into account.
- The candidate must be at the date of recruitment a doctoral candidate (i.e. not already in possession of doctoral degree). Researchers who have successfully defended their doctoral thesis but who have not yet formally been awarded the doctoral degree will not be considered eligible.
- The candidate must agree to work exclusively for the action.

Specific requirements:
- Bachelor's degree in Science, Engineering, Mathematics, or any other related field.
- Studies that grant access to a Ph.D. Program by September 1st, 2024.
- Programming skills: Previous experience programming in scientific computing.
- Language: Excellent command of English, together with good academic writing and presentation skills.
Preferred skills:
- Familiar with neural networks and deep learning algorithms.
- Experience with numerical methods for partial differential equations.
- Able to work independently and flexibly, taking initiative where required.
- Able to communicate and collaborate effectively in a team setting.

Contract: Full-time contract.

Duration: 36 months, including 2 secondments at other consortium members’ premises.

Estimated starting date: September 1st, 2024 at the latest.

Salary: The gross annual salary is 28,000€ (estimated). The candidate will also receive a mobility allowance of 600€ per month, and where applicable, a family allowance of 660€ per month and a special needs allowance.

Application: The selected candidate must have applied before the application deadline online at the webpage: [https://joboffers.bcamath.org](https://joboffers.bcamath.org)
The candidates that do not fulfil the mandatory requirements will not be evaluated with respect to their scientific profile.
- Required documents for application:
  - CV
  - Letter of interest
  - 2 recommendation letters

*Note: The document related to the statement of past and proposed future research in the application platform is not required for this call.

Evaluation process and criteria: The evaluation committee will evaluate the candidates in two phases.

- **Phase 1:** Evaluation of the CV and letter of interest:
  - Academic performance during the undergraduate studies - 30 points.
  - Research experience in the area of the call, including publications, projects, and internships - 30 points.
  - Awards, honors, other significant roles and achievements as a student - 10 points.
  - Additional coursework, certifications, training programs, continuous learning - 5 points.

- **Phase 2:** Only for those scoring 50 or above in Phase 1:
  - Interview to assess communication skills, initiative, critical thinking, and motivation to pursue a PhD. - 15 points.
  - Letters of recommendation - 10 points.

For candidates of comparable academic level and experience, preference shall be given to women.

Deadline: April 19th, 2024

**Women are encouraged to apply!**
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One person, one value.