Postdoctoral Researcher (f/m/d): Algorithm development for constrained spatio-temporal optimization of SARS-CoV-2 testing strategies

The Center for Advanced Systems Understanding (CASUS) is a German-Polish research center for data-intensive digital systems research. We combine innovative methods from mathematics, theoretical systems research, simulations, data science, and computer science to provide solutions for a range of disciplines – materials science under ambient and extreme conditions, earth system research, systems biology, and autonomous vehicles.

CASUS was jointly founded in August 2019 by the Helmholtz-Zentrum Dresden-Rossendorf, the Helmholtz Centre for Environmental Research, the Max Planck Institute of Molecular Cell Biology and Genetics, the Technical University of Dresden and the University of Wroclaw. CASUS is located in the heart of Görlitz at the border between Germany and Poland. The CASUS start-up phase is hosted by the Helmholtz-Zentrum Dresden-Rossendorf and is financed by the Federal Ministry of Education and Research and the Saxon State Ministry of Science and Art.

The Earth System Science department seeks a postdoctoral researcher focused on development of algorithms for optimizing the timing, location, prioritization and test type/strategy of SARS-CoV-2 testing based on proxy data for individual risk, the distribution of health care services, and basic demographic data. Crucially, these optimizations must be performed under a constraint on the total amount of testing that can be done, which may change over time and by location.

Location of work is Görlitz, the working hours will amount to 39 h per week.

The position will be available from now. The employment contract is limited until 31.12.2022.

The Scope of Your Job

The successful candidate will be part of a team studying how to optimally deploy limited testing capacity in an emerging epidemic. This position will focus on developing optimization algorithms for informing policies on how to most efficiently use limited testing resources in an emerging epidemic to accurately characterize spatial-temporal disease prevalence. These algorithms will leverage an extensive dataset on risk factors, health care services, and demographics, as well as parameterized spatio-temporal epidemiological models, both of which will be developed by other team members. The initial focus will be on the state of Saxony in Germany, with subsequent expansion to the rest of Germany and possibly other countries.

Your Tasks

- Develop constrained optimization algorithms that prioritize which individuals, locations, and strategies should be focal points for testing;
- Evaluate and refine the optimization algorithms against a broad array of model-generated epidemic scenarios;
- Implement the algorithms in software that will form the foundation for an open webportal for test policy optimization;
- Work with our team to facilitate a coordinated approach to optimizing testing locations and strategies;
- Publish results in academic, peer-reviewed journals;
- Present results at scientific meetings.

Your Qualifications

- Ph.D. in computer science, numerical methods, statistics, or a related field;

- A solid background in mathematics, statistics, and data science;
- Excellent programming skills in languages such as R and Python;
- Strong motivation to work in a collaborative environment;
- Excellent communication skills in English and in a professional context (presentation of research results at scientific meetings, colloquial discussions, preparation of manuscripts);
- Evidence of the ability to publish results in top peer reviewed journals;
- Experience in epidemiology is advantageous but is not required

What We Offer

- A vibrant research community in an open, diverse, and international work environment
- Scientific excellence and extensive professional networking opportunities
- The employment contract is limited to three years with the possibility of longer-term prospects
- Salary and social benefits in conformity with the provisions of the Collective Agreement TvöD-Bund
- 30 vacation days per year
- Company pension scheme (VBL)
- A good work/life balance for which we offer assistance in the form of:
  - o Possibility to work part-time
  - o Flexible working hours
  - o In-house health management

Application

Please submit your application (including a one-page cover letter, CV, academic degrees, transcripts, etc.) online on the HZDR application portal:

https://www.hzdr.de/db/Cms?pNid=490&pOid=61397&pContLang=en

Deadline:

Review of applications will begin on 24 August 2020, but the position will remain open until filled.

For details please contact:

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