Postdoctoral Research Fellow in machine learning

About the position

Position as Postdoctoral Research Fellow available at Section of Machine Learning, Department of Informatics.

The appointment is a fulltime position and is made for a period of two (2) years. Starting date is 15.08.2020.

Job description / Project description / Development plan:

Antibodies and T-cell receptors, called immune receptors, are key molecules of our adaptive immune system, representing nature’s most finely-tuned defence tools in that they recognize and neutralise with exquisite specificity any harmful particle (antigen), such as cancer, virus and bacteria. Past and current antigen encounters are written invariably into the genetic sequence information of immune receptors where it is stored as immunogenomic memory. Even when the immune system is failing, as in infection with HIV or in cases of autoimmune disease, the immune system will leave specific marks in this immunogenomic memory. Although it is currently feasible to determine the receptor sequence of millions of different unique immune cells - the adaptive immune repertoire of a person - it is much harder to predict disease risk and progression from such generated data.

Machine learning has entered center stage in the biological sciences thanks to its ability to detect, recover and re-create complex signals (e.g., sequence motifs) in large-scale biological data in which noise abounds. The detection of disease signals in immune repertoires belongs to a particularly challenging class of machine learning problems called Multiple instance learning. This is a form of weakly supervised learning where labels are provided only at the level of bags of assorted training instances. Immune repertoire classification is an ideal example of Multiple instance learning, where a given disease state is driven by a small unknown subset of immune cells of a patient. The problem is furthermore a multi-label multiple instance problem, as the immune repertoire of a person will contain a myriad of immune cell subsets corresponding to a lifetime of vaccines, pathogen encounters and more.

The postdoc position is part of a research centre focused on improving disease diagnostics and developing novel treatments for coeliac disease, a prevalent immune mediated disease characterized by a highly specific adaptive immune cell response to dietary gluten proteins. The centre will sequence the receptors of around a million immune cells for each of a total of 300 coeliacs and controls.

The driving case for the postdoc will be to develop machine learning methodology that achieves high accuracy in classifying the coeliac state based on an immune repertoire, which if successful could lead to a new non-invasive diagnostic test for coeliac disease as well as inspire novel treatment options. Coeliac disease is a particularly interesting case for machine learning methodology development as the disease is known to be driven by an immune reaction to gluten. The coeliac research centre has established protocols for experimentally capturing individual immune receptors that recognize gluten. What this means is that the machine learning problem is of an interesting hybrid form where one does not only have disease state labels for the bags (for each immune repertoire as a whole), but also has some degree of fine-grained information on which instances (individual immune receptors) contribute to the disease state. Recent technological breakthroughs in linking multiplexed antigen recognition with immune repertoires point to such a form of information integration becoming a highly powerful approach to study disease processes. By exploiting the already known association of gluten-reactive immune cells with coeliac disease, the postdoc will be ideally positioned to spearhead machine learning development in this direction.

The postdoc candidate will have a shared association with the machine learning group of Sandve at Department of Informatics and the coeliac disease research group of Sollid at Department of Immunology. This shared association will provide the candidate with an ideal opportunity to gain a deep understanding of the intricacies of the problem and approach these challenges through state-of-the-art approaches.

The main purpose of a postdoctoral fellowship is to provide the candidates with enhanced skills to pursue a scientific top position within or beyond academia. To promote a strategic career path, all postdoctoral research fellows are required to submit a professional development plan no later than one month after commencement of the postdoctoral period.

Qualification requirements

The Faculty of Mathematics and Natural Sciences has a strategic ambition of being a leading research faculty. Candidates for these fellowships will be selected in accordance with this ambition, and the successful candidate is expected to be in the upper segment of her/his class with respect to academic credentials.

- Applicants must hold a degree equivalent to a Norwegian doctoral degree in Computer Science, Statistics or a related field. Doctoral dissertation must be submitted for evaluation by the closing date. Only applicants with an approved doctoral thesis and public defence are eligible for appointment.
- Fluent oral and written communication skills in English

The following qualifications will count in the assessment of the applicants:

- Documented experience with machine learning or statistical methodology development
- Any experience with immunology would be considered an advantage, but is not required

Personal skills

- Ability to lead and conduct research in a collaborative environment
We offer

- Salary NOK 523 200 - 605 500 per year depending on qualifications in position as Postdoctoral Research Fellow (position code 1352)
- Attractive welfare benefits and a generous pension agreement
- Professionally stimulating working environment
- Vibrant international academic environment
- Postdoctoral development programmes
- Oslo’s family-friendly surroundings with their rich opportunities for culture and outdoor activities

How to apply

The application must include:

- Cover letter (statement of motivation, summarizing scientific work and research interest)
- CV (summarizing education, positions, pedagogical experience, administrative experience and other qualifying activity)
- Copies of educational certificates, academic transcript of records and letters of recommendation
- A complete list of publications and up to 5 academic works that the applicant wishes to be considered by the evaluation committee
- Names and contact details of 2-3 references (name, relation to candidate, e-mail and telephone number)

The application with attachments must be delivered in our electronic recruiting system, please follow the link “apply for this job”. Foreign applicants are advised to attach an explanation of their University's grading system. Please note that all documents should be in English (or a Scandinavian language).

In assessing the applications, special emphasis will be placed on the documented, academic qualifications, the project description (whenever this is required in the call for applicants), and the quality of the project as well as the candidates motivation and personal suitability. Interviews with the best qualified candidates will be arranged.

It is expected that the successful candidate will be able to complete the project in the course of the period of employment.

Formal regulations

Please see the guidelines and regulations for appointments to Postdoctoral fellowships at the University of Oslo.

No one can be appointed for more than one Postdoctoral Fellow period at the University of Oslo.

According to the Norwegian Freedom of Information Act (Offentleglova) information about the applicant may be included in the public applicant list, also in cases where the applicant has requested non-disclosure.

The University of Oslo has an agreement for all employees, aiming to secure rights to research results etc.

The University of Oslo aims to achieve a balanced gender composition in the workforce and to recruit people with ethnic minority backgrounds.

Contact information

For further information please contact: Geir Kjetil Sandve, e-mail: geirksa@ifi.uio.no or Ludvig M. Sollid, e-mail: l.m.sollid@medisin.uio.no

For technical question regarding the recruitment system, please contact HR Adviser; Torunn Standal Guttormsen, t.s.guttormsen@mn.uio.no, phone: +47 22854272

About the University of Oslo

The University of Oslo is Norway’s oldest and highest rated institution of research and education with 28 000 students and 7000 employees. Its broad range of academic disciplines and internationally esteemed research communities make U/O an important contributor to society.

The Department of Informatics (IFI) is one of nine departments belonging to the Faculty of Mathematics and Natural Sciences. IFI is Norway’s largest university department for general education and research in Computer Science and related topics.

The Department has more than 1800 students on bachelor level, 600 master students, and over 240 PhDs and postdocs. The overall staff of the Department is close to 370 employees, about 280 of these in full time positions. The full time tenured academic staff is 75, mostly Full/Associate Professors.

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