Position Details

CSIRO Early Research Career (CERC) Postdoctoral Fellowship – CSOF4

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| The following information is for applicants |
| Advertised Job Title | CSIRO Postdoctoral Fellowship Machine Learning and Artificial Intelligence: Constraints (2 Positions) |
| Job Reference | 64888 |
| Tenure | Specified Term of 3 years Full-time |
| Salary Range | AU$83,687 to AU$94,679 pa + up to 15.4% superannuation |
| Location(s) | Eveleigh, NSW |
| Relocation Assistance | Will be provided to the successful candidate if required |
| Applications are open to | All Candidates |
| Position reports to the | Project Leader |
| Client Focus – Internal | 80% |
| Client Focus – External | 20% |
| Number of Direct Reports | 0 |
| Enquire about this job | Richard Nock via email: MLAIFSP\_Admin@csiro.au*Please do not email your application directly to Richard Nock. Applications received via this method will not be considered.* |
| How to apply | Apply online at <https://jobs.csiro.au/> Internal applicants please apply via **Jobs Central**If you experience difficulties when applying, please email careers.online@csiro.au or call 1300 984 220. |

**Role Overview**

**CSIRO Early Research Career (CERC) Postdoctoral Fellowships** provide opportunities to scientists and engineers who have completed their doctorate and have less than three years relevant postdoctoral work experience. These fellowships aim to develop the next generation of future leaders of the innovation system through:

* A differentiated career development program to deliver capability excellence and breadth across all facets of the national innovation system.
* Research training via strategic research and development projects with a clear focus that will deliver real impact through science and engineering excellence;
* An innovative culture supporting the development and demonstration of original thinking and expertise leading to peer-recognition; and
* Opportunities to develop skills and experience in collaborative research teams to effectively work within national and global multi/transdisciplinary and multi-stakeholder environments.

CERC Postdoctoral Fellows **are appointed for three years or part time equivalent.**

The Machine Learning and Artificial Intelligence Future Science Platform (MLAI FSP) will build an exciting new research portfolio to leverage CSIRO’s deep domain expertise and experience. It will explore questions such as: How do we use machine learning to augment a scientist’s ability to generate and learn from scientific data? What is the best way to include domain constraints (such as physical laws) and design constraints (such as privacy and fairness) into machine learning models? Where can we exploit genomic information in plant and animal breeding? Why is deep learning so effective in extracting meaningful features? Solving these types of challenges will open new vistas of scientific knowledge and positive impact.

As a member of the Platform team the Postdoc Fellow will work with top CSIRO scientists and engineers to develop new machine learning and artificial intelligence methods with a specific emphasis on solving significant science questions. Together we will build the next generation of science tools using high performance computing infrastructure and cloud technologies to underpin the next generation of Australian science.

The roles sit within the Constraints activity area within the MLAI FSP, which investigates MLAI models with design constraints, for example scalability, uncertainty propagation and privacy. The role has two main potential implementations which are not necessarily exclusive: design of new ML algorithms that are privacy compliant, and analysis of the privacy leakage of ML algorithms.

Along the former implementation, ACM Turing Award Shaffi Goldwasser declared during NeurIPS 2018’s privacy workshop that it is now time for ML to be crafted with privacy compliance from the start, instead of tweaking ML algorithms that were not designed with privacy in mind. This is what we intend to do, essentially in the secure multiparty computation model. This implies new ML algorithms, SMC routines & the quantification and justification of their performances (generalization, communication etc.). Development may include implementation of core low-level routines (matrix/tensor algebra) with further connections to sophisticated higher-level algorithms (e.g. deep learning, kernels, boosting etc.).

Along the latter implementation, in applications such as healthcare, smart energy and cyberdefence, the ability to recover training data or re-construct model parameters from ML/AI services can have serious privacy consequences resulting in loss of confidentiality and hampering the growth of AI services. Our objective is to properly quantify information leakage from ML algorithms and investigate the development of algorithmic countermeasures. This will be done within national and international settings, and as part of a diverse multidisciplinary team.

**Duties and Key Result Areas:**

Under the direction of senior research scientists and engineers, Postdoctoral Fellows will:

* Investigate, design and evaluate formally new ML algorithms for secure learning and/or the potential leakage of the state of the art with fixes.
* Implement these methods efficiently using programing tools such as R or Python.
* Carrying out evaluation of the developed software to demonstrate its competitiveness and fitness for purpose. Taking responsibility for functionality, performance and robustness.
* Carry out high impact research of strategic importance to CSIRO, with the aim of achieving innovative and wide-reaching scientific outcomes and ideas for further research.
* Collaborate with members of a diverse project team and external partners to ensure research directions can lead to lasting impact in application domains.
* Undertake regular reviews of the latest literature in artificial intelligence and machine learning.
* Publish results in relevant international scientific venues (high-level journals and conferences).
* Interpret and present research findings in artificial intelligence and machine learning to research scientists and practitioners from a wide range of other scientific areas.
* Communicate effectively and respectfully with all staff, clients and suppliers in the interests of good business practice, collaboration and enhancement of CSIRO’s reputation.
* Adhere to the spirit and practice of CSIRO’s policies and guidelines, including values, health, safety & environment, diversity initiatives and zero harm goals.
* Other related duties as directed.

[**The CERC Postdoctoral Fellow learning and development program**](http://www.csiro.au/en/Careers/Student-and-graduate-programs/Postdoctoral-fellowships)is developed between the CERC Postdoctoral Fellow and their CSIRO supervisor. The program will focus on enhancing the Fellows’ capabilities to the level expected of an independent researcher and will include on-the-job and course-based development encompassing:

* Discipline-specific techniques and protocols
* Professional growth
* Project management
* Communication and influencing skills
* Working and collaborating with others

## Required Competencies:

* **Teamwork and Collaboration:** Cooperates with others to achieve organisational objectives and may share team resources in order to do this. Collaborates with other teams as well as industry colleagues.
* **Influence and Communication:** Uses knowledge of other party's priorities and adapts presentations or discussions to appeal to the interests and level of the audience. Anticipates and prepares for others reactions.
* **Resource Management/Leadership:** Allocates activities, directs tasks and manages resources to meet objectives. Provides coaching and on the job training, recognises and supports staff achievements and fosters open communication in the team.
* **Judgement and Problem Solving:** Investigates underlying issues of complex and ill-defined problems and develops appropriate response by adapting/creating and testing alternative solutions.
* **Independence:** Recognise and makes immediate changes to improve performance (faster, better, lower cost, more efficiently, better quality, improved client satisfaction).
* **Adaptability:**Copes with ambiguity or situations that lack clarity. Adapts readily to changing circumstances and new responsibilities (which may include activities outside own preferences) in the interests of achieving team objectives. Recognises the need for and undertakes personal development as a result of changes.

 **Selection Criteria**

**Essential:**

*Under CSIRO policy only those who meet all essential criteria can be appointed.*

1. A doctorate (or will shortly satisfy the requirements of a PhD) in a Platform-relevant discipline area, such as machine learning, artificial intelligence, computer science, statistics, privacy/crypto or applied mathematics.

*Please note: To be eligible for this role you must have* ***no more than 3 years*** *(or part time equivalent) of postdoctoral research experience.*

1. Solid fundamental and applied knowledge of machine learning and statistics or privacy
2. Demonstrated ability to understand and develop mathematically-founded machine learning algorithms and their development in toolkits.
3. High level computational and programming skills (in Python, R, or C++) to build machine learning models and conduct analyses.
4. **High level written and oral communication skills with the ability to effectively represent the research team internally and externally, including publishing in peer reviewed journals and/or authorship of scientific papers, reports, and presenting at national and/or international conferences.**
5. A record of science innovation and creativity, including the ability & willingness to incorporate novel ideas and approaches into scientific investigations, preferably across diverse and inclusive teams.

**Desirable:**

1. Demonstrated interest in a scientific domain of CSIRO.
2. **The ability to work effectively as part of a multi-disciplinary, potentially regionally dispersed research team, plus the motivation and discipline to carry out autonomous research.**
3. Experience or interest in one or more of the following: Secure Multiparty Computation or cryptography, deep learning on graphs and other structured data, optimisation and information geometry, tensor algebra, statistical learning theory, topology, kernels or differential privacy.

To be appointed as a Postdoctoral Fellow within CSIRO, candidates are required to have **submitted** their PhD at the time of commencement, as a minimum requirement, if PhD conferment has not been obtained. If a candidate has submitted, but their PhD has not yet been formally attained, the starting salary will be CSOF4-1 *($83,687).* Upon CSIRO receiving written confirmation that the PhD has been awarded (within a six-month period from commencement date), the salary will be increased to the negotiated level and the difference will be back-paid to the Officer’s start date.

**Special Requirements**

Appointment to this role may be subject to conditions including provision of a national police check as well as other security/medical/character clearance requirements.

* The successful candidate will be asked to obtain and provide evidence of a National Police Check or equivalent. Please note that people with criminal records are not automatically deemed ineligible. Each application will be considered on its merits.
* If the successful candidate is not an Australian Citizen or Permanent Resident, they may be required to undergo additional security clearances, which may include medical examinations and an international standardised test of English language proficiency (i.e. IELTS test).- https://ielts.com.au/

**Our value proposition**

We want CERC Postdoc Fellows to join our world class science, engineering and digital teams to solve big, complex problems that make a real difference to the future of Australia and the world.

You'll get to work with some of the most talented minds in their fields, not just in Australia, but in the world. At CSIRO, we spark off each other, learn from each other, trust each other and collaborate closely to achieve more than we could individually.

**About Data61:**

We solve the greatest challenges through innovative science and technology. To find out more visit us [online](https://www.data61.csiro.au/)!