

POSITION DESCRIPTION

POSITION TITLE:	Research Officer
CLASSIFICATION:	QR2
RESPONSIBLE TO:	A/Prof Quan Nguyen
LOCATION:	Herston

POSITION OBJECTIVES

This position will be tasked with several key responsibilities that are pivotal to advancing spatial omics through sophisticated deep learning frameworks. The role involves the development and implementation of cutting-edge deep learning models, such as contrastive models for robust feature extraction and foundation models for scalable applications. The focus will be on devising algorithms that integrate spatial sequencing data with histopathological images, contributing innovative and impactful methods for diagnosis and prognosis using spatial cellular pathology. Additionally, the Research Officer will utilise state-of-the-art deep learning techniques to create predictive models for metastasis and disease progression, making use of extensive spatial datasets. This will include the analysis and interpretation of complex temporal and spatial patterns in biomedical data to better predict and understand disease trajectories.

Further responsibilities encompass contributions to drug target discovery and analytical innovation using machine learning in spatial multiomics. The Research Officer is expected to develop computational strategies that can identify potential therapeutic targets in intricate biological systems through deep learning methods. The Research Officer will spearhead the development of computational methods that integrate various forms of spatial omics data, including spatial transcriptomics and proteomics. This role requires close collaboration with interdisciplinary teams to develop and refine powerful analytical tools, thereby setting new benchmarks in the field and enhancing the capabilities of spatial multiomics research.

ORGANISATIONAL CONTEXT

QIMR Berghofer is a statutory body under the *Queensland Institute of Medical Research Act (1945)*. QIMR Berghofer Medical Research Institute proudly serves the people of Queensland with better health and wellbeing through impactful medical research. Our collaborative research programs address the foremost health challenges of our time. Our research responds to health challenges arising from social and environmental factors and aims to advance Aboriginal and Torres Strait Islander health equity.

QIMR Berghofer has a vision to lead the way to significant innovation in health outcomes, nationally and globally. We are committed to supporting ground-breaking research discoveries, achieving sustainability and conducting impactful research.

The Institute focuses its research within four key Programs:

- Cancer Research
- Infection & Inflammation
- Brain and Mental Health
- Population Health

The Genomics and Machine Learning Lab (GML) studies cancer and infected tissues in patient samples and mouse models. They generate novel data from spatial and single cell technologies and develop new computational and statistical methods to find clinically important patterns from this complex data. They pioneered the merging of two big data fields, sequencing, and imaging, to advance understanding of pathological processes one cell at a time and across all cells within a diseased tissue.

QIMR Berghofer promotes a *Working Better Together* operating model, recognising that whilst the purpose of the Institute is medical research, and the contribution of researchers is key, it cannot be done without the work of our highly-skilled professional staff. It recognises that we are all here to facilitate the same purpose – *Better health and wellbeing through impactful medical research*. *Working Better Together* is underpinned by the shared understanding and application of our values:

- Excellence
- Integrity
- Respect
- Collaboration
- Accountability

REPORTING AND RELATIONSHIPS

The Research Officer reports to the Group Leader and is a member of the Genomics and Machine Learning Lab.

The Research Officer works closely with all members of the Genomics and Machine Learning Lab.

PRIMARY RESPONSIBILITIES

- Lead the development of advanced deep learning frameworks and predictive models, focusing on integrating spatial sequencing data with histopathological images to enhance diagnosis and prognosis in spatial cellular pathology.
- Employ state-of-the-art deep learning techniques, including contrastive and foundation models, to develop robust feature extraction methods and scalable applications in spatial omics for predicting metastasis and disease progression.
- Perform spatial image analysis using tools such as ImageJ, QuPath, and napari to extract and analyse features from histopathological and multichannel immunofluorescence images, leveraging extensive spatial datasets from platforms like 10x Visium, 10x Xenium, Akoya PhenoCycler, and MALDI-MSI.
- Contribute to drug target discovery and the development of computational strategies for uncovering potential therapeutic targets in complex biological systems, employing advanced analytics to interpret temporal and spatial patterns in biomedical data.
- Lead the analysis team in the development and refinement of computational methods that integrate spatial transcriptomics and proteomics data, working collaboratively with interdisciplinary teams to set new standards in the field.
- Utilise high-performance computing systems and cloud computing environments for large-scale data processing and analysis, ensuring cross-disciplinary collaboration with scientists, clinicians, and technologists while promoting excellence and integrity, adhering to the highest quality and ethical standards.
- Stay at the forefront of rapidly evolving technologies and scientific knowledge in machine learning, spatial omics, and computational biology, tackling complex datasets and

computational challenges with innovative problem-solving skills and robust analytical capabilities.

- Collaborate with a diverse team of scientists in a multidisciplinary research environment, requiring excellent communication skills and adaptability.
 - Model and promote excellence and integrity, adhering to the highest quality and ethical standards
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KEY SELECTION CRITERIA

- PhD in Computational Biology, Bioinformatics, Computer Science, or related field, with a focus on machine learning and deep learning.
- Proficient in machine learning techniques and frameworks such as TensorFlow or PyTorch, and foundation models for imaging and sequencing data.
- Strong background in cancer omics data analysis, understanding molecular and cellular mechanisms of cancer.
- Skilled in high-performance computing, GPU applications, and cloud computing for large-scale data processing.
- Proficient in spatial image analysis tools like ImageJ, QuPath, and napari.
- Strong data visualization skills and ability to manage, manipulate, and interpret large datasets.
- Solid grasp of statistical methods applied to biological data.
- Robust publication history in peer-reviewed journals, reflecting deep learning, spatial omics, or related fields.

QIMR Berghofer also offers:

- Salary Packaging
- State-of-the-art facilities
- Stimulating work setting focussed on cutting-edge medical research
- Supportive/collaborative team environment
- Parental leave provisions