

Postdoctoral Researcher in Temporal Knowledge-Graph Embeddings for Biomedical Data

Post Title	Postdoctoral Researcher in Temporal Knowledge-Graph Embeddings for Biomedical Data
Post Duration	24 Months
Salary Scale	IUA Postdoctoral Researcher Salary range €43,908 - €51,677
Location	<p>The School of Computer Science & Statistics The O'Reilly Institute Trinity College Dublin, the University of Dublin College Green, Dublin 2, Ireland</p> <p>The successful candidate will be employed by Trinity College Dublin. However, the project is a joint project with Accenture Labs in Dublin and the successful candidate is expected to be available to work at Accenture Labs as part of the project.</p>
Reports to	John D. Kelleher
Closing Date	9th of September 2024

Research Project Description:

The research goal of this project is to investigate Temporal GraphML/Time-aware Knowledge Graph Embeddings to predict patient outcome and/or their trajectory from structured clinical records. Within the project scope patient data is framed as a sequence of events (diagnoses, procedures, observations, etc.) that link into heterogeneous data types (-omics, lab results, demographic, clinical assessment, etc.) that are modeled within a knowledge graph. Note that some of the data may be time variable and others may be static (e.g. the knowledge that a disease is related to a gene). Examples of current relevant literature that the project will build on include [1,2,3]. An initial research target of the project will be to assess whether existing time-aware graph embedding methods are good enough to operate on biomedical temporal datasets? (see [4] as an example of this type of work). Building on the findings of this assessment the project will then seek to develop new state-of-the-art methods for temporal knowledge graph embeddings.

[1] <https://arxiv.org/abs/2201.08236>

[2] <https://doi.org/10.1145/3670105.3670113>

[3] <https://doi.org/10.1109/IBHI.2024.3390419>

[4] <https://doi.org/10.1093/bib/bbac279>

Minimum Qualifications:

- Ph.D. in Computer Science, Biomedical Informatics, Data Science, Artificial Intelligence, or a closely related field.

Desirable Qualifications:

Research Experience:

- Demonstrated research experience in knowledge graphs, temporal data analysis, machine learning, or a related area.
- Publications in reputable journals and conferences, especially in relevant fields such as AI, machine learning, bioinformatics, or data mining.

Technical Skills and Expertise:

- Proficiency in programming languages commonly used in data science and machine learning, such as Python, R, or Julia.
- Experience with deep learning frameworks (e.g., TensorFlow, PyTorch, Keras).
- Strong knowledge of knowledge graph construction, representation, and reasoning.
- Experience with temporal data analysis, including time series analysis and modelling temporal relationships in data.
- Expertise in developing and applying machine learning models, especially in the context of representation learning and embeddings.
- Understanding of graph neural networks, graph embeddings, and related algorithms.

Domain Knowledge:

- Understanding of biomedical data, including its structure, types, and sources (e.g., omics data, clinical data, electronic health records).
- Familiarity with biomedical ontologies and standards (e.g., UMLS, SNOMED CT, Gene Ontology).

Communication Skills:

- Ability to effectively communicate complex technical concepts to both technical and non-technical audiences.
- Strong writing skills for preparing research papers, reports, and grant proposals.

Collaboration and Project Management:

- Ability to work effectively in a multidisciplinary team environment.
- Experience managing and organizing large datasets and projects.

Other Desirable Skills:

- Familiarity with software development practices, including version control (e.g., Git) and collaborative coding platforms (e.g., GitHub, GitLab).
- Experience with database management systems, especially those suited for graph data (e.g., Neo4j, RDF databases).
- Experience with high-performance computing or cloud computing platforms for data processing.

Application process:

In order to assist the selection process, applicants should submit a Curriculum Vitae and a Cover letter (1 A4 page) before the closing date clearly addressing their experience and how they obtained their knowledge. Submit applications here:

<https://forms.gle/Gb1QNrEkoPds1eQQ6>

Why ADAPT?

- Contribute to the ADAPT research agenda that pioneers and combines research in AI driven technologies: Natural Language Processing, Video/Text/Image/Speech processing, digital engagement & HCI, semantic modelling, personalisation, privacy & data governance.
- Work with our interdisciplinary team of leading experts from the complementary fields of Social Sciences, Communications, Commerce/Fintech, Ethics, Law, Health, Environment and Sustainability.
- Leverage our success ADAPT's researchers have signed 43 collaborative research projects, 52 licence agreements and oversee 16 active commercialisation funds and 52 commercialisation awards. ADAPT has won 40 competitive EU research projects and obtained €18.5 million in non-exchequer non-commercial funding. Additionally, six spinout companies have been formed. ADAPT's researchers have produced over

1,500 journal and conference publications and nearly 100 PhD students have been trained.

- Develop skills in a fast-paced environment focused on cutting-edge technology innovation

As an ADAPT researcher you will have access to a network of 85 global experts and over 250 staff as well as a wide multi-disciplinary ecosystem across 8 leading Irish universities. We can influence and inform your work, share our networks, and collaborate with you to increase your impact, and accelerate your career opportunities. Specifically, we offer:

- Exposure and free access within a multi-disciplinary ecosystem across 8 leading Irish universities.
- Opportunity to build your profile at international conferences and global events.
- Fast-track your career through formalised training & development, expert one-on-one supervision, and exposure to top AI specialists.

Diversity

ADAPT is committed to achieving better diversity and gender representation at all levels of the organisation, across leadership, academic, operations, research staff and studentship levels. ADAPT is committed to the continued development of employment policies, procedures and practices that promote gender equality. On that basis we encourage and welcome talented people from all backgrounds to join ADAPT.

About the ADAPT Centre

ADAPT is the world leading SFI research centre for AI Driven Digital Content Technology, coordinated by Trinity College Dublin and based within Dublin City University, University College Dublin, Technological University Dublin, Maynooth University, Munster Technological University, Athlone Institute of Technology, and the National University of Ireland Galway. ADAPT's research vision is to pioneer new forms of proactive, scalable, and integrated AI-driven Digital Content Technology that empower individuals and society to engage in digital experiences with control, inclusion, and accountability with the long-term goal of a balanced digital society by 2030. ADAPT is pioneering new Human Centric AI techniques and technologies including personalisation, natural language processing, data analytics, intelligent machine translation, human-computer interaction, as well as setting the standards for data governance, privacy, and ethics for digital content.