Faculty of Science and Engineering

Profile report: Tenure Track Assistant Professor in Artificial Intelligence - Generative AI

- Discipline: Generative AI
- Level: Assistant professor
- Focus: Research
- Fte: 0,8-1,0 fte

1. Scientific discipline

Artificial Intelligence (AI) is a scientific discipline that focuses on creating computer systems capable of performing tasks that typically require human intelligence, such as problem solving, decision making, and learning from data. Generative AI addresses the creation of multi-modal content in the form of text, images, and videos using AI systems. In this subfield, methods are developed to combine various data types for continual, persistent learning.

2. Vacancy

This position is opened by the board of the Faculty of Science and Engineering (PT/gl/22/00155) and will be embedded in the Bernoulli Institute, Department of Artificial Intelligence, Machine Learning group. The position falls within the framework of the faculty's career system Career Paths in Science and Engineering. As the focus domain of the position is research, the criteria of the career path with a focus on research apply. Please see the link for more information.

3. Selection committee (BAC)

Prof. dr. N. Taatgen (chair)	Scientific Director Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence
Prof. dr. H.B. Verheij	Head of department Artificial Intelligence, professor of AI and Argumentation
Dr. F. Cnossen	Education Director Artificial Intelligence & Computational Cognitive Science
Prof. dr. J.S. Dibangoye	Associate professor of Machine Learning
Prof. dr. R. Carloni	Associate professor of Robotics
Prof. dr. R.C. Veltkamp	Professor of Game and Media Technology, Utrecht University, External member
TBA	Student member

Advisors:

Prof. dr. L.C. Verbrugge	Professor of Logic and Cognition
Dr. A.S. Lubbe	Institute Manager
F. Postma, MSc	HR Advisor

4. Area of expertise

In recent years it has become clear that the ability to generate new information is as important as the analysis of existing data by means of classification or pattern recognition. Starting with the ability to generate new images on the basis of large image collections (generative adversarial networks), the generative approach is currently generalised to the textual domain, using transformers for large-language models. However, at this point it has become clear that artificial intelligence research needs to address a broader perspective on intelligent transformation of patterns, i.e., generalising from single modality, such as images, or text, to the simultaneous transformation of patterns from any modality to any other modality (video, audio, graphs, tabular data, etc). Current large-language models are not mature in this respect and new fundamental research is needed. Additional challenges concern the problem of a static training setup followed by a separate operational stage of models, while the information world is in a continuous flux. Continual machine learning will become essential in order to realise efficient systems that do not require full retraining after new input data becomes available. Research in this domain is at the forefront of current developments in AI and is highly relevant to the neighbouring research groups in robotics and multi-agent systems. Actual experience with (the design of) multi-modal deep learning algorithms will be advantageous to be successful in this position.

5. Embedding: institute (and base unit)

The position will be embedded in the Artificial Intelligence department of the Bernoulli Institute. The department is organized as four research groups: Machine Learning, Human Centered Robotics, Cognitive Modeling and Multi-Agent Systems. This position will be embedded within the Machine Learning research group.

The Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence is part of the Faculty of Science and Engineering (FSE). The profile of the institute centres around modelling, computation, and cognition with a focus on science and technology, keeping a balanced mix of fundamental and applied aspects. The Bernoulli Institute has research groups in mathematics, computer science and artificial intelligence that work together on three scientific challenges: 1. Persistent Complex Systems, 2. The Future of AI, and 3. Tomorrow's Software-Intensive Infrastructures. The institute participates in various national research schools and most of the PhD students are enrolled in an educational programme and take part in other activities offered by these schools. The institute has a leading role in the cross-disciplinary research theme on Digitalization and in the Center "Groningen Cognitive Systems and Materials" (CogniGron) within the Faculty of Science and Engineering.

6. Local and (inter)national position

The Bernoulli Institute has strong collaborations with other faculties of the university and the University Medical Center, and participates in the Jantina Tammes school for Digital Society, Technology and Artificial Intelligence. The institute leads a large national NWA-ORC project, HAICu, directed at the development of algorithms for

digital humanities and the cultural heritage. In addition, the institute has a leading role in the 10 year NWO Gravitation project Hybrid Intelligence (2019-2029), a national collaboration between Dutch universities. Within the Netherlands, there is a growing interest in Artificial Intelligence as formulated in the NWO AI Research Agenda. Both the EU and the Dutch Government are investing significantly in AI research.
The Bernoulli institute has a strong international reputation in the area of Systems Theory, Dynamical Systems, Software Engineering and Cognitive AI, and collaborates with several international institutes, among which ETH Zürich, Stanford University, the University of Washington and Carnegie Mellon University.

7. Expected contributions to education

The candidate is expected to teach and develop relevant course modules within our ambitious BSc and MSc programmes in Artificial Intelligence, and our MSc programme Computational Cognitive Science. The candidate plays a role in developing education concerning their area of expertise. The exact topics of the course modules co-depend on the expertise and interests of the candidate. The candidate will also supervise graduation projects in the BSc and MSc programmes. The candidate should co-create an educational culture where Artificial Intelligence and Computational Cognitive Science students feel supported and where teachers foster personal growth in students. Importantly, the candidate is expected to add to a supportive and collaborative environment between colleagues.

8. Expected contributions to research

The candidate is expected to initiate and develop an internationally leading research programme in the field of Generative AI. The research should have visibility on the national and worldwide levels and lead to publications in top journals and conferences. Further it is expected that the new professor will take a leading role in the field of Artificial Intelligence within the Netherlands. Obtaining substantial external funding for PhD projects is crucial. Supervision of PhD students is an important part of the research activities. The research is expected to strengthen the existing efforts in the field of Artificial Intelligence within the Bernoulli Institute, and should lead to a strengthening of the international reputation of the group, the research centre and the institute.

9. Expected contributions to the organisation

The candidate is expected to have an active interest and to provide a positive contribution to the management and organisational tasks of the institute. The candidate will furthermore contribute to the organisation of the faculty, for example by participating in working groups and committees, in the domains of education, research and management. The candidate will contribute to relevant organisational activities on the national and international level.