

Profile  
(0.5 FTE)

Chair: Computational Linguistics and AI

Leiden University Centre of Linguistics (LUCL)  
Universiteit Leiden

## 1. Description of the Research Area of the Chair

Artificial Intelligence (AI) aims to simulate human intelligence. One of the species-defining and species-unique features of homo sapiens is *natural language*. The development of natural language has been called the greatest and most important development in millions of years. It is therefore of utmost importance that the tools of AI are being applied to the processing of natural language in order to further our understanding of human language representation and processing. This new chair will focus on the basic linguistic processes such as acquisition, production and perception of language by applying tools of computational linguistics and AI.

### Challenges in the Research Area

One important aspect in the area of natural language processing (NLP) is statistical processing. Take for instance automatic speech recognition: very good results are booked using algorithms that make predictions about the signal based on statistical probabilities. The same is true for automatic translation where sequence-to-sequence translations (i.e. translation of lexical bundles) yield very high success rates. Indeed, the data-driven approach currently dominates the field of machine translation. However, an important question concerns the question how much knowledge about grammatical structure is necessary to further improve the outcome of automatic speech recognition or automatic translation. Currently, attempts are made to combine or complement data-driven approaches with rule-based methods in order to overcome inherent limitations with the statistical approaches.

Therefore, this chair in “Computational Linguistics and AI” will investigate AI-methodology such as deep neural learning and machine learning techniques in the area of computational linguistics.

### Goal

The goal of the chair in “Computational Linguistics and AI” is to strengthen the fields of Computational Linguistics and AI, both in scientific research and in education. The chair will study the application of AI tools such as deep learning, machine learning and deep neural networks to computational linguistics and NLP.

*The focus of the chair is to work on the use of AI methods in NLP and apply these techniques to areas such as text mining, automatic speech and language analysis as well as machine translation.*

Typical important research topics in this area are:

- Automatic analysis and interpretation of natural language (NLP)
- Optimization of machine learning-based language analysis
- Deep learning and text mining
- Deep neural networks and their relation to cognitive neuroscience
- Machine Translation (MT)

## **2. Profile of the Full Professor “Computational Linguistics and AI”**

The professor shall have:

- excellent research qualities in the field of (computational) linguistics and artificial intelligence,
- an internationally renowned reputation in the field of (computational) linguistics and artificial intelligence,
- affinity with interdisciplinary research, for instance, experimental research,
- the ability to attract prestigious national and international personal grants,
- the ability to initiate international research programs and consortia,
- experience in establishing research programs and supervising and coordinating scientific research,
- the ability to supervise and inspire undergraduate, graduate, and PhD candidates and researchers,
- excellent communication and social skills,
- willingness to contribute to the governance of the institute and proven track record of governance skills,
- significant teaching experience at the undergraduate and graduate level and the willingness to contribute to LUCL’s educational activities in the Bachelor and Master.

## **3. Embedding**

At the level of Leiden University, the chair will contribute to the recently started initiative on Social Science, Humanities, Law, AI and Life Sciences (“SAILS”), in which multidisciplinary research across different faculties, with AI as a core technology, is conducted. SAILS provides ample opportunities for multidisciplinary collaborations, with application domains for deep learning where new approaches for understanding the decision making in deep neural networks will be very welcome.

At the level of the Institute LUCL, the chair will mainly collaborate with the Theoretical and Experimental Linguistics and the Language Use in Past and Present program, depending on qualifications and research interests. The professor will collaborate with existing groups focusing on machine learning, deep (neural) learning, and statistical modeling.

The professor will participate in and initiate research projects within LUCL and will supervise PhD candidates. The professor will contribute to education programs at the BA and/or MA level.