Michael **Schlichtkrull**

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About me

I am Michael, a postdoc currently working with Prof. Andreas Vlachos on automated fact-checking via natural language processing. My primary focus is on modeling information gathering tasks over very large data sources, such as knowledge bases, Wikipedia, or the open web. I am especially interested in tasks involving *untrustworthy* sources, e.g. fact-checking of current events.

I want to spend my life solving interesting and challenging problems, and creating technology that makes life better. I want to enable people to access information easier and with a better critical lens, working towards increases in information literacy both for the average person and for specialists.

I like studying machine learning techniques and applying them to interesting problems. I enjoy reading, mostly science fiction and non-fiction with the occasional classic in the mix. I also like cooking, cycling, computer gaming, hiking, and badminton, and I have recently taken up watercolour painting.

Work Experience

Postdoctoral Research Associate
Cambridge, United Kingdom

University of Cambridge — *March 2021 - Present*

- Ongoing research position at the University of Cambridge, where I work with Andreas Vlachos on automated fact-checking.
- Multiple publications at top venues, including the FEVEROUS dataset at NeurIPS 2021, and a survey paper on fact-checking in TACL.
- Worked as a co-organizer for the FEVER 2021, 2022, and 2023 workshops at EMNLP 2021, ACL 2022, and EACL 2023 respectively.

Research Intern
London, United Kingdom

Facebook AI Research — *June 2020 - September 2020*

- Research internship in NLP at FAIR London.
- Investigation into and development of a system for fact-checking over large open collections of tabular data.

Applied Science Intern
Berlin, Germany

Amazon — *July 2018 - September 2018*

- Research internship in NLP at Amazon Berlin.
- Development of systems and evaluation practices for question generation over natural text.

Student Assistant in IT Development
Copenhagen, Denmark

Saxo.com ApS — *June 2014 - June 2016*

- Development of server-side software for online booksales, working mainly in C# and SQL.
- Implementation and exposure of functionalities through a public API, as well as occasional front-end work.

Teaching Assistant for Algorithms and Data Structures I & II
Copenhagen, Denmark

Technical University of Denmark — *February 2012 - December 2012*

- Exercise sessions and homework grading for Algorithms and Data Structures I, taught by Inge Li Gøtz. Introductory material including sorting, searching, heaps, trees, and elementary graph theory.
- Exercise sessions for Algorithms and Data Structures II, taught by Paul Fischer. Higher-level material including flow algorithms, balanced data structures, and graph partitioning.

Education

PhD in Computer Science
Amsterdam, Netherlands & Edinburgh, United Kingdom

University of Amsterdam — *Sep 2016 - June 2021*

- The subject of my PhD was the use of graph-neural networks to model structured data for natural language processing. My PhD advisor was Ivan Titov.
- We developed graph neural network models for link prediction and knowledge base question answering, as well as advanced techniques for interpreting graph neural networks.
- While I formally worked at the University of Amsterdam, I was posted as a permanent visitor at the University of Edinburgh for much of my PhD.

Master of Science in IT and Cognition *Copenhagen, Denmark*

University of Copenhagen *Sep 2014 - Aug 2016*

- My thesis subject was cross-lingual dependency parsing for truly low-resource languages, and resulted in state-of-the-art performance as well as a publication at EACL. My thesis was supervised by Anders Søgaard.
- The programme was offered by the Center for Language Technology, and approaches language processing as an interdisciplinary field involving mathematics, machine learning, and knowledge from linguistics and cognitive science.
- Courses in natural language processing, statistical machine learning, probabilistic modelling, and image processing, with a secondary focus on cognitive science.

Bachelor of Science in Software Engineering *Copenhagen, Denmark*

Technical University of Denmark *Sep 2010 - Jul 2013*

- I wrote my thesis on coreference resolution in semantic parsing, applying a formal logical approach based on type theory. My supervisor was Jørgen Villadsen.
- Courses in mathematics, probability theory, graph theory, algorithms, formal logic, and computer science modelling.

Student Supervision

Eric Chamoun I am currently co-supervising Eric Chamoun's PhD research together with Andreas Vlachos. His topic is automated fact-checking for scientific claims, focusing on the use of peer reviews as data for fact-checking models.

Mubashara Akhtar I am currently co-supervising Mubashara Akhtar's project as a visiting PhD researcher, together with Andreas Vlachos. Her topic is evaluation of evidence retrieval for automated fact-checking.

Boxuan Wang I am currently co-supervising Boxuan Wang on his undergraduate dissertation together with Zhijiang Guo and Andreas Vlachos. His topic is the use of table-to-text models as priors for table reading in automated fact-checking.

Xuyou Cheng In 2022 I acted as the primary supervisor for Xuyou Cheng on his master's dissertation. His topic was to model lexical semantics with graph convolutional networks, exploring whether knowledge can transfer from knowledge base modelling to classical semantic tasks. We intend to submit a paper based on the thesis to EMNLP 2023.

Andrew Georgiou In 2022 I co-supervised Andrew Georgiou on his master's dissertation together with Zhijiang Guo and Andreas Vlachos. His topic was to edit the knowledge contained in language models, in order to improve their factuality on fact-checking tasks.

Henry Caushi In 2022 I co-supervised Henry Caushi on his undergraduate dissertation together with Zhijiang Guo, Ilya Shumailov, and Andreas Vlachos. His topic was to explore the possibility of automatically generated adversarial attacks against fact-checking models.

Selected Publications

The Intended Uses of Automated Fact-Checking Artefacts: Why, How and Who in which we study the intentions of researchers and designers of automated fact-checking systems, arguing that current practise is dominated by vague narratives that hold back the technology. With Ousidhoum, N., and Vlachos, A. *ArXiV, 2023*.

A survey on automated fact-checking in which we survey research directions and recent developments in automated fact-checking, highlight the connections between various subtasks, and discuss future challenges and research directions. With Guo, Z., and Vlachos, A. In *TACL 2022*, presented at *ACL 2022*.

FEVEROUS: Fact Extraction and VERification Over Unstructured and Structured information in which we introduce the FEVEROUS dataset for fact-checking over structured and unstructured evidence, a new benchmark which requires modelling of both text and tables. With Aly, R., Guo, Z., Thorne, J., Vlachos, A., Christodoulopoulos, C., Cocarascu, O., and Mittal, A. In *NeurIPS 2021*.

Joint Verification and Reranking for Open Fact Checking Over Tables in which we investigate fact-checking over large collections of tables, producing the first results in the open domain along with a state-of-the-art attention-based model for both the open and the closed domain. With Karpukhin, V., Oğuz, B., Lewis, M., Yih, W., and Riedel, S. In *ACL 2021*.

Interpreting Graph Neural Networks for NLP With Differentiable Edge Masking in which we propose a technique for interpreting graph neural networks by identifying relevant and superfluous edges through a learned erasure function, and apply said technique to study models for semantic role labeling and question answering. With De Cao, N. and Titov, I. In *ICLR 2021*.

How do Decisions Emerge across Layers in Neural Models? Interpretation with Differentiable Masking in which we propose a technique for interpreting attention-based models through a learned erasure function, and apply said technique to study BERT models on sentiment classification and question answering. With De Cao, N., Aziz, W., and Titov, I. In *EMNLP 2020*.

Evaluating for Diversity in Question Generation over Text in which we investigate diversity in question generation over text, proposing an alternative evaluation metric to account for semantic diversity in references and demonstrating significant improvement on an existing system with the addition of a variationally trained latent variable. With Cheng, W. *ArXiV, 2020*.

Modeling Relational Data with Graph Convolutional Networks in which we obtain state-of-the-art results with a neural model for relational link prediction by developing and applying an extension of the recently proposed Graph Convolutional Networks to relational data. With Kipf, T. N., Bloem, P., Berg, R. V. D., Titov, I., & Welling, M. In *ESWC, 2018*. Won best student research paper award.

Cross-Lingual Dependency Parsing with Late Decoding for Truly Low-Resource Languages in which we improve upon the state of the art for cross-lingual dependency parsing through annotation projection and an extension of LSTM. With Søgaard, A. In *EACL, 2017*.

Taxonomy Enrichment by Evidence Ranking in which we beat a hard baseline for taxonomy enrichment through a simple method of candidate extraction and scoring inspired by results in information retrieval. With Alonso, H. M. At *SemEval, 2016*.

Learning Affective Projections for Emoticons on Twitter in which I develop a distantly supervised algorithm for interpreting emoticons on social media data using skipgram embeddings. In *CogInfoCom, 2015*. Won best paper award.

Skills

Natural languages	English (fluent), Danish (native), German (Proficient), Spanish (Intermediate)
Programming languages	Python, Java, C#, C, C++, ML, Prolog, F#, Matlab, Javascript, Visual BASIC
Frameworks	Pytorch, Tensorflow, Theano, Scikit-learn
Other technologies	SQL, SPARQL, CSS, ASP.NET