



PhD position in machine learning for education (m/f/d; E13 TV-L, 65%)

Applications received until 15.10.2021 will receive full consideration. The position is limited to three years.

The project

Ever studied for an exam only to forget just days later? Psychophysical studies have shown how reviewing regularly leads to long-term recall, and on average the optimal review schedule spaces out repetitions exponentially in time, which is good news. However, although many apps make use of this fact, and students worldwide use them to schedule their learning of languages or even the medical curriculum, such spaced repetition apps usually lack flexibility to adapt to each individual learner, and they don't take advantage of the structure of the learning domain. For example, in programming you typically want to learn about variables before you learn about functions, classes or even macros, so it doesn't make sense to review the latter concepts before the former become familiar.

In this PhD you will address exactly these problems and develop machine learning methods that learn to schedule based on how the learner is doing so far and the structure of the learning domain, encoded as a knowledge graph. As part of this project, you may learn and use techniques like Bayesian structure induction, Gaussian processes, graph neural networks, and reinforcement learning in an environment with experts in those areas. By running controlled online tests with real human learners, we will be able to quantify how well the algorithm does relative to current approaches. And by writing a scheduler that any learning app can use, you will make your algorithm accessible to self-directed learners around the world.

You will have the opportunity to develop skills in probabilistic modelling, software engineering, and cognitive psychology working in a stimulating environment with [peers and supervision from machine learning, cognitive psychology, computational linguistics / natural language processing and education sciences](#). We are excited about the intellectual challenges as much as about the practical impact in helping people learn better, and we hope you share our enthusiasm!

Your qualifications

You should have an excellent M.Sc. in a quantitative discipline, an affinity for software engineering, and a good understanding of probabilistic modelling for machine learning. The ideal candidate should be self-motivated, comfortable with both analytic and critical thinking, and passionate about science.

Please indicate in your application if you have prior experience with conducting experiments, computational modeling, and machine learning, including NLP. Programming (in e.g., Julia, Python or Javascript), software engineering (API design, databases, CI/CD), mathematics, communication (in English), and the ability to independently manage a project (of any type) should also be mentioned.

Important note: this project is very interdisciplinary! We only expect you to have experience in some of the subject domains, and bring in a lot of enthusiasm for the rest.



About us

The project is jointly led by Álvaro Tejero-Cantero ([ML \$\rightleftharpoons\$ Science Colaboratory](#)) and Charley Wu ([Human and Machine Cognition Lab](#)), with co-supervision by Detmar Meurers ([Theoretical Computational Linguistics Lab](#)), Kou Murayama ([Motivation Science Lab](#)) and Ulf Brefeld ([Information systems and Machine Learning](#)).

This project is one of four subprojects in the [Machine Learning in Education Network Project](#), an initiative of the [Cluster of Excellence ML in Science](#) to bring modern machine learning to education.

About Tübingen

Tübingen is a scenic university town on the Neckar river in South-Western Germany. The quality of life is exceptionally high, and the atmosphere is diverse and inclusive; most locals speak English. Tübingen offers excellent research opportunities due to the University, four Max Planck institutes, the University Hospital, and Europe's largest AI research consortium. You can find out more about Tübingen and our work environment [here](#).

Apply

We believe that diversity in age, abilities, sexuality, gender identity, ethnicity, perspectives and ideas makes not just for a richer life, but also for a better team outcome. And we know that people do their best work when they feel like they belong — included, valued, and equal. We strive for an environment where everyone brings their full selves to work knowing that they'll be supported to succeed. If you share this vision, we would like to know you.

To apply, send in a single pdf file <lastname>.pdf with a cover letter detailing how your experience fits with the project and a clear description of your specific skills, your CV, the names and email addresses of 2-3 people who we can contact for reference, and unofficial copies of your University degrees.

Please link to or enclose some code you have written (applications without code samples will not be considered). Send your application material to Elena (elena.sizana—uni-tuebingen.de). For questions about the job, write to Álvaro and Charley (alvaro.tejero / charley.wu—uni-tuebingen.de).

The university seeks to raise the number of women in research and teaching and therefore urges qualified women academics to apply for these positions. Equally qualified applicants with disabilities will be given preference. The employment will be carried out by the central administration of the University of Tübingen.

E 13 TV-L

According to the general pay scale of German universities, the salary will be “E 13 TV-L at 65%”. There are 30 vacation days. Depending on your experience after the M. Sc., the University administration will place you in a certain level — check this [salary calculator, with gross and net](#).