# PhD position (m/f/d; E13 TV-L, 65%) in machine learning in climate science

The Machine Learning in Climate Science research group at the Cluster of Excellence "Machine Learning," University of Tübingen, invites applications for a **PhD position (m/f/d; E13 TV-L, 65%)** to develop seasonal forecasts of extreme rainfall events over Germany and western Europe using spatiotemporal artificial neural networks (STANNs). The position is funded for three years starting no later than 1 September 2021 and, along with three other PhD projects, is part of the mini-graduate school *Modeling and Understanding SpatioTemporal Environmental INteractions* (MUSTEIN).

MUSTEIN aims at developing machine learning (ML) techniques that reliably learn explainable models of critical aspects of four highly interacting spheres, focusing on (i) seasonal weather dynamics (P1), (ii) river water discharge (P2), (iii) soil erosion (P3), and (iv) solar thermal systems (P4). The targeted ML-based systems will potentially allow us to (i) predict environmental system dynamics more accurately and for longer periods into the future, (ii) anticipate future climatic developments and prepare accordingly, (iii) partially control the developments, and (iv) explain the hidden causes and influences in an accessible, causal manner.

## Qualifications

You should hold a MSc degree (or should have one by June 2021) in computer science, physics, mathematics, statistics, geoscience, earth science, meteorology, or any other relevant discipline. A background in probability and statistics, along with a basic knowledge of artificial neural networks and deep learning is preferable. You should be capable of independent, creative, and critical thinking, and you should be willing to tackle challenging problems which do not offer easy resolutions at first sight. Ideally, should you have experience in scientific programming, along with some prior experience of working with deep learning libraries such as PyTorch or TensorFlow. If you have prior research experience, such as from a Master's thesis project or in the form of a conference paper or a manuscript, it will add significantly to the strength of your application.

## Role

You will work towards a PhD degree, to be completed within three years from the start of funding. You will conduct supervised scientific research within *Project P1: Seasonal Weather Forecast* of MUSTEIN. This will involve developing new methods and techniques to analyse extreme rainfall over western Europe using STANNs and to develop a probabilistic seasonal forecast scheme that can be used to anticipate the frequency of extreme rainfall events up to six months in advance. The project will necessitate the analysis of large-scale spatiotemporal climate data sets and the application of state-of-the-art deep learning methods. You will be required to regularly communicate your scientific progress in the form of conference presentations and academic journal articles. Your

project will be supervised by Dr. Bedartha Goswami (Machine Learning in Climate Science), in collaboration with Prof. Dr. Martin V. Butz (Neuro-Cognitive Modeling Group), Prof. Dr. Hendrik Lensch (Computer Graphics), and Dr. Nicole Ludwig (Machine Learning in Sustainable Energy Systems). You will take active part in joint research activities with these research groups and also others that are involved in MUSTEIN.

## Tübingen

Tübingen is a picturesque town home to one of Germany's oldest universities dating back to 1477. It also houses four Max Planck Institutes, four Helmholtz Research Centres, three institutes of the Leibniz Association, the University Hospital, and a significant portion of the Cyber Valley initiative, Europe's largest AI research consortium. The town has a dynamic and intellectually stimulating atmosphere that will allow you to grow as a researcher and as a person. The people here are welcoming, diverse, and inclusive, and most locals speak English. Theater, concerts, exhibitions, and festivals are a regular feature in the town's calendar and there are numerous possibilities of going out on nature excursions in the surrounding Swabian Jura.

## Application

Your application should consist of a single PDF file `<lastname_firstname>.pdf` containing:

- *a cover letter*, explaining why you would like to join us,
- *a statement of research interests* (max 2 pages), briefly outlining the research topics that excite you and that you would like to pursue in your PhD,
- *your CV*, with details of publications and conference participations (if applicable),
- *a copy of your Master's degree certificate*, if you already have one,
- *a copy of your academic transcripts from your Master's degree program*, and
- *two letters of reference*.

Barring the degree certificate, transcripts, and letters of reference, the document should be typeset using left-aligned Times New Roman, Arial, or Calibri typefaces, 12pt font size, single line spacing, and 1 inch margins.

Please send in the application file to Dr. Bedartha Goswami at bedartha.goswami@uni-tuebingen.de by **15 May 2021**. Shortlisted candidates will be informed by the end of May and interviews will be held virtually in the first week of June. We expect you to start in August preferably, but no later than 1 September 2021.

## Equal opportunities

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.