Meteorologisk institutt

Jobbnorge ID: 254909
Deadline: 1/12/2024
Website: https://www.met.no/
Scope: Fulltime
Duration: Project

About us

The Norwegian Meteorological Institute forecasts weather, monitors the climate and conducts research. Since the institute was established in 1866, Norwegian meteorologists have figured prominently in the development of the discipline. The Norwegian Meteorological Institute is today a leading international centre of expertise.

The Norwegian Meteorological Institute develops and delivers a wide range of useful services. We ensure that rescue helicopters arrive safely and that agencies responsible for emergency planning are prepared for extreme weather and other dangerous weather. We conduct comprehensive research and deliver climate data that can be used to, among other things, calculate the future climate of the country. We have a free and open data policy, which means that anyone may use our material freely and for benefit of society. And not least: Yr.no is part of the daily planning of people both in this country and abroad.

The Development Centre for Weather Forecasting has about 60 employees in Oslo, Tromsø and Bergen, both research scientists (natural and social sciences) and research meteorologists. The Centre is dedicated to user-informed, research-driven development of services, and is responsible for Met Norway's research and development on numerical weather prediction (NWP) and the maintenance and operations of the automated NWP value chain (science for service; open data; api.met.no; Yr). The Centre has extensive national and international collaborations and research projects, and the degree of external funding is very high. Its organization emphasizes flexibility, which is especially important in the user and stakeholder engagement, supporting Met Norway's and the Centre's responsibility for the delivery of world-leading operational weather services like Yr.

The Development Centre for Weather Forecasting functions as a research and operational centre with a focus on very- and short range weather predictions and services. The most notable and acclaimed service being the weather app Yr. Yr is a collaboration between Met Norway and the Norwegian Broadcasting Company (NRK). The main focus is the Nordic countries and the European Arctic and to this end we research, develop, implement and operate dedicated numerical weather analysis (including climate re-analysis) and prediction models. On Yr, weather forecasts are provided globally for about 13 million locations. Extensive and novel post-processing is applied to automatically quality-control observations (including a massive amount of crowdsourced observations), reduce forecast errors (of numerical weather prediction models and climate analysis) and provide high geographical details in the weather forecasts and climate monitoring.

The ECMWF is an intergovernmental organisation created in 1975 and is today supported by 35 Member and Co-operating States mostly in Europe. The Centre's mission is to serve and support its Member and Co-operating States and the wider community by developing and providing world-leading global numerical weather prediction. These predictions are also used by Met Norway both as the lateral boundaries for our short-range predictions and weather forecasts up to 21 days, e.g. as presented on Yr.

Machine Learning Scientist/Engineer for Data-Driven Methods for Weather Forecasting

About the position

The Norwegian Meteorological Institute (Met Norway) opens two 3-year positions as research scientist and/or engineer at the Development Centre for Weather Forecasting. The successful candidates will be part of a team building a world-leading, machine learning (ML) based weather forecasting system, to complement our existing physics-based system. The work is performed in collaboration with the European Centre for Medium-Range Weather Forecasts (ECMWF). The work will involve solving exciting research questions in machine learning for Earth system modelling, for instance a stretched-grid model configuration for Nordic weather conditions. Optimisation of large ML models and exploring ensembles approaches will be key to developing and implementing optimal model configurations for accurate and reliable weather prediction. Another topic is to build and extend ML-ready datasets for training. The results will support the rapid evolution of ML in weather science and pioneer data-driven prediction models and their role in the weather forecasting value chain for improved weather services such as Yr.

These positions are located in Oslo. Several visits of different length at ECMWF in Bonn and/or Reading are expected. An introduction to Met Norway's and ECMWF operational weather production chain will be given including but not limited to operational earth-system modelling and model output postprocessing.

The work language at Met Norway is Norwegian. For all applicants fluency in written and spoken English is required, and for foreign applicants a willingness to learn Norwegian. Training courses will be provided.

Work areas (all are not expected to be fulfilled by one candidate alone) for these positions are :

- Improve the training performance and scale to larger ML models (both in terms of complexity and resolution) across multiple GPUs
- Explore approaches to build weather prediction ensembles
- Build ML-ready datasets to enhance training ML models by fast data loading and suitable for training a stretched-grid model
- Validation and verification of model forecast performance
- Collectively contribute to find the optimal model configurations
- Progressively engage in research to operations, interact with stakeholders and users
- Participate in national and international projects, including proposal writing
- Contribute to scientific publications

Skills and qualifications

- PhD or MSc degree in statistics, computer science, meteorology, geophysics, physics, applied mathematics or equivalent
- Expertise in at least one deep learning framework (PyTorch, Tensorflow, JAX)
- Experience developing in Python or similar languages
- Interest in earth-system modelling, meteorology and/or meteorological applications is an advantage
- Good analytical skills
- Ability to take responsibility, work independently within an interdisciplinary environment
- Good collaborative and interpersonal skills
- Good oral and written communication skills

The following skills are desirable and the more experience you have on each the better, but it is not a necessity to have all:

- Experience in improving computational and memory performance of machine learning models
- Experience in developing model-parallel training
- Experience with graph neural networks and/or transformer models
- Experience with generative modelling using GANs/diffusion models/score-based optimisation
- Experience with git (or similar) for software version control
- Strong statistical knowledge

We can offer

- Good working environment and professional challenges in a modern, technological environment
- Salary on the governmental salary scales dependent on qualifications and experience, NOK 575,400 - 770,000 pr. year. Higher salary can be negotiated in case the selected applicant has excellent qualifications.
- Membership in the governmental pension scheme (2% deducted from gross salary)
- The first 6 months is a mutual trial period.

Contact

Further information can be obtained from the Director of Development Centre for Weather Forecasting Dr. Jørn Kristiansen (+47 46420054; jornk@met.no)

Additional information

We emphasize diversity and therefore encourage everyone qualified to apply for a job regardless of age, gender, disability, national or ethnic background.

In case an applicant does not wish to be registered on the public application list, the applicant will need to give a reasonably argued justification. Information about the applicant can still be published. If the wish to not be registered on the public application list is denied, the applicant will be informed prior to the disclosure.

ECMWF recently launched the Artificial Intelligence/Integrated Forecasting System (AIFS) model based on a graph neural networks (GNN) architecture, https://www.ecmwf.int/en/about/media-centre/aifs-blog/2023/ECMWF-unveils-alpha-version-of-new-ML-model. Whilst AIFS is still in its alpha version, it is a deterministic model of comparable skill with leading data-driven models and offers tangible foundations that we will build upon. Further research and development will explore optimal approaches for building reliable ensembles with data-driven models, as the small computing cost of inference with data-driven models offers the possibility of running large ensembles. The developments include the development of a pipeline spanning the creation of training datasets, training models at scale and connecting trained models to operational infrastructure for evaluation and dissemination.

Additional information

Contact person:

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