VN 23/52 Research Fellowship at DMI (joint with Met Norway)

EUMETSAT is now inviting applications from suitably qualified data scientists from its Member States for a Research Fellowship on an innovative and collaborative project about the potential benefits of machine learning (ML) within data assimilation (DA) and forecasting systems in Arctic regions. The Research Fellow will join the Numerical Weather Prediction (NWP) department at the Danish Meteorological Institute (DMI) and, as expected by the joint fellowship program, He/She will also collaborate with scientists from the Norwegian Meteorological Institute (Met Norway).

In recent years, there has been increased interest in producing more accurate weather predictions for Polar regions. To do so, due to the lack of conventional observations in these remote areas, NWP/DA systems have to significantly improve the use of satellite observations to produce the best estimate of the state of the atmosphere and the surface.

Within NWP/DA systems, the direct assimilation of microwave radiances is managed by a physical-based forward model (also named as 'observation operator') that is necessary to simulate the satellite observations. If the simulated and observed brightness temperatures are close enough, then the observations are assimilated. In ice-covered Arctic regions, the poor performance of operational observation operators (e.g., RTTOV) at simulating realistic brightness temperatures is related to the difficulty of representing the surface emission properties of sea ice and snow (more generally, the 'sea ice/snow emissivity'). The Fellow's work will focus on investigating state-of-the-art ML tools (e.g., 'supervised' and 'unsupervised' learning methodologies) which can improve the performance of the canonical forward model so that simulated radiances can better fit satellite observations. The Research Fellow will develop ML techniques that can be interfaced with the Met Norway NWP/DA limited area model (AROME-Arctic) which covers a large part of the Arctic region. The goal of the work is also to conduct data assimilation experiments to evaluate the performance of the derived ML model with respect to the use of the default observation operator. Statistics on the forecast scores will be computed to illustrate the improvements, associated to a case study eventually.

LOCATION

Copenhagen,

Denmark

QUALIFICATIONS

University degree in physics, mathematics, meteorology, remote sensing and a PhD in a relevant field (or equivalent research experience).

LANGUAGES

Candidates must be able to work effectively in English and have solid written and verbal communication skills for contributing to presentation and publication (papers or conference).

DEADLINE

29 January 2024

Duties

- Familiarization with the AROME-Arctic weather and data assimilation system: solid understanding of satellite microwave observations and model data available in the NWP/DA system which are important to support the development of ML models; basic knowledge on how to configure and run a data assimilation experiment.
- State-of-the-art ML literature review and identification of ‘supervised’ and ‘unsupervised’ learning methodologies valuable for the goal of the fellowship.
- Preparing the dataset and the framework to run and validate the ML models.
- Extend the ML framework within the AROME-Arctic system and possibility of running data assimilation experiments.
- Presentation and publication of results (e.g. conferences, journals).

Skills and Experience

- University degree in physics, mathematics, meteorology, remote sensing and a PhD in a relevant field (or equivalent research experience).
- Knowledge in one or more of the following areas is highly desirable: microwave radiative transfer modeling, satellite data assimilation, numerical weather forecasting system (previous experience with HARMONIE is preferable).
- Experience in using ‘supervised’ or ‘unsupervised’ machine learning methodologies (python-based preferable). Proven ability with ML algorithms on earth-system modeling or observations is a clear advantage.
- Good knowledge of Unix/Linux based systems is mandatory (previous exposure with HPC systems is also desirable).
- Strong interpersonal and team working skills along with strengths in analysis and problem solving abilities.
- Candidates must be able to work effectively in English and have solid written and verbal communication skills for contributing to presentation and publication (papers or conference).

Employment Conditions

The fellowship is offered for one year, with the possibility of extension for up to two additional years.

According to the DMI public policy, the successful post-doc candidate, based on experience, will be recruited with a monthly gross salary ranging between 42,000 and 44,000 DKK plus pension.

EUMETSAT is committed to providing an equal opportunities work environment for men and women.
Please note that only nationals of EUMETSAT Member States may apply. The EUMETSAT Convention requires that Staff shall be recruited on the basis of their qualifications, account being taken of the international character of EUMETSAT.

About EUMETSAT

EUMETSAT is Europe’s meteorological satellite agency. Its role is to establish and operate meteorological satellites to monitor the weather and climate from space - 24 hours a day, 365 days a year. This information is supplied to the National Meteorological Services of the organisation's Member States in Europe, as well as other users worldwide.

EUMETSAT also operates several Copernicus missions on behalf of the European Union and provide data services to the Copernicus marine and atmospheric services and their users.

As an intergovernmental European Organisation, EUMETSAT has 30 Member States (Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, The Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.)

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