

Master thesis: Improving Deep Learning Models for All-Sky Imager-based Solar Forecasting

Stellenanbieter: Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)

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Your mission:

Predicting future solar irradiance is critical for the efficiency and integration of solar power plants. Cloud dynamics, which significantly influence solar irradiance, play a central role in this process. Developing advanced solar forecasting models is essential to address the challenges of the energy transition and mitigate climate change. This Master's thesis focuses on optimization and further development of our data-driven solar forecasting models using ground-based sky images and sensor data. A key requirement to obtain spatially-resolved information on the effect of clouds on solar irradiance is their geolocation. While detecting clouds in images has been improved significantly, exact geolocation remains a challenge. Leveraging available high-quality datasets, this research will explore data preprocessing techniques, innovative training methodologies and model validation.

Your tasks will be:

- Conduct a literature review of data-driven methods for solar forecasting with all-sky imagers and cloud height estimation for cloud geolocation.
- Prepare standardized training, validation and test datasets for model development.
- Implement and compare cloud height estimation methods and integrate them into our forecasting model
- Validate your models and benchmark them against state-of-the-art models
- Summarize your methodology, experiments and results in a well-structured Master's thesis.

We've got a great offer for you:

- A collaborative, diverse, and motivated team committed to building a sustainable future.
- Opportunities to work closely with colleagues and tutors, exchanging ideas and solving challenges.
- Hands-on experience in machine learning, software development, automatic testing and version control.
- Exposure to cutting-edge technologies in image processing, computer vision and machine learning.
- A chance to contribute to climate change mitigation and advance renewable energy solutions.

- A position based in Almería, Spain, a sunny city on the Mediterranean coast.

Your qualification:

- You have a good academic record in a Master's/Diploma program in the fields of in computer science, physics, engineering or similar.
- Experience in Python and basic knowledge about machine learning
- The ability to work independently and collaborate in an international team
- Confident in speaking and writing English
- Prior experience or interest in data analysis, computer vision, and software versioning systems is an advantage.

If this sounds like an exciting opportunity for you, please contact us! Yann Fabel (yann.fabel@dlr.de + 49 2203 6011 038). Please enclose supporting documents for the above points with your application.

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Ursprünglich veröffentlicht: 21.01.2025

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