# Master thesis (f/m/x): Cloud classification using deep learning and infrared cameras

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

The Institute of Solar Research develops innovative technologies for the utilisation of solar energy. The focus is on electricity generation and the provision of heat and fuels. The primary goal is to use solar energy to contribute to the heat transition and a reduction in fossil fuels.

## What to expect:

Accurate cloud segmentation and classification are essential for reliable solar power forecasting and optical satellite communications. The Institute of Solar Research is at the forefront of developing short-term cloud cover forecasts. To address the challenges of cloud analysis, machine learning techniques are emerging as a highly effective solution for automated detection and classification in high-resolution sky images, though they still face significant challenges, particularly in multi-layer cloud scenarios and during nighttime conditions. You will be part of a diverse and motivated team working on energy-transition topics and contributing to climate protection. Close collaboration with supervisors and colleagues will support you in exchanging ideas and solving challenges. You will gain hands-on experience in software development, automated testing, version control and modern image-processing technologies. A particular highlight of the project is the opportunity to work in Almería, Spain, one of the sunniest locations in Europe.

## Your tasks:

- Conduct a comprehensive literature review on image and video segmentation/classification, data augmentation, synthetic image generation, and learning from limited annotated data.
- Contribute to the development of a deep learning-based machine learning model for cloud detection and classification using infrared (IR) imagery.
- Enhance the training pipeline to reduce the need for manually annotated reference data, exploring semi-supervised learning and synthetic data generation techniques.
- Assist in the annotation of reference datasets.
- Train and evaluate models for cloud detection and classification under both daytime and nighttime conditions.
- Benchmark model performance against existing cloud detection methods and conduct in-depth performance analysis.
- Document your methodology, experimental setup, and results in a clear, well-structured technical report.

## Your profile:

- You have a good academic record in a Master's/Diploma program in the fields of in

computer science, physics, mathematics, engineering or similar.
- Experience in Python and basic knowledge about machine learning.
- Prior experience or interest in data analysis, computer vision, and software versioning systems is an advantage.
- The ability to work independently and collaborate in an international team.
- Confident in speaking and writing English.

**If this sounds like an exciting opportunity for you, please apply by sending us a cover letter and your CV!** Eduardo Saez Martinez (eduardo.saezmartinez@dlr.de, +4922036011374).

#Python #CloudClassification #DeepLearning #MachineLearning #ComputerVision #SolarEnergy #ImageSegmentation #InfraredImaging #LWIR #DLR #Almería

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**Stellenanbieter:** Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
Institut für Solarforschung, Standort Almería, Spanien
Calle Doctor Carracido 44
04005 Almeria, Spanien

**WWW:** http://www.dlr.de/sf

**Ansprechpartner:** Eduardo Saez Martinez
**Telefon:** +4922036011374
**E-Mail:** eduardo.saezmartinez@dlr.de

**Online-Bewerbung:** eduardo.saezmartinez@dlr.de

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