Multi-image super-resolution techniques on cloud-occluded satellite images

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Many disciplines (environmental management, precision agriculture, ...) base their studies on multispectral images captured from satellites. The quality of the provided images (precision, resolution, …) limits the possible studies of the scene. Moreover, the atmospheric conditions (clouds, haze, …) also can difficult the extraction of reliable information from images. Therefore, the development of techniques that attenuate those problems can have a big impact on many domains.

In this project we propose to explore the fusion of multiple satellite images of a same scene, to generate a high-resolution image where the atmospheric distortions have been attenuated. This will be done by first segmenting the image regions affected by clouds and their casted shadows, to then combine this information to generate a single enhanced image.

The task to be performed by the student are the following ones:

- Study the detection of cloud/shadow image regions as a semantic segmentation and regression problem, using real and synthetic datasets.
- Explore different ways to integrate cloud/shadow information in a multi-image super-resolution algorithm.
- Asses the quality achieved by the different explored alternatives.