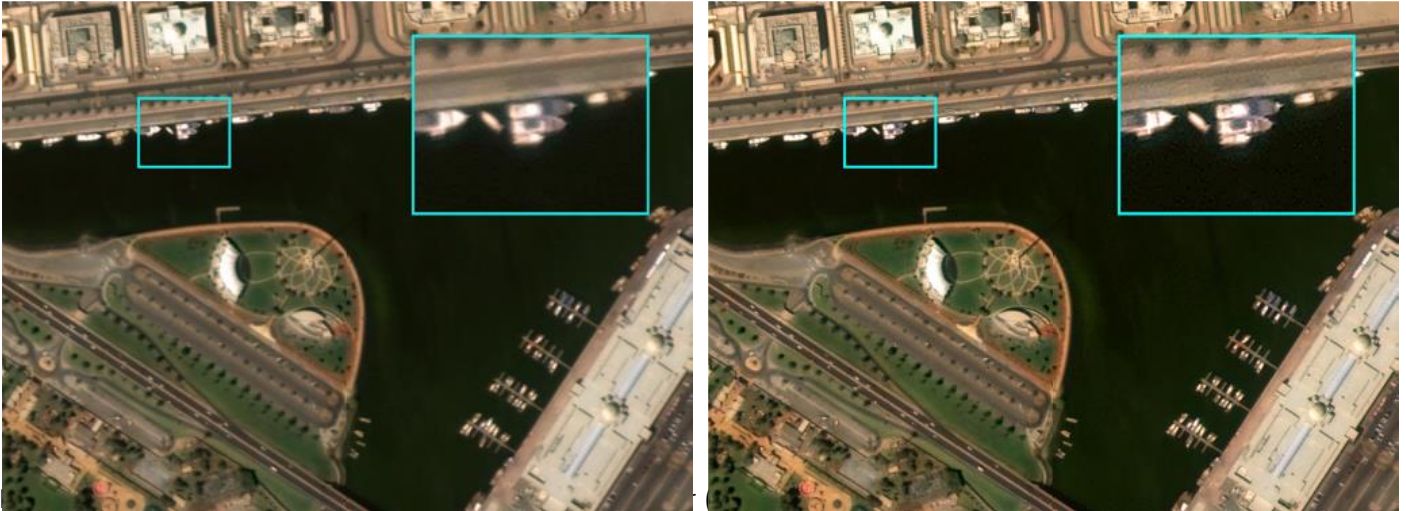# GEOSAT improves resolution in satellite imagery based on Artificial Intelligence (AI)

GEOSAT is a global Earth Observation company delivering very-high resolution and wide swath imagery complemented with analytics targeted at specific vertical markets in a great variety of fields and applications. The company owns and operates 2 satellites: GEOSAT 1 (22m resolution) and GEOSAT 2 (up to 40m resolution at nadir) and is currently leading the development of its future constellation of High-Resolution (HR) & Very High-Resolution (VHR) satellites, targeted at frequent revisit and increased resolution.

The 24/7 satellite operations, enabled by a network of 5 ground stations, distributed in 4 different countries, allow for the management and coordination of major campaigns involving both GEOSAT owned and partner satellites.

Among others, GEOSAT's products have been contributing to the ESA/UE Copernicus program and crop monitoring projects over USA and Europe for more than 8 years. The 24/7 Customer Service is available for any type of emergency or dedicated customer requirements. For more information, please visit www.geosat.space

Super Resolution (SR) Satellite Imagery

As part of the in-house development and innovation processes, a growing need has been detected for higher resolution images that allow for a more detailed analysis of the information.

GEOSAT 2 products feature a standard resolution of 75 cm at nadir, which has been enhanced with a new product which improves resolution to 40 cm, dubbed GEOSAT 2 Super Resolution (SR).

From 75 to 40 cm thanks to AI

GEOSAT's Innovation department has worked to improve the resolution of its images through a model that combines AI and Machine Learning techniques.

Super Resolution algorithms can be applied to both Pansharpened and Bundle Multispectral products, while the former has a standard resolution of up to 75 cm, which is reduced to 40 cm with the SR technique. In the case of multispectral images with a standard resolution of 3m, Super Resolution images can be generated at 1.6 meters.

Super Resolution applied to RGB and Multispectral images

This algorithm is based on the availability of very high-resolution images considered as ground truth. Pairs of high- and low-resolution images (HR, LR) are constructed from these images. The latter are obtained by degrading the high-resolution images by simulating the processes that would affect a real low-resolution capture (e.g., scaling factor, blur, or noise, among others). From these pairs of images, a prediction model is trained, which is then used to generate the Super Resolution images. In between, various data preparation and normalization tasks are carried out, which help to achieve better model performance. Finally, once a properly parameterized predictive model is available, it is possible to use this model to generate an HR version of a new LR image given as input. In this way, Super Resolution images with very high levels of similarity to the real image are achieved.

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