

# Application of Artificial Intelligence Techniques to Improve Sentinel-3 Spatial Resolution

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## Abstract

The Sentinel-2 mission satellites provide multispectral images with 13 spectral bands at three different spatial resolutions (10, 20 and 60m Ground Sample Distance - GSD). In contrast, the Sentinel-3 mission products have 21 spectral bands at a minimum spatial resolution of 300m. Therefore, the article's objective is to combine the data of two satellite missions to improve the spatial resolution of the latter. We use a convolutional neural network (CNN), which has already been proven to improve the resolution of Sentinel-2 bands from 20 and 60m GSD to 10m, and a generative adversarial network (GAN), both of which are trained with data from different latitudes and terrains at lower resolution, i.e., from 9km to 300m, to predict the step from 300m to 10m. The results of both neural networks are compared with those of the traditional pansharpening and bicubic interpolation super-resolution algorithms. Thus, it shows that the newly proposed methods improve the previous ones both through quantitative analysis and visual comparison. In particular, the outstanding performance of the GAN used is remarkable, which manages to improve the global numerical results of traditional algorithms by around 30%.