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AI SUPER RESOLUTION IMAGES FROM IAI OPTICAL EO SATELLITES

Abstract

IAI Optical EO satellites provide high resolution and high quality images, based on its advanced optics and capabilities. In recent years many Single Image Super Resolution (SISR) techniques, have been developed and applied for different uses, including satellite imagery. The advantages of SISR over regular Super-Resolution in the space domain is the latter's need of producing multiple satellite images from the same viewpoint and in same lighting conditions, which is operationally challenging, especially for optical EO satellites in a non-Sun-Synchronous orbit. Multiple research and commercial general-purpose SISR products being already released to the public but their straightforward usage for satellite data did not bring the expected improvement in quality. Some projects though were developed specifically for satellites, and even then the results were inconsistent and subsequent adoption was cautious until now. Two of the main reasons for that being: lack of familiarity with the specific satellite imaging platform and differences between the actual real-world images and the dataset the algorithms were trained on. In order to provide AI Super resolution for our satellites, IAI has developed in-house SISR technique adapting previous work for super-resolution architectures, and training networks on a carefully constructed dataset most resembling IAI actual satellite imagery. We employed these techniques on real =-world orthophoto imagery, the results show a significant benefit – equivalent to a decrease in resolution of approx. 30The performance was evaluated and tested with a combination of human and machine-driven metrics. The methods we use combine identification and perception by human observer, GIQE - NIIRS score methodology, either full-image quality or only for resolution-evaluation. We will present several examples of significant image improvements, and demonstrate that images processed with this method allow better analysis and subsequent processing, human or automated.