IAF SPACE SYSTEMS SYMPOSIUM (D1)
Technologies that Enable Space Systems (2)

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AEYE: MULTI-SPECTRAL IMAGING PAYLOAD EQUIPPED WITH ON-BOARD IMAGE CLASSIFICATION USING AI-GENERATED IMAGES

Abstract

Satellite systems have witnessed continuous development, fostering advanced on-processing capabilities while optimizing power consumption. Leveraging recent advancements in generative AI, it has become evident that such technologies can be effectively employed in various remote sensing applications. In this paper, we propose a novel approach integrating AEYE, a Multi-Spectral Imaging Payload (MSIP), with on-board image classification facilitated by AI-generated images. The comprehensive system design encompasses hardware specifications, dataset generation, inter-subsystem communication, model optimization, and fault-tolerance schemes. The hardware design includes components such as a multispectral imager, expandable memory, GPU, and peripheral interfaces. The AEYE system enables the detection and direct classification of objects from space, with a focus on training the model using an AI-generated dataset featuring stadiums and ports. To enhance model efficiency, specific quantization techniques were employed, and the model was converted to TensorFlow Lite, resulting in a significant reduction in power consumption. Furthermore, memory redundancy techniques, including RAID (Redundant Array of Independent Disks), were explored to ensure data integrity and system reliability. RAID, a method for storing data redundantly across multiple disks or SSDs, offers protection against data loss in the event of drive failure. This study delves into various RAID levels to determine their applicability in enhancing data security within the proposed AEYE system. Overall, the proposed AEYE system, augmented with on-board image classification powered by AI-generated images, represents a promising advancement in satellite technology, offering improved operational efficiency and data processing capabilities.