Natural Hazard Detection and Monitoring: Artificially Inteligence Enhanced Multispectral Observations

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Although along time many researchers used Earth observations to detect and monitor natural disaters, this challenge still faces issues due to the complex structures of images. The visualization of a multispectral EO product is usually performed by mapping the three bands of the visual part of the spectrum to natural color representation. Yet, these products often ehibits clouds, fog, or smoke, phenomenas that hinder the ability of humans or machines to interpret and properly used these data. The wavelength of the bands in the visual spectrum is small, so they fail to penetrate the haziness to get to the sensor and the information about terrestrial aspect is lost. Relevant information could be transferd betwen bands in an attempt to visually reconstitute those parts of the image affected by atmospheric phenomena. This poster highlights two approaches: a stacked autoencoder that successfully encompasses the information from all spectral bands into a latent representation used for visualization and a a self-supervised paradigm in learning image representations by training a deep convolutional model to differentiate in a series of geometric transformations. Preliminary experiments performed on two Sentinel-2 datasets including burned areas within predisposed zones to fire events, Australia and Bolivia. Future work aims to test the developed methodology on Sentinel-2 time series data to monitor pre and post extreme phenomennos and natural disaster's impact over the land .

虽然一直以来，许多研究人员利用对地观测来探测和监测自然灾难，但由于图像的复杂结构，这一挑战仍然面临问题。多谱段EO产品的可视化通常是通过将光谱的视觉部分的三个波段映射到自然色彩的表示上。然而，这些产品经常出现云、雾或烟雾，这些现象阻碍了人类或机器解释和正确使用这些数据的能力。 视觉光谱中的波段波长很小，所以它们无法穿透雾气到达传感器，有关陆地方面的信息就会丢失。相关的信息可以在各波段之间转移，以试图在视觉上重建图像中受大气现象影响的部分。这张海报强调了两种方法：一种是叠加的自动编码器，它成功地将所有光谱带的信息包含在一个用于可视化的潜在表示中；另一种是通过训练一个深度卷积模型来区分一系列的几何变换，在学习图像表示中的自我监督范式。 在两个Sentinel-2数据集上进行了初步实验，包括澳大利亚和玻利维亚的火灾事件易发区中的烧毁区域。未来的工作旨在对Sentinel-2的时间序列数据进行测试，以监测极端现象和自然灾害对土地的影响的前期和后期。