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ARTIFICIAL VISION FOR THE DETECTION OF IRON OXIDES ON MARS

Abstract

Exploring the presence of water on Mars is a crucial aspect of understanding the planet's past habitability and its potential for life. This paper presents an approach that uses computer vision and multispectral imaging techniques to detect iron oxides, specifically hematite and goethite, on the Martian surface. These minerals are indicative of the presence of water in the past and can provide valuable information about the geological history of Mars. Using cameras on Mars rovers, such as the Mars 2020 Perseverance rover, images can be captured at different wavelengths to identify the spectral signatures of hematite and goethite. This methodology improves the rover's ability to map potential water reservoirs and identify areas where water may have existed in the past. To further improve the accuracy and efficiency of mineral detection, a computer vision model will be trained using Pytorch. This open source deep learning framework will be used to analyze a carefully curated image dataset from previous NASA explorations, a repository dedicated to Martian data-rich space imagery. By training the model on this diverse data set, it will be equipped to distinguish the unique visual signatures of hematite and goethite in future images captured by the rovers. This automated approach has the potential to revolutionize the search for evidence of past water on Mars and ultimately contribute to a deeper understanding of the planet's potential to host life. As a reference to previous works, it is expected that the model obtains results with an accuracy greater than 90%.