Computer Vision Based Lunar Laser Ranging Signal Detection

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Lunar laser ranging represents the pinnacle of current laser ranging technology. Due to the long distance to the Moon and the strong background noise, the signal-to-noise ratio (SNR) of lunar laser ranging is lower compared to laser ranging of satellites in Earth orbit. The correct processing of lunar laser ranging data is a prerequisite for its scientific application. To address the issue of low SNR in lunar laser ranging, we developed a signal detection model based on computer vision methods and tested the model through simulation data and actual experiments. The model provided accurate detection results for both simulated data at -19 dB and real measurement data at -12.9347 dB. The results indicate that the signal detection model we established is highly reliable and can serve as a reference for the proper processing of lunar laser ranging data.