

**Parallel and Adaptive Uniform-Distributed Registration Method for Chang'e-1 Lunar Remote Sensed Imagery**

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On the October 24th 2007, Chinese launched its first lunar Probe Satellite "Chang'E I". After the 494 days travelling, the probe vehicle landed accurately at its predetermined landing site on the moon at 52.36 degrees east longitude and 1.5 degrees south latitude. It sent back the first imagery of the lunar surface on 26 November 2007 and accomplished all the scheduled scientific tasks successfully. As the first lunar Probe Satellite, the major goal of Chang'E I mission is to obtain three-dimensional images of the landforms and geological structures of the lunar surface, so as to provide a reference for planned future soft landings. However, due to the dramatic change of the radiation information of the CE-1imagery, the traditional methods which are based on the gray and line characters show the limitation achieving a satisfied result. Moreover, the registration processing between lunar images which cover the whole Moon has proved to be very time-consuming.

To resolve the above mentioned registration difficulties, a parallel and adaptive uniform-distributed registration method for Chang'e-1 lunar remote sensed imagery is proposed in this paper. The overlapping area between images to be registered is clipped into blocks firstly, then SIFT feature descriptors are extracted parallelly. During the extracting process, Gaussian octaves and DoGs (difference of Gaussian) are divided into different priority levels to achieve an uniform-distributed result. The SIFT feature descriptors extracting process terminates when the adequate registration points are collected. Under this condition, the low level Gaussian octaves and DoGs are not being processed.

6 pairs of images were selected randomly to assess the versatility and effectiveness of the proposed algorithm. The experimental results indicate that: for the complete parallel and adaptive uniform-distributed registration method ( both criteria were executed ) , the efficiency of Chang'e-1 Lunar Remote Sensed Imagery registration could be increased dramatically. Therefore, the proposed method in the paper could acquire uniform-distributed registration results more effectively, the registration difficulties including hard to obtain results, time-consuming, no uniform distribution could be solved.

**Keywords:** Chang'E-1; Registration; SIFT; Parallel calculation; Uniform distribution