Term Project: Crater Classification on Mars Crater Data Set

Assigned Date: Sunday, March 14, 2011

Educational Goal

Apply Artificial Intelligence and Machine Learning techniques to real-world Mars crater data.

Team

Henry Z. Lo, Shun Guang, Joseph Paul Cohen

Phase IV: Precision Enhancement

(200 points)

Due: 5:30 PM Thursday, May 17, 2011

Requirements

- **Content of Negative Examples:** Explore different ways of generating negative examples. Include images that contain partial craters. Find out of the classifier needs more examples of a certain percentage of crater overlap than others. Empirically test each training set generated, and find the one with the best results.

- **Negative Example Set Cardinality:** Test different sizes of negative example training sets. Note the effect that size has on precision and recall. Find the optimal number of elements to include in the negative example training set.

- **Cascade Testing:** Test the training sets mentioned above on several different number of classifier layers in the cascade. That is, make sure that what is an optimal training set for a cascaded classifier is also optimal for another classifier with a different amount of cascades. Then train a strong classifier with the optimal number of layers.

- **Parallelization:** Check opencv and the Internet for information about possible parallelization of the training algorithm. Implement parallelization if time permits.

- **Testing on Other Tiles:** Test the determined optimal classifier on other tiles in addition to tile3_24.

CS 739 Spatial Data Mining

1. Generate a report of the results of every test run. In this report, include side-by-side comparisons of techniques and a side-by-side comparison of data sets.

2. Write a brief summary on the effectiveness of preprocessing, differences in classification algorithms, and the relative utility of each DEM and optical data. Also identify future directions of research.

3. Submit reports through Blackboard.