Celestial Mapping System and Digital Lunar Library Initiative

Parul Agrawal, Graham Mackintosh, Allison Zuniga, and Ignacio Lopez-Francos
NASA Ames Research Center, Moffett Field, CA 94035-1000.

ASTRACT:

We are preparing to create an interactive, global 3D lunar environment with integrated dataset and AI/ML tools to provide unique value to mission planners, scientists and the entire lunar community. This lunar environment will be based on NASA Ames Celestial Mapping System (CMS) [1] and Digital Lunar Library (DLL) Initiative. CMS provides a 3D virtual Lunar Globe with extensive user friendly tool sets, that include high resolution terrain visualization, elevation profiles, measurement kits, slope analysis, path optimization, line of sight analysis, equipment planning and placement tools and many other functionalities [1]. It has a thick client with less overhead to access hardware resources. This allows features such as terrain profiling and distance calculations to be performed on the client and on the fly. The application is developed to provide situational and domain awareness on the Lunar surface, planning capabilities for equipment placements and traverse path optimization. As data becomes available, CMS has the capabilities to integrate data sets that change dynamically in real-time, which will be useful for monitoring satellites and remotely-sensed data on the Lunar surface. CMS supports importing synthetic features in a variety of 3D, 2D, vector and raster formats.

In the future, these capabilities will be enhanced by incorporating AI/ML tools and a plug-in architecture to enable customization by the user groups. With the help of DLL we will be able to : 1) Amplify the value of lunar information with AI-powered data enhancements 2) Acquire and integrate lunar data with AI-assisted georectification and homogenization 3) Analyze lunar data with advanced 3D visualization, intelligent search-by-example 4) Apply lunar data insights to specific use cases with an open plug-in architecture. The CMS-DLL initiative will have several potential use cases for NASA and the lunar community in general, including subsurface lava tube visualization and analysis, soil analysis, in-situ lunar resource visualization and representation on 3D globe, and data analytics for utilization.

REFERENCES:

[1] https://celestial.arc.nasa.gov/