CometCIEF: A Web-based Image Enhancement Facility to digitally enhance images of cometary comae

N. Samarasinha[1], P. Martin[1,2], and S. Larson[2]

[1]Planetary Science Institute, Tucson, AZ 85719, USA
[2]University of Arizona, Tucson, AZ 85721, USA

The detailed analysis of cometary comae provides an observational basis to investigate both the nucleus as well as the coma of comets. The structures in the coma are indicative of the anisotropic emission of gas and dust from the nucleus. Therefore, accurate identifications and measurements of spatial information related to coma structures are needed for realistic quantitative interpretation of coma observations. In many instances, the coma features are only a few percent above the ambient background coma and require enhancement of such features to unambiguously identify them, to make measurements on them, and to carry out subsequent detailed analyses.

There is a number of image enhancement techniques used by cometary scientists. Despite this, the wider applicability of many advanced enhancement techniques is limited due to the non-availability of relevant software as open source. To alleviate this, we are making available a number of such techniques using a user-friendly web interface.

In this image enhancement facility available at **http://www.psi.edu/research/cometimen** one can upload a fits format image of a cometary coma and digitally enhance it using an image enhancement technique of the user's choice. The user can then easily download the enhanced image as well as any associated images generated during the enhancement as fits files for detailed analysis later at the user's institution. The available image enhancement techniques at the facility are:
(a) division by azimuthal average;
(b) division by azimuthal median;
(c) azimuthal renormalization;
(d) division by $1/\rho$ profile, where ρ is the sky-plane projected distance from the nucleus; and
(e) radially variable spatial filtering.

The site provides documentation describing the above enhancement techniques as well as a tutorial showing the application of the enhancement techniques to actual cometary images and how the results may vary with different input parameters. In addition, the source codes as well as the executables are available for the user to download. To provide a secure facility, all the images uploaded by the users as well as the images created at the facility are deleted after 1-2 hours using a script, which runs every hour.

At the *Asteroids, Comet, Meteors 2014* meeting, we will present a description of CometCIEF and its capabilities as well as the effective usage of the facility to maximize the science return.

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