The Co-registration of Optically Sensed Images and Correlation (COSI-Corr) software, which was first released on January 2007, is continuously evolving. This poster shows our latest contributions and on-going studies to make COSI-Corr a fully automated, robust, fast, and extremely accurate tool, for the study of time series from a variety of optical sensors. Our latest developments concern not only new technical algorithms such as improved adaptive resampling, automatic and robust tie-points matching, compensation of aliasing effects in sub-pixel phase correlation, and sensor-agnostic topography extraction; they also concern new software development methods.

As COSI-Corr is increasing in complexity, we now must adopt the rigorous development procedures in effect in the software industry. Low level languages, multi-threaded processing and adequate source control and bug tracking are now integrated in our development cycle. In addition, our ambition is taking us toward large scale processing and analysis, and cluster and cloud computing solutions are being explored. As COSI-Corr is growing, the expertise of many more people is required. For several studies, you will notice the participation of additional collaborators. Orchestrating the many new projects is a challenging and exciting task.

**Rigorous Adaptive Resampling for High Resolution Image Warping**

**Epipolar Perpendicular Projection: Suppressing Topo Biases**

**Improved Development Process for Quality Software**

**Topography Extraction from Stereo-pairs**

**Processing of images from planetary surfaces, in particular HiRISE images from Mars**

**Aliasing Effects in Phase Correlation: First Steps Toward Unbiased Measurements**

**Robust Selection of tie-points between multi-temporal images**

**Distributed Cluster Computing for Fast and Large-Scale Analysis**

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**References:**


Portable code for Linux and Windows (Mac coming soon)

Building the equivalent resampling kernel: formulation

**MtF for simplicity**

This equation is assuming a linearly decreasing spatial frequency function, $f(x) = f_0 e^{-x}$.

Generally non-separable

Kernel is explicit

Kernel is a standard, separable and non-adaptive

It is known that the correlation plane lies in the plane $(O_1 MO_2)$, the direction perpendicular to this plane is defined as $\overrightarrow{D}$ lives in the plane $(O_1 MO_2)$, the direction perpendicular to this plane is defined as $\overrightarrow{D}$.

**Observations and simulation**

**Theoretical considerations and bias reduction**

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**Distributed Cluster Computing for Fast and Large-Scale Analysis**

**Current structure to be distributed**

**Images are distributed across multiple machines to build a single large image**

**Improvements and enhancements**

**Processing of images from planetary surfaces, in particular HiRISE images from Mars**

**Characterization of topographic artifacts in HiRISE images**

For data with high noise content, the ortho-rectification is not reliable as it is impossible to get a reasonable correlation plane.

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