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A FULLY AUTOMATED INCREMENTAL PHOTOGRAMMETRIC PROCESSING DEDICATED FOR COLLABORATIVE REMOTE-COMPUTING WORKFLOW

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ABSTRACT:

Image-based-modeling (IBM) practices in the field of Cultural Heritage studies are nowadays no longer seen as one-shot applications but as various and complex multimodal scenarios. Current use of SFM and photogrammetric methods implies their extensions to facilitate the management of complex multimodal data sets carried out by different experts around a single heritage asset. In order to fully benefit of collaborative semantic enrichment of spatially oriented resources, a versatile and robust solution have been developed to enable incremental registration of image-sets within the web-based platform AIOI (www.aioli.cloud).

TACO (Totally Automated Co-registration and Orientation):

It is an inter-operative, automated, robust and versatile IBM data processing methodology dedicated to multimodal and incremental registration of CH resources. It has been formalized as an iterative-recursive algorithm based on open-source packages combining the velocity of SFM and the accuracy of photogrammetric methods, structured as follow:

i) Automatic best sub-sampling parametrization for tie-points extraction and matching using best-neighbours pre-selection

ii) Self-adaptive incremental internal and external orientation based on QR-code detection

iii) Automatic scaling and user defined world-space orientation based on QR-code detection

FUTURE WORKS:

- Import projects from MicMac, Open-MVG and PhotoScan
- Automatic bad or unconnected images removal
- Support of spherical images
- Enhanced features extraction (MSD or MI)
- Automatic GCP’s extraction and coded targets support
- Automatic orthophotomosaic generation, including multiband support
- Support Alembic format for dynamic point-cloud instantiations

RESULTS:

- A robust initial iteration
- Initialisation with the highest degree of exigency and incrementally compromising on key parameters
- Iterative multi-resolution approach to optimize tie-points
- Combining velocity of trifocal tensor and the reliability of bundle block adjustment and self-calibration
- Global refinement of the scene through iterations toward possible gain of accuracy, resolution or completion

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