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Optical detection of asteroids by NEARBY platform

The survey of the nearby space and continuous monitoring of the near Earth objects (NEOs) and near Earth asteroids (NEAs) are essential for the future of our planet. More computing power and sophisticated algorithms are needed to cope with the astronomy imaging cameras dedicated for survey telescopes. Medium and larger size telescopes (2-4m) are needed for the detection of fainter NEAs using the classic "blink" algorithm if targets are visible in most individual images, but smaller telescopes could be also used to image faint targets invisible on individual images using the "track and stack" and the new synthetic (or digital) tracking algorithms which need extensive computing resources. We propose to improve these methods and implement them in a new pipeline to reduce astronomical images and detect moving sources in astronomical surveys of the nearby space in almost real time needed to secure new discoveries. The NEARBY Project (Visual Analysis of Multidimensional Astrophysics Data for Moving Objects Detection) aims to develop a software platform and application to process and analyze multidimensional data in order to detect and identify faint moving objects in astronomical images of the same field taken in similar observing conditions (weather, filter, exposure time) within short time intervals. The project is funded by the Romanian Space Agency (ROSA). The NEARBY software also supports the visually analysis and validation of the moving objects, flexible description of the adaptive processing over high performance computation infrastructure.

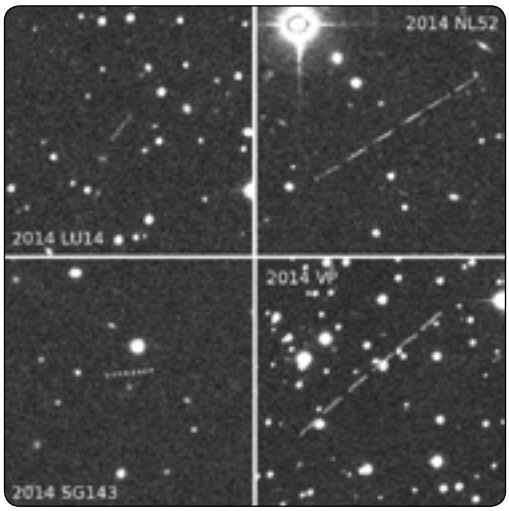

Figure 1. First NEA discoveries of using the INT 2.5m telescope in La Palma

Recent Publications

1. Gorgan D., Bacu V., Stefanut T., Rodila D., Mihon D., (2012) Earth Observation application development based on the Grid oriented ESIP satellite image processing platform, Journal of Computer Standards & Interfaces, 34(6):541–548.
2. Vaduvescu O et al. (2013) 739 observed NEAs and new 2-4m survey statistics within the EURONEAR network. Planetary and Space Sciences. 85:299-311.
3. Vaduvescu O et al. (2015) First EURONEAR NEA discoveries from La Palma using the INT. MNRAS. 449(2):1614-1624.
4. Mazzetti P., Roncella R., Mihon D., Bacu V., Lacroix P., Guigoz Y., Ray N., Giuliani G., Gorgan D., Nativi S., (2016) Integration of data and computing infrastructures for earth science: an image mosaicking use-case. Journal of Earth Science Informatics, 9(3):325-342.
5. Nandra C., Gorgan D., (2016) Defining Earth Data Batch Processing Tasks by Means of a Flexible Workflow Description Language, ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. III(4):59-66.

Biography

Dorian Gorgan, PhD. Eng. is Full Professor in Computer Science Department at the Technical University of Cluj-Napoca, Romania. He is a PhD Supervisor in Computers and Information Technology. His scientific research concerns with parallel and distributed processing over HPC infrastructures, development of platforms and applications for spatial data processing and visualization, interdisciplinary research in the domains of Earth Sciences and Earth Observations. He has been involved as Scientific Coordinator in national and international research projects such as NEARBY, HORUS, BIGEARTH, PECSA, enviroGRIDS, IASON, SEE-GRID-SCI, GiSHEO, MedioGrid, COMPLEXHPC and KEYSTONE. He has given more than 350 papers and presentations in the domains of computer science and earth observation. His research interest: parallel and distributed processing, high performance computation, platforms and applications for spatial data processing and visualization, visual analytics, interdisciplinary domains of earth sciences and earth observations.

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