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Development of a database for the 3D data of X-ray CT

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Recently, X-ray Computed Tomography (X-ray CT) becomes one of the important tools for the non-destructive and three-dimensional observation of samples of earth and planetary science field (e.g. Nakamura et al., 2008). However, the 3D data of X-ray CT is very large, particularly a few GB for an experiment, and the method of analysis and softwares are still under the development. So the analysis of 3D image data still has difficulty for users, especially for the case of a large number of data. Thus, it is important to develop a database system of 3D image data for the efficient operation of X-ray CT observation as well as the development of method for 3D image analysis.
However, it is difficult to construct and operate the database system for users who are not familier to the computer systems, because of technical problems. Those database systems have been commonly operated by large-scale computer systems. However, 3D image data of X-ray CT is difficult to operate such multi-user system because of the large unit size of a single set of CT data, which causes problems on HDD storage and network traffic. In addition, management cost and security problem are considerably large for such cases. Our purpose of the development of the CT database system is the construction of small-scale computer systems applicable every users of X-ray CT. The installation and operation processes of the database are simplified considerably in our system, and the system works with the softwares of 3D image processing developed at SPring-8, called Slice (Nakano et al., 2006) . So the process of image analysis is directly reflected by the database.
In this presentation, we report an example for the application of the database system to samples of the planetary science. We also discuss the future direction of the development.

References

Nakamura, T., Noguchi, T., Tsuchiyama, A., Ushikubo, T., Kita, N., Valley, J. W., Zolensky, M. E., Kakazu Y., Sakamoto, K., Mashio, E., Uesugi, K., Nakano, T., 2008. Chondrule like objects in short-period comet 81P/Wild 2. Science 321, 1664-1667.
Nakano, T., Tsuchiyama, A., Uesugi, K., Uesugi, M., Shinohara, K., 2006. Slice -Softwares for basic 3-D analysis- (web). http://www-bl20.spring8.or.jp/slice/, Japan Synchrotron Radiation Research Institute.