Image Processing and analysis is one of the most essential techniques to elucidate the relationship between structure and function in organisms in the life science fields. For instance, these techniques can give us the three-dimensional structure from series of 2D projection images of electron micrographs and identification of interesting structure. Recently, the situations have been changed into the atomic resolved structure from sub-millions of 2D images and the new types of image detection devices, such as direct detectors. Thus the more computational resources can give us the more detailed structure. Many types of applications have been proposed and developed in progress to do so but each of them still isn’t conclusive.

We have also been developing an integrated environment for image processing and analysis for electron micrographs, which is called as Eos, Extensible-object oriented system for electron micrographs. We have already implement more than 400 small programs and thousands of application program interfaces, some of which GPGPU or pthread techniques can be applied to for fast processing. Eos have been developed as an open-source the SOURCEFORGE, https://sourceforge.jp/projects/eos/.

Moreover, we have developed a platform to more effectively and fast process the complex tasks such as image analysis, e.g., single particle analysis, electron tomography, etc., under distributed and hetero computer resource, which is called as PINOE, Process-rule for INPUT/OUTPUT Negotiation Environment. This is a novel rule based workflow engine using forward chaining algorithm, similar to production rule systems. The defined rules for small image analysis can be executed adequately following the presence and modified times of INPUT/OUTPUT files. The rule-based processes and many types of computers can be linked by the attributes of ‘feature’ and they can work under the appropriate computers among hetero sets of computers including computers with many cores, GPGPU-based computers etc. We have implement several kinds of integrated solutions such as single particle analysis, electron tomography and so on. In addition, we have developed a front-end for image processing using PINOE, pione-client and pione-webclient, which is a web-browser based one using AJAX techniques. PINOE have also been developed as an open source under GITHUB, https://github.com/pione/.

Here we introduce the progress of development of Eos and PINOE and expect the feedback from users, experts and developers for image analysis.

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