

Multidimensional Image Processing & Analysis in R/RIPA/Magick in the context of Cryo-EM/TEM/SEM Images – An Insight into 'R' based Electron Microscopy(EM) Image Processing Based on MVA.

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Abstract :

Researchers believe that an open-source programming language for statistical analysis “called R”, could certainly pave the way for solving demanding scientific applications like Cryo-EM image processing. As we see today, thousands of international scientists are participating in the R development community programs contributing towards the development of new tools and libraries. It is in this context, that the author intends to reap the benefits of R/RIPA/Magick Tools & Multivariate Analysis concept(MVA) to process Cryo-EM/TEM/SEM images.

index words : Cryo-EM/TEM/SEM/Image Processing/HPC/R/RIPA/Magick/
Statistical Computing/MVA – Multivariate Analysis/HPC.

Introduction & Inspiration :

“Today,R is used in a range of scientific disciplines from astronomy to genomics, and even in drug development. Because it is an open-source statistical framework, it allows users to quickly share techniques with other R users, as well as reproduce and reuse the techniques they have discovered”.

"RIPA is one of the best image processing/analysis packages in R," says Ushizima, who works with Perciano in image analysis and recognition at LBNL. (**Lawrence Berkeley National Laboratory**)

Source of inspiration : <https://phys.org/news/2014-06-multidimensional-image-analysis.html>

I am not going into the details of Cryo-EM/TEM/SEM Image Processing Readers are requested to kindly go through one of our publications Ref[4] && <http://rxiv.org/pdf/1802.0050v1.pdf>

Informatics Framework :

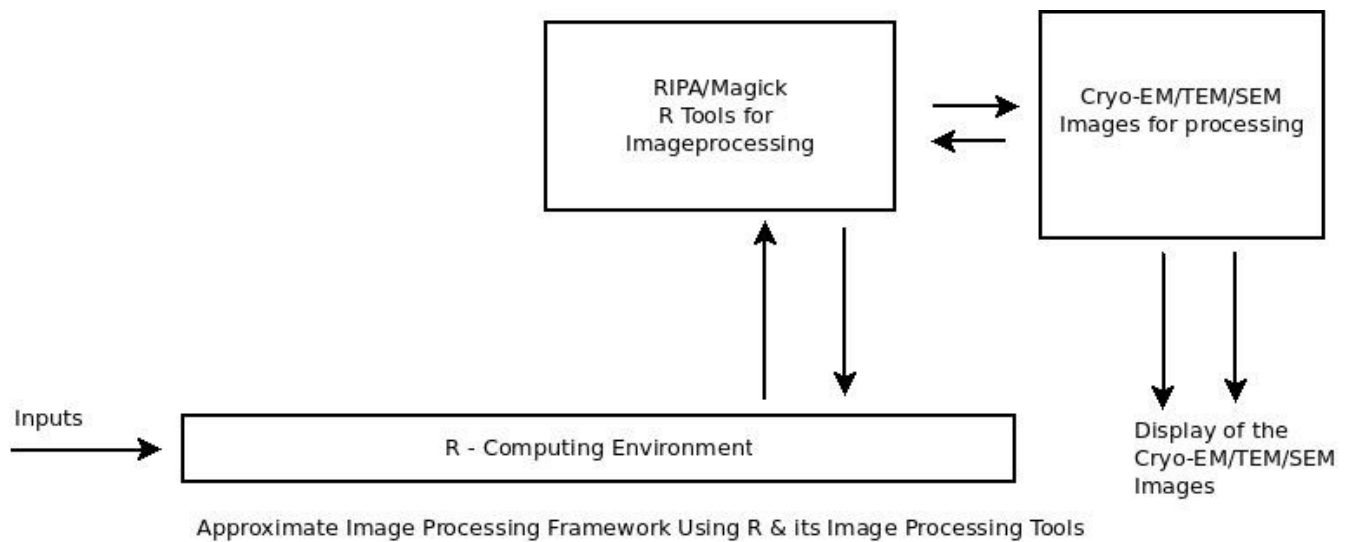


Figure I : Approximate Image Processing Framework Using R & its Image Processing Tools.

Please read some points on “Multivariate Analysis” & Applications :

[a] An Introduction to Applied Multivariate Analysis with R by Brian Everitt • Torsten Hothorn.

[b] https://web.stanford.edu/class/bios221/labs/multivariate/lab_5_multivariate.html

Conclusions & Future Perspectives :

The importance of Cryo-EM/TEM/SEM Image processing is highlighted and useful tools like RIPA/Magick in the context of “R” Statistical Computing Environment is suggested. Thus by combining all or some of the concepts/Tools, we could perform some useful image processing tasks in the above mentioned E M applications.

Additional Information on Software Used :

[i] www.rstudio.com

[ii] <https://cran.r-project.org/>

[iii] <https://journal.r-project.org/>

[iv] <https://cran.r-project.org/web/packages/ripa/index.html>

[v] <https://cran.r-project.org/web/packages/magick/vignettes/intro.html>

[vi] <https://www.ma.utexas.edu/users/hadani/publications.htm>

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References :

[1] <https://www.r-project.org/>

[2] <https://phys.org/news/2014-06-multidimensional-image-analysis.html>

[3] <https://crd.lbl.gov/news-and-publications/news/2014/multidimensional-image-processing-and-analysis-in-r/>

[4] Kumar, D.N.T. & Shmavonyan, G.s. (2016). Understanding JikesRVM in the Context of Cryo-EM/TEM/SEM Imaging Algorithms and Applications – A General Informatics Introduction from a Software Architecture View Point. International Journal of Applied Research on Information Technology and Computing. 7. 1. 10.5958/0975-8089.2016.00001.4.

[5] <http://www.springer.com/br/book/9781447149491> -
{Introduction to Image Processing Using R Learning by Examples; Authors: **Frery**, Alejandro C.,
Perciano, Talita }