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.

Nirmal Tej Kumar

Current member - ante Inst,UTD,Dallas, TX, USA.
Independent Consultant - Nanotechnology/Informatics/HPC
R&D Collaborator in - USA/Israel/BRICS Group of Nations.
email id - hmfg2014@gmail.com

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)*


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.](image)

**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

Acknowledgements:

Special thanks to all those who have made this possible. The author declares no conflict of interest and no competing financial interest/s. This short note or technical communication is for non-profit academic research work.

References:

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