NAME

      roprc – robust principal components analysis

SYNOPSIS

      roprc
      [−mvt [trim_pct [max_iter [conv_level]]] |
       −mlt [dof [max_iter [conv_level]]] |
       −mlh [huber_const [max_iter [conv_level]]]]
      [−corr]
      [−M mask_file [mask_value]]
      [−C dispfile]
      [−saveC saveCfile]
      [−saveid idfile]

DESCRIPTION

      roprc performs a robust principal components analysis on an image sequence with the purpose of eliminating the influence of outliers. The input sequence must be in HIPS-format and the format must be either byte, short, int or float. The inputsequence may be either bandinterleaved by line or not. The output sequence is in float format. The program estimates each pixels Mahanalobis distance to the estimated mean and weights it accordingly. Statistical data are sent to the file 'log(pid)'.

OPTIONS

      −mvt [trim_pct [max_iter [conv_level]]]

            Use multivariate trimming for elimination of outliers. **Trim_pct** is the percentage of pixels to be trimmed. The iterations stop when either the number of iterations reaches **max_iter** or the greatest absolute change in an element of the estimated correlation matrix between two successive iterations does not exceed **conv_level. trim_pct** defaults to 10, **max_iter** to 30 and **conv_level** to 0.000001.

      −mlt [dof [max_iter [conv_level]]]

            Use M-estimation. The weights used result in maximum likelihood estimators for a elliptical t-distribution with **dof** degress of freedom. The iterations stop when either the number of iterations reaches **max_iter** or the greatest absolute change in an element of the estimated correlation matrix between two successive iterations does not exceed **conv_level. dof** defaults to 1, **max_iter** to 30 and **conv_level** to 0.000001.

      −mlh [huber_const [max_iter [conv_level]]]

            Use M-estimation. The weights used are of the Huber type. The iterations stop when either the number of iterations reaches **max_iter** or the greatest absolute change in an element of the estimated correlation matrix between two successive iterations does not exceed **conv_level. Huber_const** defaults to 0.9, **max_iter** to 30 and **conv_level** to 0.000001.

      −corr   Perform the eigenanalysis on the correlation matrix instead of the covariance matrix.

      −C filename

            Read the initial estimate of the covariance matrix of the input data from **filename.** The covariance matrix must be loaded in HIPS-format and the format must be double. The first line must contain the image mean.

      −M mask_file [mask_value]

            Read a mask from **mask_file.** The mask must be in HIPS-format and the format must be byte. **roprc** will only calculate statistics on those pixels in the input sequence whose values in **mask_file** are **mask_value. mask_value** defaults to 1.

      −saveC saveCfile

            save the estimated mean and covariancematrix in **saveCfile. saveCfile** defaults to 'cov'.

      −saveid idfile

            save the final pixel weights in **idfile.**

SEE ALSO

maf(1), bil(1), bip(1)

REFERENCES

Devlin, S.J., Gnanadesikan, R. and Kettenring, J.R.: Robust Estimation of Dispersion Matrices and Principal Components. *Journal of the American Statistical Association,* Vol. 76, No. 374, pp. 354-362, 1981.

AUTHOR

Rasmus Larsen, M.Sc., Ph.D.
IMM, Technical University of Denmark
E-mail: rl@imm.dtu.dk, Internet http://www.imm.dtu/~rl