A test statistic in the complex Wishart distribution and its application to change detection in polarimetric SAR data

When working with multilook fully polarimetric synthetic aperture radar (SAR) data, an appropriate way of representing the backscattered signal consists of the so-called covariance matrix. For each pixel, this is a 3x3 Hermitian positive definite matrix that follows a complex Wishart distribution. Based on this distribution, a test statistic for equality of two such matrices and an associated asymptotic probability for obtaining a smaller value of the test statistic are derived and applied successfully to change detection in polarimetric SAR data. In a case study, EMISAR L-band data from April 17, 1998 and May 20, 1998 covering agricultural fields near Foulum, Denmark are used. Multilook full covariance matrix data, azimuthal symmetric data, covariance matrix diagonal-only data, and horizontal–horizontal (HH), vertical–vertical (VV), or horizontal–vertical (HV) data alone can be used. If applied to HH, VV, or HV data alone, the derived test statistic reduces to the well-known gamma likelihood-ratio test statistic. The derived test statistic and the associated significance value can be applied as a line or edge detector in fully polarimetric SAR data also.

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Image Analysis and Computer Graphics
Authors: Conradsen, K. (Intern), Nielsen, A. A. (Intern), Schou, J. (Intern), Skriver, H. (Intern)
Pages: 4-19
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Volume: 41
Issue number: 1
ISSN (Print): 0196-2892
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 5.84 SJR 2.649 SNIP 2.774
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.45 SJR 2.616 SNIP 3.184
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.486 SNIP 3.107 CiteScore 4.7
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.445 SNIP 3.459 CiteScore 4.71
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.283 SNIP 3.227 CiteScore 4.22
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.337 SNIP 3.833 CiteScore 4.26
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.249 SNIP 2.988 CiteScore 3.85
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.14 SNIP 2.932
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2