



Computer Science > Information Theory

An Interpretation of the Moore-Penrose Generalized Inverse of a Singular Fisher Information Matrix

Yen-Huan Li, Ping-Cheng Yeh

(Submitted on 11 Jul 2011 (v1), last revised 6 Aug 2012 (this version, v4))

It is proved that in a non-Bayesian parametric estimation problem, if the Fisher information matrix (FIM) is singular, unbiased estimators for the unknown parameter will not exist. Cramer-Rao bound (CRB), a popular tool to lower bound the variances of unbiased estimators, seems inapplicable in such situations. In this paper, we show that the Moore-Penrose generalized inverse of a singular FIM can be interpreted as the CRB corresponding to the minimum variance among all choices of minimum constraint functions. This result ensures the logical validity of applying the Moore-Penrose generalized inverse of an FIM as the covariance lower bound when the FIM is singular. Furthermore, the result can be applied as a performance bound on the joint design of constraint functions and unbiased estimators.

Comments: 10 pages, accepted for publication in IEEE Transactions on Signal Processing

Subjects: **Information Theory (cs.IT)**; Statistics Theory (math.ST)

Cite as: [arXiv:1107.1944](#) [cs.IT]

(or [arXiv:1107.1944v4](#) [cs.IT] for this version)

Submission history

From: Yen-Huan Li [[view email](#)]

[v1] Mon, 11 Jul 2011 06:53:35 GMT (9kb)

[v2] Thu, 6 Oct 2011 16:05:57 GMT (9kb)

[v3] Fri, 3 Feb 2012 03:51:49 GMT (9kb)

[v4] Mon, 6 Aug 2012 05:42:56 GMT (10kb)

Which authors of this paper are endorsers?

Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

cs.IT

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1107](#)

Change to browse by:

[cs](#)

[math](#)

[math.ST](#)

[stat](#)

References & Citations

- [NASA ADS](#)

DBLP - CS Bibliography

[listing](#) | [bibtex](#)

Yen-Huan Li

Ping-Cheng Yeh

Bookmark (what is this?)

