



4,822 Views | 222 CrossRef citations to date | 2 Altmetric

Original Articles

Variance Inflation Factor and Condition Number in multiple linear regression

R. Salmerón , C. B. García & J. García

Pages 2365-2384 | Received 19 Apr 2017, Accepted 07 Apr 2018, Published online: 22 Apr 2018

Cite this article <https://doi.org/10.1080/00949655.2018.1463376>



Sample our
Computer Science
Journals
>> [Sign in here](#) to start your access
to the latest two volumes for 14 days

Full Article

Figures & data

References

Citations

Metrics

Reprints & Permissions

Read this article

Share

ABSTRACT

The Variance Inflation Factor and the Condition Number are measures traditionally applied to detect the presence of collinearity in a multiple linear model. This paper presents the relation and the difference between both measures from theoretical and empirical perspectives by using Monte Carlo simulations and taking special interest in the computational techniques.

KEYWORDS:

Variance Inflation Factor

Condition Number

multicollinearity detection

data transformation

ORCID

R. Salmerón <http://orcid.org/0000-0003-2589-4058>

C. B. García <http://orcid.org/0000-0003-1622-3877>

Notes

1 Note that the constant term disappears after the standardization of the data.

2 Note that, when data are standardized, the VIF and CN coincide with the result obtained from typified data.

3 Note that these examples are not regression models since $n=p$.

4 Denoting $X_1=1$, the auxiliary regression to calculate the VIF is expressed as $X_2=\gamma_1+w$, where it is verified that $\hat{\gamma}=X^{-2}$ and, consequently, $SSR=\sum_{i=1}^n(X_{2i}-X^{-2})^2=SST$. In this case, it is always verified that $R_{aux}^2=1$. The version of the previous regression with unit length data is given by $X_{2,lu}=\gamma_1 l_u+w$ where $X_{2,lu}=X/a$ with $a=\sum_{i=1}^n X_{2i}^2$ and $l_u=1/n$. In this case, $\hat{\gamma}=n/a \cdot X^{-2}$ and, then, $SSR=(1/a)\sum_{i=1}^n(X_{2i}-n \cdot X^{-2} \cdot 1/n)^2=SST$. Thus, this situation will be similar to the initial one.

Related research

People also read

Recommended articles

Cited by
222

Information for

[Authors](#)

[R&D professionals](#)

[Editors](#)

[Librarians](#)

[Societies](#)

Opportunities

[Reprints and e-prints](#)

[Advertising solutions](#)

[Accelerated publication](#)

[Corporate access solutions](#)

Open access

[Overview](#)

[Open journals](#)

[Open Select](#)

[Dove Medical Press](#)

[F1000Research](#)

Help and information

[Help and contact](#)

[Newsroom](#)

[All journals](#)

[Books](#)

Keep up to date

Register to receive personalised research and resources by email



Sign me up



Copyright © 2025 Informa UK Limited [Privacy policy](#) [Cookies](#) [Terms & conditions](#)

[Accessibility](#)

 Taylor and Francis Group

Registered in England & Wales No. 01072954
5 Howick Place | London | SW1P 1WG