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IPS Paper

Getting the precisions right in complex models: Precisions from models and the bootstrap

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Brief Description

The increasing importance and complexity of scientific data modelling in all fields has increased the need for complex statistical methods to cope with the data complexity.

Machine learning methods have become popular through their wide availability, great flexibility, and lack of dependence on a probability model.

However, the dependence of these methods on the development of "model-free" and extended least squares procedures has not produced reliable precision statements about regression model parameters.

We show the benefits of modern probability model-based statistical methods in providing precisions which do not depend on restrictive probability model assumptions.

These benefits are illustrated with two complex examples from different scientific areas.

Abstract

The increasing importance and complexity of scientific data modelling in all fields has increased the need for complex statistical methods to cope with the data complexity. Machine learning methods have become popular through their wide availability, great flexibility, and lack of dependence on a probability model.

However, the dependence of these methods on the development of "model-free" and extended least squares procedures has not produced reliable precision statements about regression model parameters.

We show the benefits of modern probability model-based statistical methods in providing precisions which do not depend on restrictive probability model assumptions. These benefits are illustrated with two complex examples from different scientific areas.