

Could information criteria guide elastic net regularisation in credit risk? Empirical results using simulation over artificially generated multicollinearity in credit risk models.

Abstract

Multicollinearity frequently complicates financial modelling, particularly in credit risk assessment, leading to unstable coefficient estimates and potentially overfitting. While Elastic Net regularisation, encompassing L1 (Lasso) and L2 (Ridge) penalties, effectively addresses this, selecting the optimal balance between these penalties remains a challenge. This research explores the utility of Information Criteria (ICs), with a focus on the Corrected Akaike Information Criterion (AICc), in guiding the selection of Elastic Net parameters (alpha and lambda) when faced with varying levels of multicollinearity.

Our methodology employs a controlled simulation approach. We start with a well-calibrated credit risk dataset exhibiting good predictive performance and minimal overfitting, serving as our benchmark 'ideal model'. We then systematically introduce multicollinearity by generating new features highly correlated (e.g., 90%, 80%, 70% overlap) with original predictors using techniques like adding controlled noise or linear combinations. Elastic Net models are trained on these modified datasets. We employ various ICs – including AIC, AICc, and BIC – to guide the selection of Elastic Net parameters, evaluating how well these selections approximate the benchmark model's performance.

Performance is assessed using standard credit risk metrics (e.g., AUC-ROC) and statistical measures (e.g., R-squared, coefficient stability). By comparing the IC-guided regularised models against the benchmark in this controlled environment, we analyse how effectively different criteria manage the bias-variance trade-off under induced multicollinearity. The study aims to provide valuable, practical guidance for practitioners on leveraging ICs to tune Elastic Net models robustly, enhancing model stability and reliability when dealing with common real-world data challenges like correlated predictors.

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