Regularization and Prior Choice for the Bayesian Generalized Probit Model

Challenge:

The Bayesian generalized probit model, merging probit and logistic approaches, offers a novel solution for binary classification in Bayesian frameworks. It employs a link function from the generalized normal distribution, addressing mis-specification issues in binary classification GLMs. This model is particularly effective against the well-separation problem, which often leads to overfitting in clearly divided datasets, by utilizing regularization for more reliable outcomes.

Central to this research is the influence of prior selection on the model's performance, especially in handling datasets with perfect separation. By exploring various prior configurations, the study aims to determine their effect on model robustness and accuracy in challenging classification tasks. These findings are crucial for enhancing the Bayesian generalized probit model's effectiveness in scenarios with significant data separation, providing essential guidance for practitioners in these challenging situations.