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Editors,
Journal of Computational and Graphical Statistics

Dear Prof. Chen and Prof. Sangalli,

Please consider our manuscript "Automated Assessment of Residual Plots with Computer Vision Models" for publication in the Journal of Computational and Graphical Statistics.

This paper describes a new computer vision model that can automatically read residual plots, it's architecture and performance relative to human evaluation and classical hypothesis testing. Our previous work, "A Plot is Worth a Thousand Tests: Assessing Residual Diagnostics with the Lineup Protocol" (JCGS, 2024), described interesting findings about human evaluations of residual plots relative to classical hypothesis testing, discovered when building training samples for the computer vision model described in our new paper. The computer vision model described in this new submission was our primary research goal.

We specifically trained a custom model to predict a specified distance measure that quantifies the discrepancy between residuals and theoretically "good" distributions. Building on these predictions, we construct a statistical testing framework aligned with the original lineup protocol, ensuring a valid visual test. Despite substantial experimentation, we could not manage to get a computer vision model to perform quite as well as the human evaluations. It is slightly more sensitive, flagging more residual plots as bad. However, as a computer model, it can process substantially more residual plots than is possible through human evaluation. Relative to statistical tests (Breusch-Pagan, Ramsey RESET, Shapiro-Wilk) it performs substantially better, is less sensitive to small departures, and jointly assesses a variety of departures (heteroscedasticity, non-linearity, non-normality).

The paper also shows that the model, like human observers, relies on visual patterns and shapes, making it a practical tool for reducing manual effort in residual plot diagnostics. This approach would be of particular interest to readers concerned with model diagnostics and the automation of visual data analysis. It represents a new direction for statistical graphics research that engages with new computational tools.

There is a shiny app and R package available to support access and use of the computer vision model, and this is documented in a special issue of the Australian and New Zealand Journal of Statistics that celebrates 25 years of R, to appear later this year.

Thank you for the consideration of this manuscript. We believe that it is a good fit for the Journal of Computational and Graphical Statistics.

<div align="center">Sincerely,</div>