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Enhancing Predictive Accuracy in Pharmaceutical Sales through an Ensemble Kernel Gaussian Process Regression Approach

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Abstract : This research employs Gaussian Process Regression (GPR) with an ensemble kernel, integrating Exponential Squared, Revised Matern, and Rational Quadratic kernels to analyze pharmaceutical sales data. Bayesian optimization was used to identify optimal kernel weights: 0.76 for Exponential Squared, 0.21 for Revised Matern, and 0.13 for Rational Quadratic. The ensemble kernel demonstrated superior performance in predictive accuracy, achieving an R^2 score near 1.0, and significantly lower values in MSE, MAE, and RMSE. These findings highlight the efficacy of ensemble kernels in GPR for predictive analytics in complex pharmaceutical sales datasets.

Keywords : Gaussian process regression, ensemble kernels, bayesian optimization, pharmaceutical sales analysis, time series forecasting, data analysis
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