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Editor
PNAS Brief

Dear Editor

We are pleased to submit the enclosed Brief Report entitled "**Complexity Signature of Generated Text**" for consideration in PNAS Brief.

In this work, we introduce a model-agnostic, training-free framework for distinguishing AI-generated text from human-authored prose based on entropy-rate estimation. Grounded in algorithmic information theory, our approach connects generative capacity to intrinsic statistical complexity, showing that long-form outputs from contemporary large language models exhibit systematically lower entropy rates than human-written text under a shared symbolization. We present a nonparametric entropy-rate estimator (NERO) that operates directly on text without model access, supervision, or retraining, and demonstrate robust discrimination across model families, genres, and time.

Beyond detection performance, the manuscript advances a principled interpretation of entropy rate as an intrinsic, physical-like statistic of generative systems. This enables calibration-free comparison of generative models and tracking of changes in generative behavior over successive model releases. The work is intentionally complementary to task-based benchmark evaluations, focusing instead on distributional properties of long-form generated text.

We believe this contribution will be of broad interest to PNAS Brief readers concerned with artificial intelligence, information theory, and the foundations of generative modeling, particularly in light of growing societal reliance on AI-generated content.

This manuscript has not been published previously and is not under consideration elsewhere. All authors have approved the submission and declare no competing interests.

Thank you for your consideration. We look forward to your response.

Sincerely,

Ishanu Chattopadhyay
Lexington, KY

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