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Editor
PNAS Nexus

Dear Editor

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

In this work, we introduce a model-agnostic, training-free framework for quantifying intrinsic complexity of long-form text as entropy rate under a fixed coarse graining. Grounded in algorithmic information theory, we connect effective generative capacity to statistical complexity, and show that outputs from contemporary large language models occupy systematically lower entropy-rate regimes than human-authored corpora 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 separation across model families, genres, and release times.

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

We believe this contribution will be of interest to PNAS Nexus readers working at the intersection of artificial intelligence, information theory, and complex systems, particularly those concerned with model-agnostic evaluation and longitudinal characterization of generative behavior.

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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