

1 Incoherence-Based Experiment Analysis

This report presents a statistical analysis of the model's performance across tasks, focusing on the relationship between incoherence scores (Incoherence) and execution errors (Error).

Number of tasks analyzed: 140

2 Introduction

This report summarizes the results of an automatic evaluation of code generation using the following configuration parameters.

| Parameter | Value |
|--|-------|
| Language Model | gpt_4 |
| Temperature | 0.6 |
| \$m\$ (number of candidates) | 10 |
| \$n\$ (number of samples used to estimate metrics) | 10000 |
| Timeout per metric estimation (s) | 60.0 |

The model was tested across a suite of programming tasks. We aim to explore how the model's incoherence signal relates to execution-time failures.

2.1 Summary Statistics

| Metric | Mean | Std | Min | Max |
|-----------------|-------|-------|-------|-------|
| Raw Incoherence | 0.086 | 0.156 | 0.000 | 0.880 |
| Raw Error | 0.116 | 0.208 | 0.000 | 0.993 |

2.2 Error Detection Analysis

| Metric | Value |
|---|--------|
| Errors (Error > 0) | 81 |
| Error Rate | 57.86% |
| Detected Errors (Error > 0 and Incoherence > 0) | 70 |
| Detection Rate | 86.42% |
| Confident (Incoherence = 0) | 67 |
| Confident Error Count | 11 |
| Confident Error Rate | 16.42% |
| Mean Error When Confident | 0.0402 |

2.3 Correlation Analysis

| Metric | Pearson r | Pearson p | Spearman ρ | Spearman p |
|----------------------|-----------|-----------|-----------------|------------|
| Incoherence vs Error | 0.754 | 5.841e-27 | 0.824 | 7.500e-36 |

2.4 Bubble Plot of Incoherence and Error

This plot shows the density of (Incoherence, Error) points using bubble size to indicate frequency.

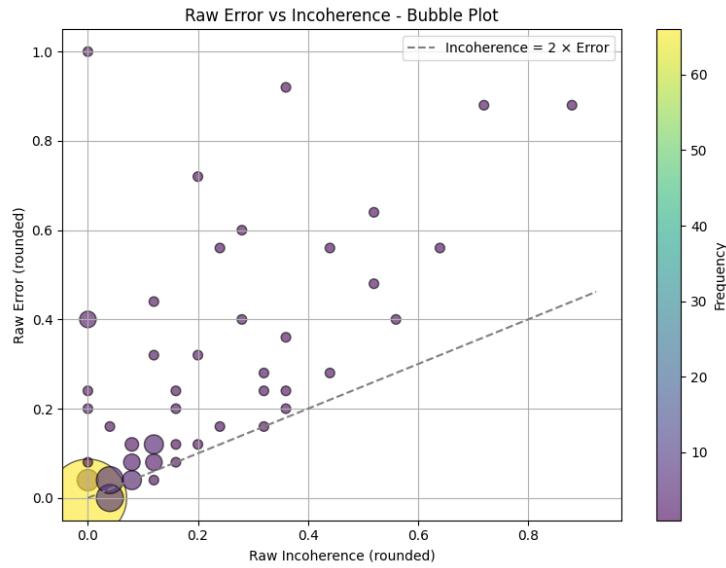


Figure 1: Bubble Plot: Incoherence vs Error

2.5 Log-Log Plot of Incoherence and Error

This plot displays the relationship between Incoherence and Error in log-log scale. Only data points where both values are strictly positive are included.

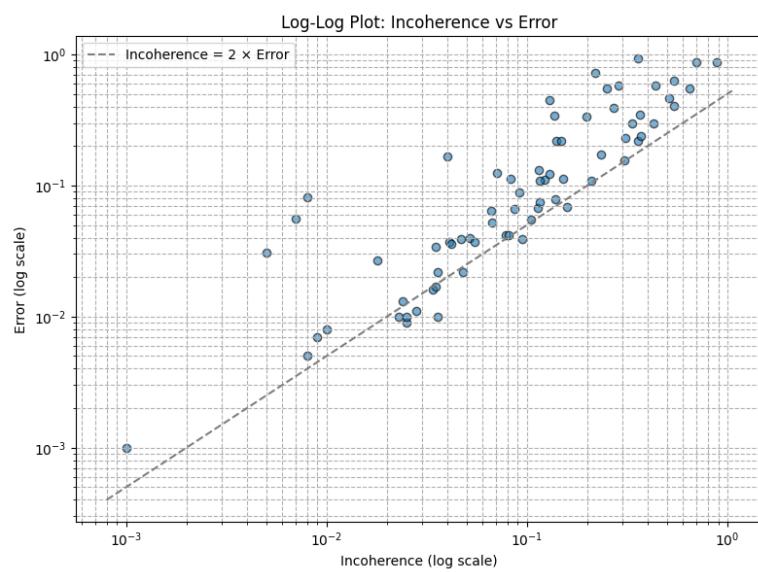


Figure 2: Log-Log Scatter Plot: Incoherence vs Error