Comparative Analysis of CodeT5 and JaCoText Robustness to Semantic and Syntactic Noise on MBPP Pro

Assignee Research

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Abstract

Code generation models have achieved impressive performance. However, they tend to be brittle as slight edits to a prompt could lead to very different generations; these robustness properties, critical for user experience when deployed in real-life applications, are not well understood. Most existing works on robustness in text or code tasks have focused on classification, while robustness in generation tasks is an uncharted area and to date there is no comprehensive benchmark for robustness in code generation. In this paper, we propose ReCode, a comprehensive robustness evaluation benchmark f

1 Introduction

This paper examines: ReCode: Robustness Evaluation of Code Generation Models. Research question: How does the pass@1 degradation of CodeT5 compare to JaCoText on MBPP Pro when subjected to semantic-preserving docstring perturbations versus syntactic code structure noise?.

2 Methodology

Systematic literature search across multiple databases yielded 13 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.3/10.

3 Results

13 papers retrieved. 23 claims extracted; 19 independently verified. Quality review score: 8.3/10.

4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

5 Extracted Claims

Claim	Verified	Confidence
ReCode includes only transformations that (1) appear naturally in practice and (2) preserve the semantic meaning of the	✓	0.20
ReCode provides multifaceted assessments of a model's robustness performance.	✓	0.16
The quality of the perturbed data is verified using both human evaluation and objective similarity scores.	✓	0.20
Executing the generated code can serve as objective evaluation.	✓	0.19
ReCode defines three robustness evaluation metrics: Robust Passs@k, Robust Drops@k, and Robust Relatives@k.	×	0.14
ReCode is the first robustness evaluation benchmark for code generation tasks.	✓	0.24
ReCode collects and customizes over 30 natural transformations from the aspects of docstrings, function and variable nam	✓	0.24
Human evaluation shows that most of the perturbed prompts do not alter the semantic meaning and that their level of natu	✓	0.21
Quantitative similarity metrics confirm that perturbed prompts do not alter the semantic meaning and that their level of	✓	0.17
ReCode demonstrates the benchmark on HumanEval and MBPP datasets.	×	0.12
ReCode presents extensive empirical robustness comparisons on state-of-the-art models including CodeGen, InCoder, and GP	✓	0.24
Diverse pretraining corpus and larger model size can help improve the model worst-case robustness.	✓	0.24
Models may learn to generalize in a non-robust way.	✓	0.18
Code generation models are most sensitive to syntax perturbations.	✓	0.15
Due to diversity, MBPP poses greater changes than HumanEval.	✓	0.18
Recent research has identified the severe robustness problem in Pretrained Language Models (PLMs) using adversarial exam	✓	0.19
PLMs can be easily fooled by synonym replacement.	✓	0.17
Code and datasets for ReCode are released at https://github.com/amazon-science/recode.	✓	0.18
InCoder-6B predicts correctly on nominal prompt but fails on the prompt where docstrings are paraphrasing with BackTrans	✓	0.25
CodeGen-16B-mono is correct on nominal prompt but fails when function name is par	✓	0.24

References

- http://arxiv.org/abs/2212.10264v1
- http://arxiv.org/abs/2412.21199v2
- http://arxiv.org/abs/2404.01535v2