PECC: Problem Extraction and Coding Challenges

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Can Language Models Understand and Code as You Narrate?

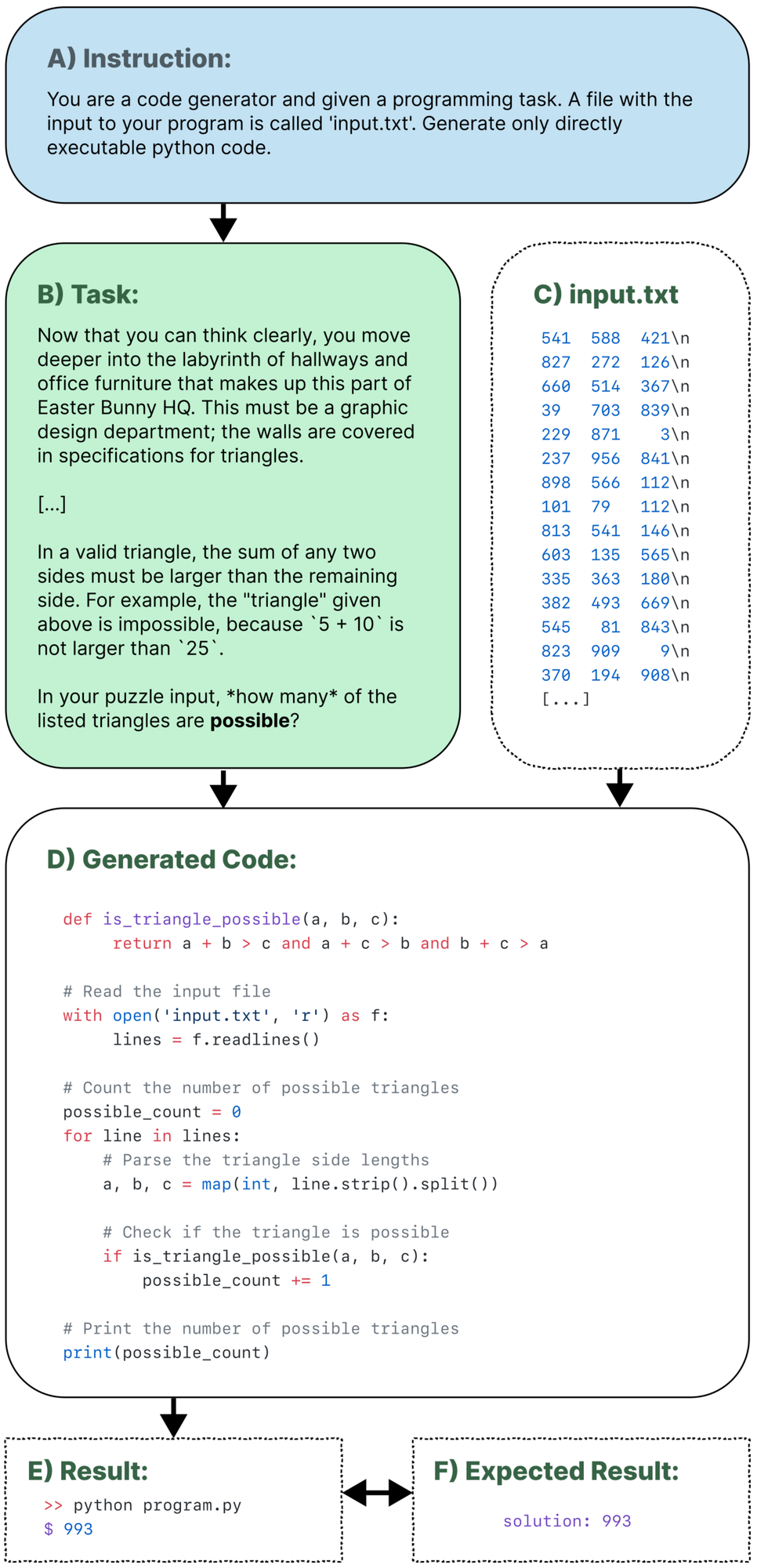
Novel Benchmark to evaluate LLMs' abilities to

- Understand prose-style problem statements.
- Extract underlying problems.
- Generate appropriate code solutions.

	APPS	HumanEval	DS-1000	PECC
Programming Language	Python	Python	Python	Universal
Avg. Program Length	18	6	3.6	26 (AoC) /19 (Euler)
Number of Problems	10,000	164	1000	2352
Domain	Programming	Programming	Programming	Math & Programming
Evaluation	Test Cases	Python Code	Test Cases + Surface Form Constraints	Explicit Result

PECC Evaluation Pipeline

- **Instruction Stage**: Define the task and context to the LLM, setting foundational instructions and problem statements.
- **Code Generation:** LLM generates executable Python code from narrative or neutral problem descriptions.
- **Execution and Result Assertion:** Code is executed, and outputs are compared against expected results to validate correctness.



Results and Findings

Evaluation with Pass@3 Accuracy on all 4 subsets and average.

Model	AoC	AoC-Concise	Euler	Euler-Stories	Average
claude-haiku	51.28	46.26	7.07	6.08	27.67
gpt-3.5-turbo	50.00	29.85	8.19	6.95	23.75
codechat-bison	21.17	17.60	4.59	2.61	11.49
chat-bison	17.09	13.78	2.36	0.62	8.48
mixtral-instruct	15.31	13.01	2.86	2.23	8.35
phi3-instruct	10.13	13.00	3.35	2.23	7.18
wizardlm-2-7b	5.87	6.89	1.24	0.87	3.72
llama3-8b-instruct	1.53	6.38	4.47	0.0	3.1

- Strong difference in AoC and Euler subset scores
- Proprietary LMs perform significantly better in chat-based evaluation

Conclusion

Challenging chat-based interaction not only requires a capable pre-trained LM, but also robust instruction fine-tuning.

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