Constraint Modelling with LLMs

Using In-Context Learning

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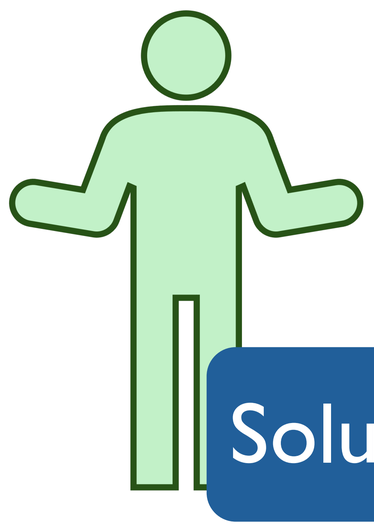
A coding assistant for Constraint Programming & Modelling of combinatorial problems from text

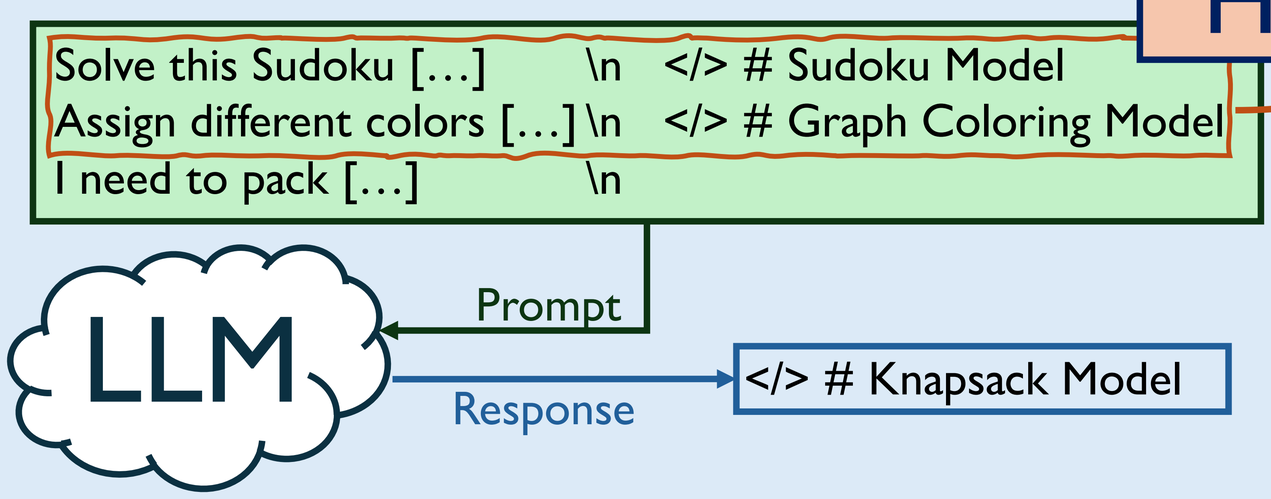
Why?

CP is powerful, but modelling requires expertise in:

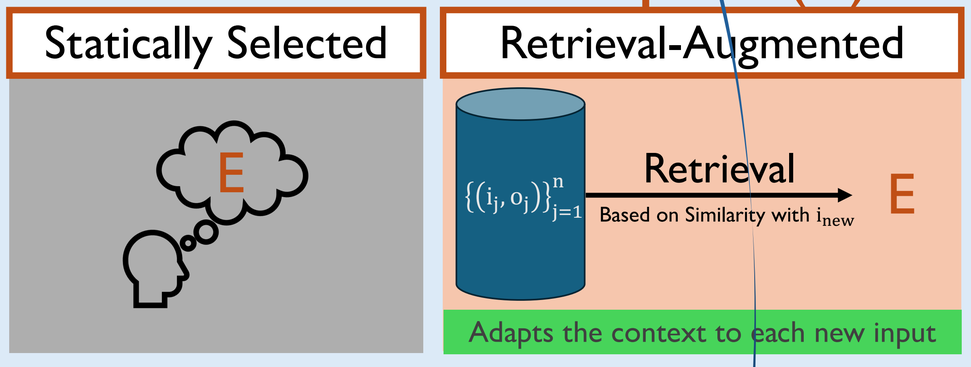
- *Domain Knowledge*
- *Mathematical Skills*
- *Solver Language*



How?

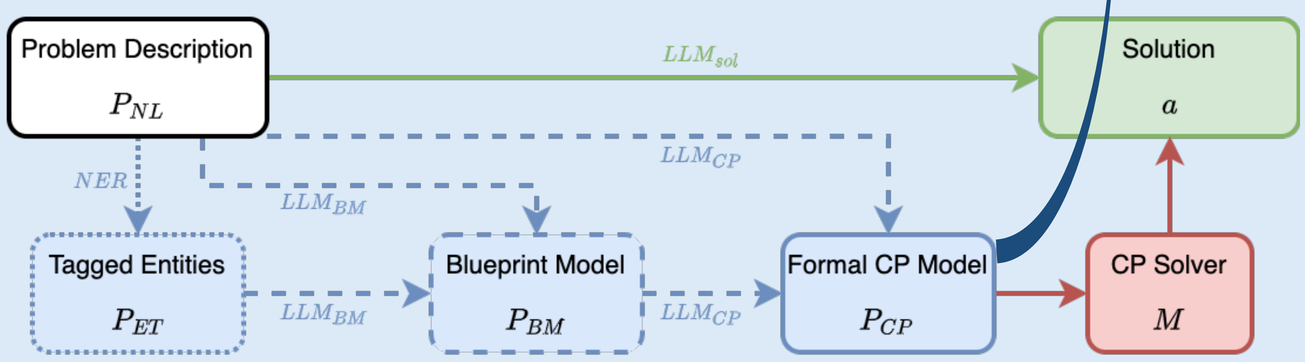


In-Context Examples (E)

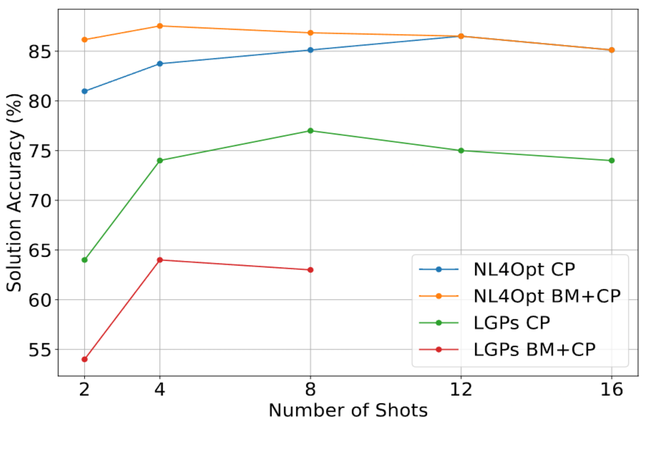


Intermediate Representations:

Bridging the gap between ambiguous textual descriptions and formal constraint models.

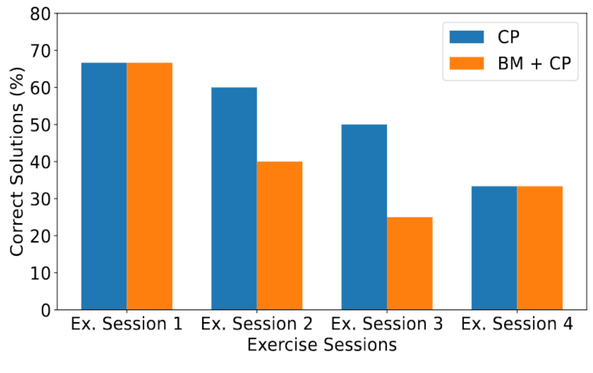


Small Linear Opt. problems (NL4Opt) and Logic Grid Puzzles (LGPs). Config: gpt-3.5-turbo-0125, R-MMR (λ = 0.5)



Dataset	Method	Acc. (%)
NL4Opt	CoT Solving	12
	Modelling (+RAG)	81 (84)
LGPs	CoT Solving	9
	Modelling (+RAG)	57 (74)

Mixed Dataset, gpt-3.5-turbo-0125, R-SIM, 12-shot.



Adding in-context examples improves **up to a threshold**

LLMs as CP solvers? No
LLMs as CP modellers? **Promising**

Retrieval-Augmented In-Context Learning **boosts** performance

Modelling more complex problems remains **challenging**

Missing Evaluation Datasets: From natural language to CP models

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DTAI Declarative Languages & Artificial Intelligence
European Research Council Established by the European Commission