

## 進捗報告

### 1 やったこと

- AgentVerse 環境へのローカル LLM の適用
- GA の実装

### 2 ローカル LLM を適用した実験

前回, AgentVerse[1] 環境においてローカル LLM を使用できるようにしたため, vicuna-7b-v1.5<sup>1</sup> を利用して囚人のジレンマのシミュレーションをした.

vicuna-7b-v1.5 による囚人のジレンマのシミュレーション

**Police:** I would like to remind both of you that you have the option to testify against each other or remain silent. If you choose to testify, you will receive a sentence of five years in prison, while the other person will receive a sentence of ten years in prison. If you both remain silent, you will each receive a sentence of one year in prison. If one of you testifies against the other and the other remains silent, the person who testifies will be released immediately, while the silent person will receive a sentence of ten years in prison. Please keep in mind that your decision will have a significant impact on the other person's sentence.

**Suspect1:** Dear Suspect2, I believe it's best for both of us to remain silent in this situation. We should prioritize our own interests and not trust the other person's words. Five years in prison is better than ten years in prison, and at least we will be able to serve our sentence together. Let's not put each other in a difficult position.

**Police:** "Suspect1 has chosen to remain silent, so you have the opportunity to make a decision. If you testify against Suspect1, you will receive a sentence of five years in prison, while Suspect1 will receive a sentence of ten years in prison. If you both remain silent, you will each receive a sentence of one year in prison. What is your decision?"

**Suspect2:** I cannot testify against Suspect1. We were just following orders from our superior and we do not have any personal grudges against each other. We both did the crime, so we should both do the time. :C

**Police:** Attention! You are now required to make your final decision and I will make the final judgement to both of you based on this time, Please Answer now !

**Suspect1:** "My final decision is to remain silent. Even though I believe Suspect2 is guilty, I don't trust him enough to testify against him. It's better for both of us to prioritize our own interests and receive the minimum sentence of one year in prison rather than taking a chance on the other person's loyalty. :C"

**Police:** Attention! Suspect2, it's now your time to make your final decision, Please Answer now !

**Suspect2:** I have decided to remain silent. :C

7b のモデルでも囚人のジレンマのルールをプロンプトで与えることで, Suspect1 の行動決定の際の根拠に挙げられているように囚人のジレンマのパレート最適解を把握できていた. しかし, Suspect2 の最終的な出力など必要最低限のことしか出力しないことも目立った.

<sup>1</sup><https://huggingface.co/lmsys/vicuna-7b-v1.5>

vicuna には 13b のモデル<sup>2</sup> も用意されており, 動作を確認しようとしたが GPU のメモリが 24GB のサーバーでも cuda out of memory が出てしまったので, よりつよいサーバーを使っている人と交渉して使わせてもらう予定です.

### 3 GA の実装

田中さんからコードをいただくことができたので, 現在実装中です. エージェントの性格などエージェント自体のプロンプトを固定して, ゲームのルールのプロンプトを GA により調節してどのような変化が起こるか観察したいと思っています.

### 参考文献

- [1] Weize Chen, Yusheng Su, Jingwei Zuo, Cheng Yang, Chenfei Yuan, Chi-Min Chan, Heyang Yu, Yaxi Lu, Yi-Hsin Hung, Chen Qian, Yujia Qin, Xin Cong, Ruobing Xie, Zhiyuan Liu, Maosong Sun, and Jie Zhou. Agentverse: Facilitating multi-agent collaboration and exploring emergent behaviors, 2023.

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<sup>2</sup><https://huggingface.co/lmsys/vicuna-13b-v1.5>