



GAIA

Find your next investment

Team RRR:

Nishk Patel

Ethan Mathew

Ishaan Salaskar

Sai Charan Naka

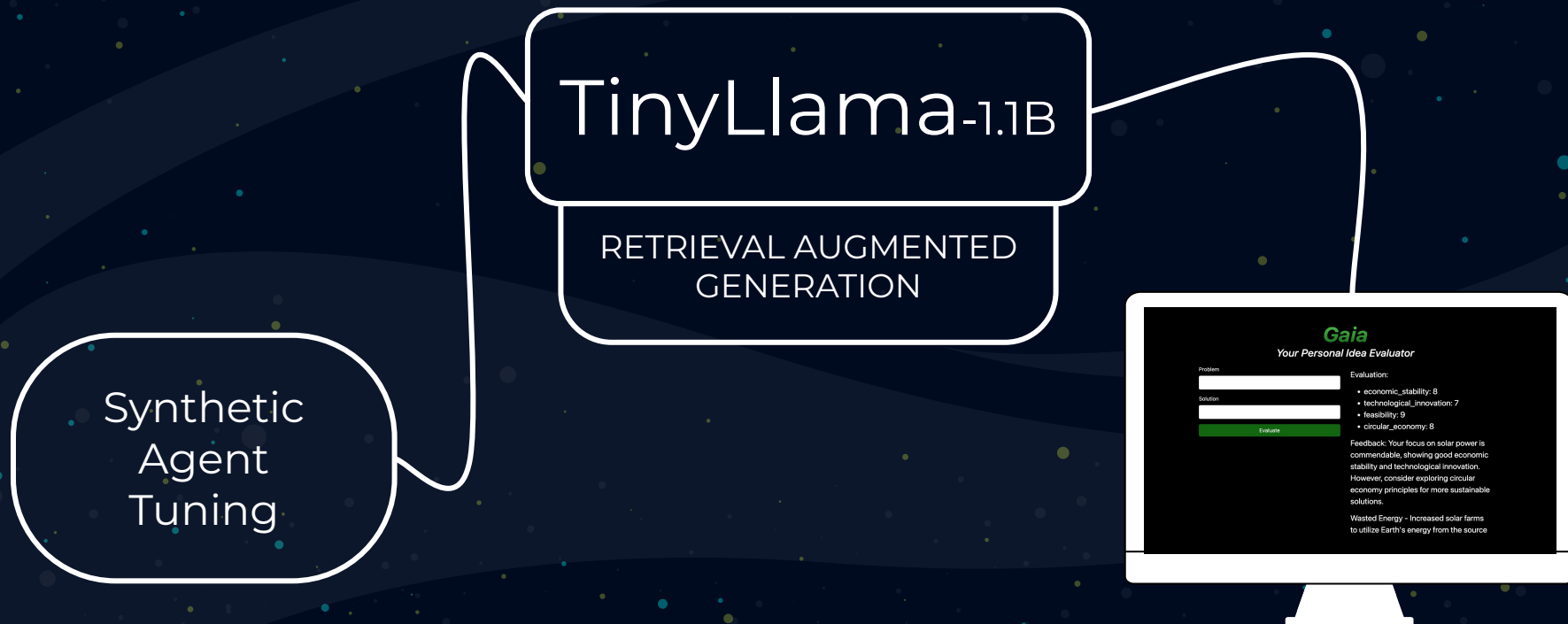


EVALUATES
CIRCULAR ECONOMY

IDEAS

Finds suitability for a variety of categories: economic stability, technological innovation, feasibility, and circular economy principles.

TECHNICAL DIAGRAM



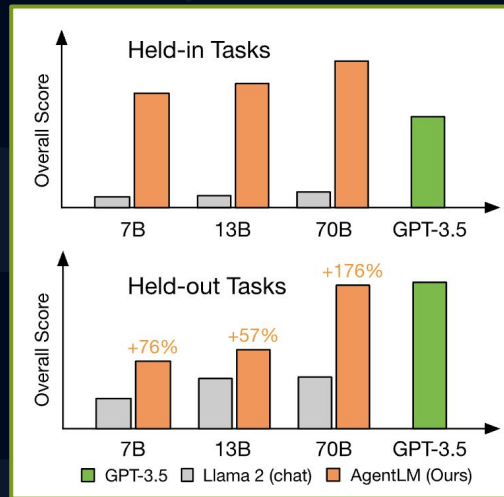
Synthetic Agent Data Creation

Based on a research paper from Tsinghua University, the creation of a dataset using closed-source models as Agent's for instruction-tuning.

We carefully constructed agentic tuning request to produce a JSON object containing synthetic evaluations as if it were a VC judging solutions

AgentTuning: Enabling Generalized Agent Abilities For LLMs

<https://arxiv.org/abs/2310.12823>



The resulting model, AgentLM, is evaluated and shown to exhibit improved agent capabilities without compromising general performance.

JSON

- We used AgentTuning and altered it with the corresponding paper to generate prompts using GPT4 api calls. .
- This created an environment where the AI as an agent acted as a venture capitalist and as an entrepreneur.
- Using given testing data, the agent acted as a VC and entrepreneur to assess problems.
- We then prompted the agent to provide feedback and rank the solution given by the entrepreneur in 4 different categories.

```
{
  "problem": "The construction industry is a significant contributor to global waste, producing approximately 1.3 billion tons annually.",
  "solution": "Utilizing modular and reusable building materials to minimize construction waste.",
  "evaluation": {
    "economic_stability": 8,
    "technological_innovation": 7,
    "feasibility": 9,
    "circular_economy": 8
  },
  "feedback": "Great solution! Modular construction not only reduces waste but also promotes economic stability and feasibility. Consider exploring even more innovative materials for better technological innovation."
},
{
  "problem": "The challenge of generating enough electrical power without using fossil fuels is a pressing issue.",
  "solution": "Investing in solar power farms and advancing energy storage technologies.",
  "evaluation": {
    "economic_stability": 9,
    "technological_innovation": 8,
    "feasibility": 7,
    "circular_economy": 6
  },
  "feedback": "Your focus on solar power is commendable, showing good economic stability and technological innovation. However, consider exploring circular economy principles for more sustainable solutions."
},
{
  "problem": "The increased carbon footprint from digital learning platforms and e-waste is a concern.",
  "solution": "Developing a platform for reusing electronic devices and promoting digital textbooks.",
  "evaluation": {
    "economic_stability": 7,
    "technological_innovation": 8,
    "feasibility": 9,
    "circular_economy": 7
  },
  "feedback": "Your solution addresses the issue well, with good economic stability and technological innovation. Emphasize circular economy principles further for a more comprehensive approach."
},
{
  "problem": "The fashion industry is a top contributor to global pollution.",
  "solution": "Implementing sustainable and recyclable materials in clothing production and encouraging a circular fashion economy.",
  "evaluation": {
    "economic_stability": 8,
    "technological_innovation": 6,
    "feasibility": 9,
    "circular_economy": 8
  }
}
```

Data produced
by synthetic
agent

fed as



Input dataset
for fine-tuning
Tiny Llama



Tiny Llama Fine Tuning

```
model_name = "TinyLlama/TinyLlama-1.1B-Chat-v1.0"  
tokenizer = transformers.AutoTokenizer.from_pretrained(model_name)  
model = LlamaForCausalLM.from_pretrained(model_name)
```



```
training_args = TrainingArguments(  
    output_dir="./output", overwrite_output_dir=True, num_train_epochs=3,  
    per_device_train_batch_size=16, save_steps=10_000, save_total_limit=2,  
)  
  
trainer = Trainer(  
    model=model, args=training_args, data_collator=data_collator,  
    train_dataset=tokenized_train_texts  
)  
  
trainer.train()
```

- ❖ After receiving the synthetic data produced by GPT, it was then utilized as the training data for the LLM.

Thinking Explained:

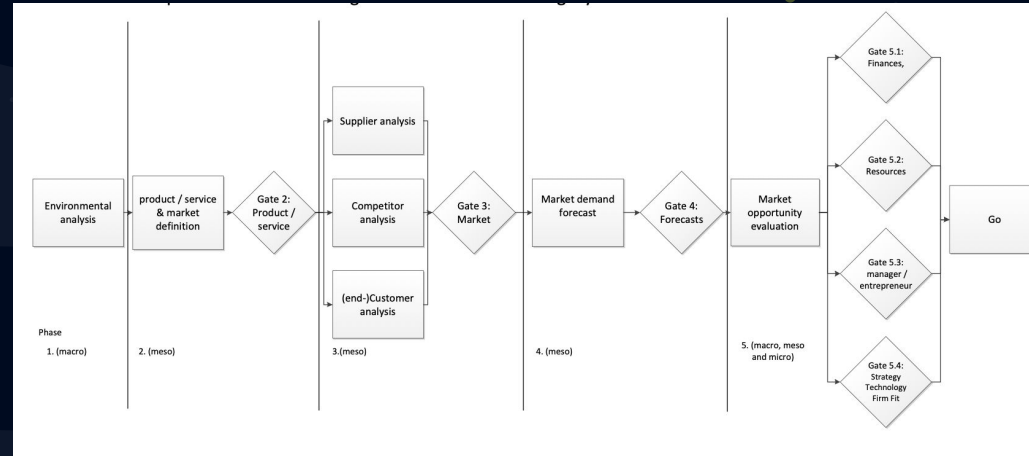
- ❖ Pre-trained Large Language Models can be fine-tuned with custom datasets, to enhance their response capabilities in certain aspects.
- ❖ Since the Tiny Llama model(open source on Hugging Face) was accessible and powerful, we fine-tuned the model using the synthetic data thus making its responses more geared towards evaluating circular economy solutions.

Retrieval Augmented Generation

- ❖ Retrieval Augmented Generation (RAG) is a technique that is used to help enhance the accuracy of a model in the case that it begins to hallucinate.

- ❖ In order for our model to ground itself we used an article from the University of Twente on Business Idea Evaluation in attempts to give it options to pull from for information

- ❖ We saw some improvement in the output of responses from models with RAG used as opposed to those that didn't.



https://essay.utwente.nl/65076/1/Bolt_MA_MB.pdf



TinyLlama answer
+
RAG knowledge



posted to

Flask Framework

Flask Framework

Gaia
Your Personal Idea Evaluator

Problem

Solution

Evaluate

Evaluation:

- economic_stability: 8
- technological_innovation: 7
- feasibility: 9
- circular_economy: 8

Feedback: Your focus on solar power is commendable, showing good economic stability and technological innovation. However, consider exploring circular economy principles for more sustainable solutions.

Wasted Energy - Increased solar farms to utilize Earth's energy from the source



Future Directions

❖ Lack of Resources

- Fine-tuning LLM's is a computationally expensive task
- We were never able to thoroughly fine-tune even a TinyLlama model with an extensive enough dataset to change language coverage, since we did not have access to computational accelerators such as external GPU's or TPU's
- Due to our limitations, we used an Open AI API to make function calls with prompt generation instead of our subpar Llama model.

Recurring error message,
after continuously exhausting
all available RAM



Your session crashed after using all available RAM. If you are interested in access to high-RAM runtimes, you may want to check out [Colab Pro](#).

[View runtime logs](#)



Given further resources including the time and funding, we would likely be able to successfully train a higher dimensional model. This model would likely serve as a new basis instead of the current Open AI API. Furthermore, we would develop an idea filter utilizing a GAN to remove solutions that do not fit the problem.