Fine-Tuning Take-Home Assignment

## **Fine-Tuning Take-Home Assignment**

## **Background and Context**

In this assignment, your task is to fine-tune a Small Language Model to parse raw, unstructured text and extract relevant entities related to scheduling a calendar event. The scheduling requests can vary widely in how they are written—for example: *“Let’s have a meeting next Monday with Alice for 30 minutes at the main office”*. The provided base SLM struggles with this task. Your fine-tuned model should be able to reliably extract the following fields (or return null if a field is missing):

* action (e.g. “meeting”)
* date
* time
* attendees
* location
* duration
* recurrence
* notes

**Provided Resources:**

**Base SLM:** [**HuggingFaceTB/SmolLM-360M**](https://huggingface.co/HuggingFaceTB/SmolLM-360M) (as well as any of its quantized versions)

Note: You are not permitted to use the SmolLM-360M-Instruct model.

**Dataset:** [**event\_text\_mapping.jsonl**](https://drive.google.com/drive/folders/1NmAsx_1wA9P0n6csVT9VrndX5CH8IQ5U?usp=sharing)

* Where each line is a JSON object with:

1. event\_text: raw input string.
2. output: the target JSON with the above keys.

**Your objective is to improve the base SLMs ability to:**

1. Identify relevant entities (e.g., action, date, time, attendees, location, duration, recurrence, and notes).
2. Maintain a structured, consistent JSON output containing these extracted entities (or null values if an entity is missing from the text).

**This assignment will involve the following tasks:**

* Curate and prepare the fine-tuning dataset using the provided data (event\_text\_mapping.jsonl).
* Fine-tune the model to enhance its ability to accurately extract and structure the required entities.
* Evaluate the baseline performance of the model on the task and measure improvements after fine-tuning.
* Clearly document your approach, methodology, results, and key insights.
* Deploy the fine-tuned model to an endpoint (e.g., Ollama, Hugging Face) and provide access instructions.

You are free to experiment with different techniques or approaches. The final deliverables should demonstrate not just your final outcome but also your reasoning and process.

## 

## **Dataset**

You will be provided with a **JSONL file** named **event\_text\_mapping.jsonl.**

Each line in the file contains a JSON object with two fields:

1. **event\_text**

* A sample input representing a calendar event in natural language, which vary in phrasing, structure, and completeness.
* Example:

"event\_text": "One-on-one on 21/10/2023 at 10am with Peter and Zoe, 30 minutes."

2. **output**

* The corresponding expected structured output for the given event\_text.
* Example:

"output": {

"action": "One-on-one",

"date": "21/10/2023",

"time": "10:00 AM",

"attendees": ["Peter", "Zoe"],

"location": null,

"duration": "30 minutes",

"recurrence": null,

"notes": null

}

You will be responsible for **curating your own fine-tuning dataset from event\_text\_mapping.jsonl.**

## **Submission Guidelines**

Your submission should include the following components:

1. **Codebase / Notebook / Scripts**
   * This can be in any format you prefer (Jupyter notebook, Python scripts, etc.).
   * And should document your approach to (wherever applicable):  
     + Dataset creation and preparation
     + Fine-tuning (any libraries or frameworks used)
     + Baseline vs. fine-tuned model evaluation
     + Inference examples
     + Deployment steps if you choose to deploy (e.g., via Ollama, Huggingface or another endpoint)
2. **Fine-Tuned Model**
   * If you manage to host or deploy the model (e.g., pushing it to Ollama or another endpoint), please provide instructions or resources so we can replicate or test it on our side.
3. **Documentation / Report**
   * A concise but detailed document describing:  
     + Your overall approach
     + The rationale behind your decisions
     + Key challenges encountered and how you addressed them
     + Results and metrics
     + Thoughts on model performance and future improvements

Your submission should be uploaded in a compressed file (zip, tar, etc.) or via a hosted repository (e.g., GitHub link) as long as we can access it.

## **4. Evaluation Criteria**

We will evaluate your work across the following dimensions. Above all, in each area, we highly value creativity and a thoughtful demonstration of your understanding of the concepts. Showcasing this will leave the strongest impression on us:

**1. Dataset Preparation (15%)**

* How you curated the fine-tuning dataset.
* The considerations and strategies you applied to ensure the dataset was appropriate for the task.

**2. Model Evaluation (20%)**

* The metrics you selected to evaluate the model’s performance.
* How effectively you compared the base model’s performance with the fine-tuned model’s improvements.

**3. Fine-Tuning Process (25%)**

* The methodology, techniques, and steps you used to fine-tune the model.

**4. Fine-Tuned Model Performance & Applicability (15%)**

* How well the model extracts entities in different scenarios.
* Consistency and structure in the JSON outputs.

**5. Documentation and Deployment (25%)**

* The clarity, organization, and level of detail in your documentation.
* How well you explain your reasoning and choices across data preparation, fine-tuning, evaluation, and deployment steps.

**How to Submit**

1. **Prepare Your Files**
   * Include all code files, notebooks, data, model artifacts, and a README or other documentation.
2. **Submission Format**
   * You may submit a single compressed file (.zip or .tar.gz) containing everything.
   * Alternatively, you can provide a link to a publicly accessible Git repository if you prefer.
3. **Where to Send**
   * Please send your submission via email (to: [ml@interviewkickstart.com](mailto:ml@interviewkickstart.com), cc: [deepti@interviewkickstart.com](mailto:deepti@interviewkickstart.com), [rakshaan.hussain@interviewkickstart.com](mailto:rakshaan.hussain@interviewkickstart.com), [dipen@interviewkickstart.com](mailto:dipen@interviewkickstart.com)) with the subject line: “[Your Name] – Fine-Tuning Assignment Submission.”

## **Final Notes**

We encourage you to explore **creative approaches** and clearly articulate your **thought process**. We are not solely focused on raw performance but also on your problem-solving methodology, reasoning, and ability to communicate your approaches.

**Time expectation**:

We estimate this assignment will take approximately **4–6 hours** to complete.

* If you find yourself going beyond that time, **prioritize documenting your approach, thought process, and any partial progress**.

**Important Reminder**

Our main goal is to give you the opportunity to demonstrate your familiarity with fine-tuning, working with data, deployment and the important considerations involved in this process.

* If you are unable to fully complete the assignment within the suggested time frame, that’s absolutely fine.
* Clearly describing **what you would have done given more time** will be considered fairly during evaluation, and strong reasoning will be recognized and valued.

Thank you, and good luck! We look forward to seeing your work and insights!