

Interactive Learning Companion for Third-Year Students

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Motivația dezvoltării aplicației

- Observarea limitărilor modelelor de limbaj mari, cum ar fi GPT-3.5 și GPT-4, în contextul educațional.
- Informații incorecte oferite de modele, care pot confuza și descuraja studenții.
- Răspunsuri incomplete și omisiunea pașilor esențiali în soluționarea problemelor.
- Diferențe între metodele utilizate de model și cele predate în cursuri, creând o deconectare între materialul didactic și ajutorul oferit de AI.

Probleme întâlnite



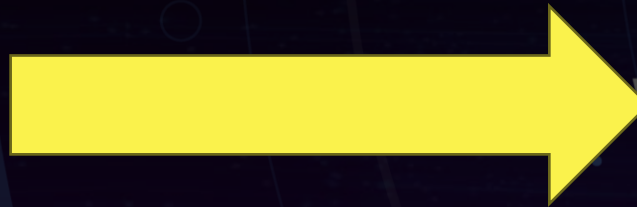
```
{  
  "instruction": "Provide an answer to the following question:",  
  "input": "What is the purpose of the 'Selection' operation on",  
  "output": "The 'Selection' operation on a relation in a databa",  
},  
{  
  "instruction": "Provide an answer to the following question:",  
  "input": "How does the 'Selection' operation work in database",  
  "output": "The 'Selection' operation works on a single relatio",  
},
```

x10.001

Probleme întâlnite

```
{  
  "instruction": "Provide an answer to the following question:",  
  "input": "What is the purpose of the 'Selection' operation on  
  "output": "The 'Selection' operation on a relation in a databa  
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{  
  "instruction": "Provide an answer to the following question:",  
  "input": "How does the 'Selection' operation work in database  
  "output": "The 'Selection' operation works on a single relatio  
},
```

x10.001



Antrenarea modelului

```
import torch
from transformers import AutoTokenizer, AutoModelForCausalLM, BitsAndBytesConfig
from trl import setup_chat_format

# Hugging Face model id
model_id = "codellama/Codellama-7b-hf" # or `mistralai/Mistral-7B-v0.1`

# BitsAndBytesConfig int-4 config
bnb_config = BitsAndBytesConfig(
    load_in_4bit=True, bnb_4bit_use_double_quant=True, bnb_4bit_quant_type="nf4", bnb_4bit_compute_dtype=torch.bfloat16
)

# Load model and tokenizer
model = AutoModelForCausalLM.from_pretrained(
    model_id,
    device_map="auto",
    attn_implementation="flash_attention_2",
    torch_dtype=torch.bfloat16,
    quantization_config=bnb_config
)
tokenizer = AutoTokenizer.from_pretrained(model_id)
tokenizer.padding_side = 'right' # to prevent warnings

# # set chat template to OAI chatML, remove if you start from a fine-tuned model
model, tokenizer = setup_chat_format(model, tokenizer)
```

Antrenarea modelului

```
from peft import LoraConfig

# LoRA config based on QLoRA paper & Sebastian Raschka experiment
peft_config = LoraConfig(
    lora_alpha=128,
    lora_dropout=0.05,
    r=256,
    bias="none",
    target_modules="all-linear",
    task_type="CAUSAL_LM",
)
```

```
from trl import SFTTrainer

max_seq_length = 3072 # max sequence length for model and packing of the dataset

trainer = SFTTrainer(
    model=model,
    args=args,
    train_dataset=dataset,
    peft_config=peft_config,
    max_seq_length=max_seq_length,
    tokenizer=tokenizer,
    packing=True,
    dataset_kwargs={
        "add_special_tokens": False, # We template with special tokens
        "append_concat_token": False, # No need to add additional separator token
    }
)
```

Antrenarea modelului

```
▶ # start training, the model will be automatically saved to the hub and the output directory
trainer.train()

# save model
trainer.save_model()
```

```
⇒ You're using a CodeLlamaTokenizerFast tokenizer. Please note that with a fast tokenizer, using the `
`use_cache=True` is incompatible with gradient checkpointing. Setting `use_cache=False`...
/usr/local/lib/python3.10/dist-packages/torch/utils/checkpoint.py:429: UserWarning: torch.utils.checkpoint
warnings.warn(
The input hidden states seems to be silently casted in float32, this might be related to the fact you
[348/348 49:28, Epoch 3/3]
```

| Step | Training Loss |
|------|---------------|
|------|---------------|

Rezultatul evaluării modelului

```
98%|██████████| 492/500 [39:16<00:29, 3.64s/it]/usr/local/lib/python3.10/dist-packages
warnings.warn(
99%|██████████| 493/500 [39:22<00:30, 4.39s/it]/usr/local/lib/python3.10/dist-packages
warnings.warn(
99%|██████████| 494/500 [39:26<00:26, 4.40s/it]/usr/local/lib/python3.10/dist-packages
warnings.warn(
99%|██████████| 495/500 [39:29<00:20, 4.06s/it]/usr/local/lib/python3.10/dist-packages
warnings.warn(
99%|██████████| 496/500 [39:31<00:13, 3.35s/it]/usr/local/lib/python3.10/dist-packages
warnings.warn(
99%|██████████| 497/500 [39:42<00:16, 5.64s/it]/usr/local/lib/python3.10/dist-packages
warnings.warn(
100%|██████████| 498/500 [39:44<00:09, 4.64s/it]/usr/local/lib/python3.10/dist-packages
warnings.warn(
100%|██████████| 499/500 [39:49<00:04, 4.53s/it]/usr/local/lib/python3.10/dist-packages
warnings.warn(
100%|██████████| 500/500 [39:52<00:00, 4.79s/it]Accuracy: 99.00%
```

Text generation using code-llama-7b-databases-finetuned

Model: [code-llama-7b-databases-finetuned2](#)

Dataset: [db_course-synthetic_text_to_sql_dataset](#)

Select Mode

Text



Text prompt

What does DBMS stands for?

Advanced Settings

Submit

DBMS stands for Database Management System.

Poze TEXT Mode

Poze SQL Mode

Text generation using code-llama-7b-databases-finetuned

Model: [code-llama-7b-databases-finetuned2](#)

Dataset: [db_course-synthetic_text_to_sql_dataset](#)

Select Mode

SQL

Context

```
CREATE TABLE Vendors (vendor_id INT, vendor_name VARCHAR(50), location VARCHAR(50),  
organic BOOLEAN); INSERT INTO Vendors (vendor_id, vendor_name, location, organic)  
VALUES (1, 'GreenAcres', 'EcoTown', false), (2, 'NaturalPicks', 'EcoTown', true), (3,  
'Farm Fresh', 'EcoTown', false);
```



Text prompt

List all suppliers from 'EcoTown' who do not provide organic ingredients.



Advanced Settings

Submit

This query lists all suppliers from 'EcoTown' who do not provide organic ingredients by filtering the records with the WHERE clause for suppliers having a location of 'EcoTown' and not providing organic ingredients (false value for the 'organic' column). `SELECT vendor_name FROM Vendors WHERE location = 'EcoTown' AND organic = false`

Poze FILE Mode

Text generation using code-llama-7b-databases-finetuned

Model: [code-llama-7b-databases-finetuned2](#)

Dataset: [db_course-synthetic_text_to_sql_dataset](#)

Select Mode

File



Upload File

Choose File

test_small.json

Advanced Settings

Submit

- DBMS stands for Database Management System.
- This query lists all suppliers from 'EcoTown' who do not provide organic ingredients by filtering the records with the WHERE clause for suppliers having a location of 'EcoTown' and not providing organic ingredients (false value for the 'organic' column).
SELECT vendor_name
FROM Vendors WHERE location = 'EcoTown' AND organic = false

Directii viitoare

- Optimizarea timpilor de răspuns ai modelului
- Interfață grafică de chat
- Conectare la o baza de date pentru salvarea istoricului
- Adaugare sistem de conturi
- Posibilitate de upgrade la versiuni premium



Vă mulțumesc pentru
atenție!