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Problem Statement: Email Auto-Drafter

Abstract

This project implements an Email Auto-Drafter that generates professional email drafts from bullet-point inputs using the distilgpt2 language model. The system accepts user-provided key points (e.g., "Sick leave", "Monday", "Back Tuesday") and produces formatted email text through prompt engineering techniques. The implementation employs a text-generation pipeline with configurable sampling parameters (temperature, top-k, top-p) to control output quality and diversity. While distilgpt2's limited capacity (82M parameters) and general-purpose training present inherent challenges in producing consistently coherent, task-specific outputs, the system demonstrates the application of prompt design and hyperparameter tuning as techniques to guide small language models toward structured text generation tasks.

Understanding and Implementation

Problem Understanding

The task required developing an automated email drafting system with the following specifications:

- **Input:** Bulleted list of key points describing the email's subject matter
- **Output:** Complete, professionally formatted email draft
- **Constraint:** Must utilize distilgpt2 model exclusively
- **Approach:** Prompt engineering to guide model behavior

The fundamental challenge stems from distilgpt2's architecture—it is a small, general-purpose text completion model without instruction-tuning or domain-specific training in professional correspondence, making coherent email generation inherently difficult.

Implementation

System Architecture:

The solution comprises four primary modules:

1. **Input Handler:** Processes bullet points via command-line arguments or interactive console input
2. **Prompt Constructor:** Formats bullet points into a structured prompt that guides the model toward email-like completions
3. **Text Generator:** Interfaces with distilgpt2 through HuggingFace's transformers pipeline with optimized sampling parameters
4. **Output Formatter:** Integrates generated content with standardized email components (greeting, closing, signature)

Prompt Engineering:

The prompt follows a hybrid structure combining explicit instruction with sentence continuation:

"Write a professional email to a manager about the following points: [bullets].

Email:

Dear Manager,

I am writing to inform you that"

This design leverages distilgpt2's text completion capabilities while providing contextual framing.

Generation Parameters:

- `temperature=0.7`: Balanced sampling to maintain coherence while allowing variability
- `max_new_tokens=200`: Sufficient length for email body content
- `repetition_penalty=1.3`: Discourages repetitive phrase generation
- `no_repeat_ngram_size=3`: Prevents 3-gram repetition loops
- `top_k=50, top_p=0.95`: Controls token selection diversity

Error Handling:

Comprehensive exception handling for model loading failures, generation errors, and invalid inputs ensures robustness.

Limitations and Observations

The system successfully generates email-structured outputs but exhibits quality inconsistencies characteristic of small, non-specialized models:

- Generated content frequently deviates from input bullet points
- Tone and coherence vary significantly across runs
- Logical flow often breaks down in longer generations

These limitations are attributable to distilgpt2's fundamental constraints rather than implementation deficiencies, underscoring the importance of model selection for task-specific applications.

Sample output

```
PS C:\GenAI Hands-on> python Banana_problem.py
Enter bullet points for the email (empty line to finish):
- Sick Leave
- Monday
- Back Tuesday
-
[Bullets]
- Sick Leave
- Monday
- Back Tuesday
-
Email:
Dear Manager,

I am writing to inform you that

[Generated Email]

Device set to use cpu
Setting `pad_token_id` to `eos_token_id`:50256 for open-end generation.
Dear Manager,

I am writing to inform you that I will be contacting your managers in advance for feedback on what is going through my mind while we are at work (or if there's something interesting or an issue with this letter). The emails below provide insight into why some of these messages might not have worked out well after all! In order "to better understand" how much each message may possibly cause me to re-read them myself during our day off from office hours? Please consider using any other information available online so as not to interrupt their communication process by waiting until they're ready to give up one last piece of paper before heading back home again next time around - especially when it comes to making sure everything works right - but please note once more what her those things aren't working together very often...

I apologize for any inconvenience this may cause. Thank you for your understanding.

Best regards,
[Your Name]
PS C:\GenAI Hands-on>
```