

Presenting. . .

Imaginary Programming with Emacs

Shane Mulligan

<2021-03-01 Mon>

Repositories for following along

<http://github1s.com/semiosis/pen.el>
<http://github1s.com/semiosis/prompts>
<https://mullikine.github.io/posts/imaginary-programming-with-gpt-3/>
imaginary programming glossary
imaginary computing glossary
semiosis protocol glossary
Pen.el glossary
<https://arxiv.org/abs/2107.13586> Pre-train, Prompt, and Predict
talk transcript

LMs are our best friends in the AI model menagerie because they make things intelligible – by understanding our textual languages.

- Explain Imaginary Computing
 - AI imagination
 - Discussing AI-generated artwork with an AI
 - Intelligent NFTs
 - Imaginary Web
 - Paracosm vs Metaverse
- Explain Philosophy
 - Simulacra and Science Fiction
 - Truth (epistemology and alethiology)
 - Structuralism: Language based on sign relations
- Demo Imaginary Programming
 - Demonstrate `ilambda.el`

Text Generator

Background knowledge

- GPT-3 is a seq2seq model (a text generator)
 - It's stochastic but can be configured to be deterministic.

Key concepts

- prompt,
- completion, and
- tokens

Limitations

Combined, the text prompt and generated completion must be below 2048 tokens (roughly ~1500 words).

context-stuffing With only 2048 tokens, you need to make use of your real estate by providing instructions and making implicit information explicit.

Characteristics

- declarative, like `html`
- stochastic, like `prolog`
- Unlocks new types of applications
- Speeds up development

Some prompts I've made

generate-vim-command.prompt

```
1 Vim
2
3 Insert "Q: " at the start of the line
4 :%s/^/Q: /g.
5 ###
6 Remove whitespace from the start of each line
7 :%s/^\s*/\1/g
8 ###
9 Join each line with the next line
10 :1,$j
11 ###
12 Make all occurrences of Steve lowercase
13 :%s/Steve/steve/g
14 ###
15 <1>
```

Classification

- Tweet Sentiment
- Company categorization
- Labeling parts of speech
- <http://github.com/semiosis/prompts/blob/master/prompts/tweet-sentiment-classifier.prompt>
- <http://github.com/semiosis/prompts/blob/master/prompts/keyword-extraction.prompt>

Generation

- Idea Generator

Come up with silly inventions.

`./silly-inventions.png`

Conversation

- Q&A agent
- Sarcastic chatbot

```
http://github.com/semiosis/prompts/blob/master/prompts/  
sarcastic-response.prompt
```

Taken from Prompt Design 101.

These are manual techniques which should be encoded in a DSL when generating prompts.

1. Reflective description of the task

State what the prompt does at the start.

At the start of the example we state in plain language what the classifier does:

```
1 This is a tweet sentiment classifier.
```

By stating this upfront, it helps the API understand much more quickly what the goal of the response is supposed to be and you'll end needing to provide fewer examples.

Taken from Prompt Design 101.

These are manual techniques which should be encoded in a DSL when generating prompts.

2. Use separators between examples

Example: ###.

You can use other characters or line breaks, but ### works pretty consistently and is also an easy to use stop sequence.

Whatever separator you use, make sure that it's clear to the API where an example starts and stops.

Taken from Prompt Design 101.

These are manual techniques which should be encoded in a DSL when generating prompts.

3. Multiplexer Part 1

Make a prompt more efficient / cheaper.

Design it to generate multiple results from one API call.

```
1 This is a tweet sentiment classifier
2 Tweet: "I loved the new Batman movie!"
3 Sentiment: Positive
4 ###
5 Tweet: "I hate it when my phone battery dies"
6 Sentiment: Negative
7 ###
8 Tweet: "My day has been [U+1F44D]"
9 Sentiment: Positive
10 ###
11 Tweet: "This is the link to the article"
12 Sentiment: Neutral
13 ###
14 Tweet text
```

Taken from Prompt Design 101.

These are manual techniques which should be encoded in a DSL when generating prompts.

3. Muxitplexer Part 2

```
1 1. "I loved the new Batman movie!"
2 2. "I hate it when my phone battery dies"
3 3. "My day has been [U+1F44D]"
4 4. "This is the link to the article"
5 5. "This new music video blew my mind"
6
7 Tweet sentiment ratings:
8 1: Positive
9 2: Negative
10 3: Positive
11 4: Neutral
12 5: Positive
13
14 ###
15 Tweet text
```

Taken from Prompt Design 101.

These are manual techniques which should be encoded in a DSL when generating prompts.

3. Multiplexer Part 3

```
1  "I can't stand homework"
2  "This sucks. I'm bored [U+1F620] "
3  "I can't wait for Halloween!!!"
4  "My cat is adorable [U+2764] [U+FE0F] [U+2764] [U+FE0F] "
5  "I hate chocolate"
6  Tweet sentiment ratings:
7  1.
```

Query Reformulation

<https://www.sciencedirect.com/topics/computer-science/query-reformulation>

You can improve the quality of the responses by making a longer more diverse list in your prompt.

One way to do that is to start off with one example, let the API generate more and select the ones that you like best and add them to the list.

A few more high-quality variations can dramatically improve the quality of the responses.

pen.el: Prompt Engineering in emacs

pen.el facilitates the creation, development, discovery and usage of prompts to a Language Model such as GPT-3.

- Create elisp functions based on GPT-3 prompts
- Chain GPT-3 queries together using keyboard macros and functions
- Interactively query, generate and transform both prose and code
- Use GPT-3 as a search engine within emacs

pen.el modes Part 1

Prompt-Engineering Minor Mode

`prompt-engineering-mode` is a global minor mode for emacs that provides keybindings for creating and executing prompts generally across emacs.

Prompt Description Major Mode

`prompt-description-mode` is a major mode for editing `.prompt` files.

The `.prompt` file format is based on YAML and an associated schema, which defines the keys which are expected.

pen.el modes Part 2

Pen Messenger Minor Mode

`pen-messenger-mode` is a minor mode for enhancing an emacs-based messenger client with GPT-3 capabilities, such as emoji generation.

Pen Conversation Mode

`prompt-conversation-mode` is a major mode designed to facilitate ongoing conversation with a prompt-based GPT-3 chatbot.

GPT-3 Training Mode

The goal of this mode is to facilitate the workflow of training on OpenAI's API.

Prompt YAML format Part 1

meeting-bullets-to-summary.prompt

```
1  title: "meeting bullet points to summary"
2  prompt: |+
3      Convert my short hand into a first-hand
4      account of the meeting:
5
6      <1>
7
8      Summary:
9  engine: "davinci-instruct-beta"
10 temperature: 0.7
11 max-tokens: 60
```

Prompt YAML format Part 2

meeting-bullets-to-summary.prompt

```
1 top-p: 1
2 frequency-penalty: 0.0
3 presence-penalty: 0.0
4 best-of: 1
5 stop-sequences:
6 - "\n\n"
7 conversation-mode: no
8 stitch-max: 0
```

stitch-max Keep stitching together until reaching this limit. This allows a full response for answers which may need $n \times \text{max-tokens}$ to reach the stop-sequence.

Prompt YAML format: Part 3

meeting-bullets-to-summary.prompt

```
1  vars:
2  - "notes"
3  examples:
4  - |+
5      Tom: Profits up 50%
6      Jane: New servers are online
7      Kjell: Need more time to fix software
8      Jane: Happy to help
9      Parkman: Beta testing almost done
```

Prompts as functions

`pen-generate-prompt-functions`

Generate prompt functions for the files in the prompts directory
Function names are prefixed with `pen-pf-` for easy searching.
<http://github.com/semiosis/prompts>

exemplary: examples as functions

An example-oriented DSL that can be used to construct and compose NLP tasks.

Why is a DSL needed for this? Just to make the code a little more terse.

Regex

<https://github.com/pemistahl/grex>

```
1 (def regex
2   "example 1\nexample2" "^example [12]$"
3   "example 2\nexample3" "^example [23]$"
4   "pi4\npi5" "^pi[45]$")
```


exemplary: examples as functions

Analogy

```
1 (def analogy
2   ;; Each line is a training example.
3   "NNs" "NNs are like genetic algorithms in
4   that both are systems that learn from
5   experience"
6   "Social media" "Social media is like a
7   market in that both are systems that
8   coordinate the actions of many
9   individuals.")
10
11 (def field
12   "chemistry" "study of chemicals"
13   "biology" "study of living things")
```

Something funny

Vexate a simple instruction

```
./complicate.png
```

Something funny

How to crack an egg

```
./crack-an-egg.png
```

Create a prompt

Ask the audience

- What type of text to generate
 - Could be code, prose, etc.

Ruby

```
https://www.twilio.com/blog/  
generating-cooking-recipes-openai-gpt3-ruby
```