# Generative AI: AI Webdesigner

A tool that creates and illustrates a webpage based on Amazon product page

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# Motivation

- Worked on **Amazon web scraper** before on products overview page
- Good idea to work on **Amazon product metadata** to fulfill the project, scraped from product page

**About me**

- Working for **Philips** as Working Student for Consumer Insights & Commercial Analytics
- Past: Rental company in Seoul for rental products, then flooring products in Germany for logistics + product development
- **Strong interest** in consumer products / CPG

# Approach

**Aim:** Making a HTML page of a company website with a company logo and product images

- To guide people in making websites with HTML structure

**Data Preparation**

- For this, you can use any <u>electronics</u> **product page** link from Amazon as an input – only a <u>single link</u> can be used
  Electronics only because the dataset was too big (…), so it was reduced to randomised sample of 10000 products in sampled data

- Web scraper will run and produce a dictionary data

- This will be used for RAG pipeline

WEB DESIGNER

## Amazon Product Reviews

**Amazon Reviews'23**

🔍 Search

Common Data Processing ⌄
Common Data Loading ⌄
Back to Home

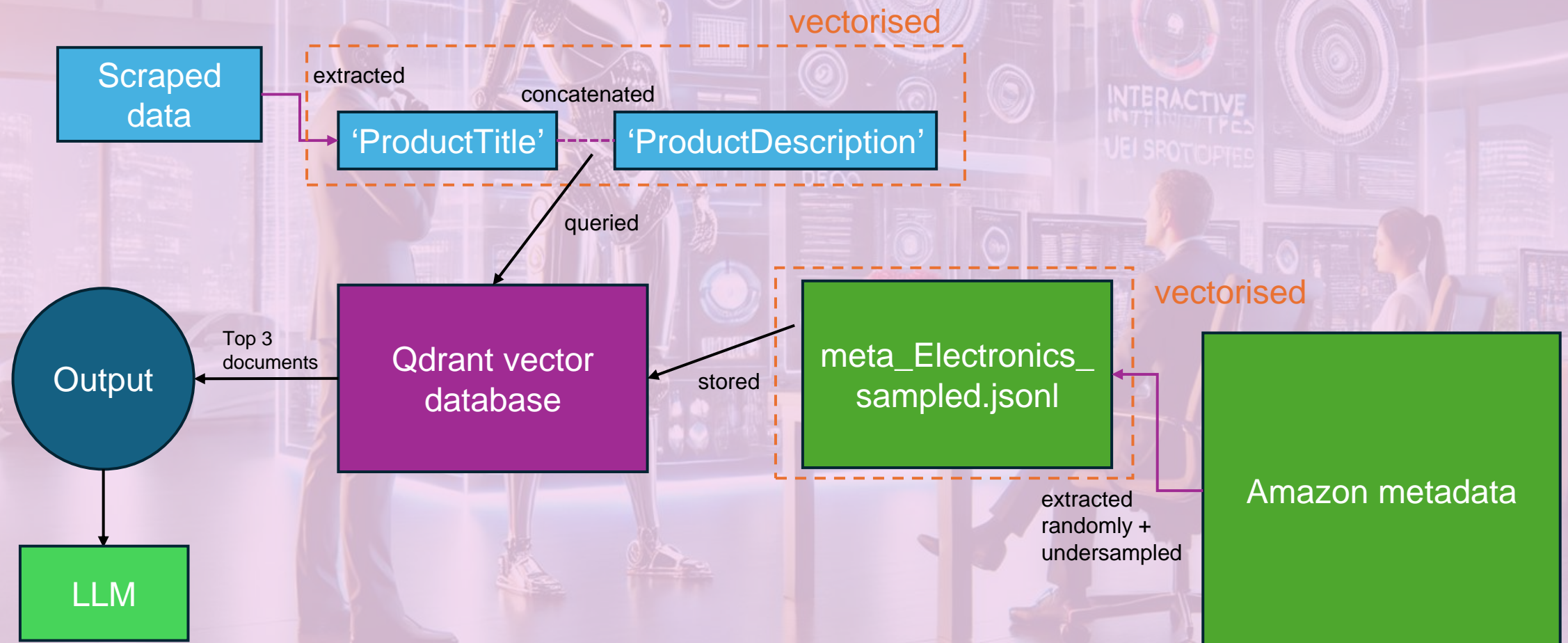| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Appliances | 1.8M | 94.3K | 2.1M | 92.8M | 95.3M | review, meta |
| Arts_Crafts_and_Sewing | 4.6M | 801.3K | 9.0M | 350.0M | 695.4M | review, meta |
| Automotive | 8.0M | 2.0M | 20.0M | 824.9M | 1.7B | review, meta |
| Baby_Products | 3.4M | 217.7K | 6.0M | 323.3M | 218.6M | review, meta |
| Beauty_and_Personal_Care | 11.3M | 1.0M | 23.9M | 1.1B | 913.7M | review, meta |
| Books | 10.3M | 4.4M | 29.5M | 2.9B | 3.7B | review, meta |
| CDs_and_Vinyl | 1.8M | 701.7K | 4.8M | 514.8M | 287.5M | review, meta |
| Cell_Phones_and_Accessories | 11.6M | 1.3M | 20.8M | 935.4M | 1.3B | review, meta |
| Clothing_Shoes_and_Jewelry | 22.6M | 7.2M | 66.0M | 2.6B | 5.9B | review, meta |
| Digital_Music | 101.0K | 70.5K | 130.4K | 11.4M | 22.3M | review, meta |
| Electronics | 18.3M | 1.6M | 43.9M | 2.7B | 1.7B | review, meta |
| Gift_Cards | 132.7K | 1.1K | 152.4K | 3.6M | 630.0K | review, meta |
| Grocery_and_Gourmet_Food | 7.0M | 603.2K | 14.3M | 579.5M | 462.8M | review, meta |
| Handmade_Products | 586.6K | 164.7K | 664.2K | 23.3M | 125.8M | review, meta |
| Health_and_Household | 12.5M | 797.4K | 25.6M | 1.2B | 787.2M | review, meta |
| Health_and_Personal_Care | 461.7K | 60.3K | 494.1K | 23.9M | 40.3M | review, meta |

3. **Links** (user-item / bought together graphs).

# RAG

## RAG pipeline

- The electronics Amazon product metadata dataset is taken from [Recommender Systems and Personalization Datasets](#) [1]
- **Rich, structured** data in .jsonl format
- SentenceTransformer `all-MiniLM-L6-v2` s used
- This is where the input will retrieve products
- **Top 3 most similar products** (using cosine similarity) will be returned from the vector database Qdrant
- Query using only 'ProductTitle' and 'ProductDescription'
- Only relevant metadata is extracted from Amazon
- At the end, only **1st product** will be used for LLM

# RAG

```
Top 3 results:
Score: 0.7163099050521851
Product: {'main_category': 'Computers', 'title': 'ASUS GeForce GTX 1070 8GB Dual-Fan Edition 4K/VR Ready Dual HDMI DP 1.4 Gaming Graphics Card (DUAL-GTX
---
Score: 0.7155039310455322
Product: {'main_category': 'Computers', 'title': 'ASUS Dual NVIDIA GeForce RTX 2070 Mini OC Edition Gaming Graphics Card (PCIe 3.0, 8GB GDDR6 Memory, HD
---
Score: 0.6429746747016907
Product: {'main_category': 'Computers', 'title': 'ASUS ROG Strix Scar 15 (2022) Gaming Laptop, 15.6" 240Hz IPS QHD Display, NVIDIA GeForce RTX 3080, Int
---
```

first_product_metadata

Python

```python
{'title': 'ASUS GeForce GTX 1070 8GB Dual-Fan Edition 4K/VR Ready Dual HDMI DP 1.4 Gaming Graphics Card (DUAL-GTX1070-8G) (Renewed)',
 'brand': 'ASUS',
 'description': 'Specifications Mfr Part Number: DUAL-GTX1070-8G Chipset: NVIDIA GeForce GTX 1070 Base Clock: 1531 MHz (OC Mode); 1506 MHz (Gaming Mode)
 'average_rating': 5.0,
 'rating_number': 2,
 'price': None,
 'store': 'Amazon Renewed',
 'images': 'https://m.media-amazon.com/images/I/512TogWHamL._AC_.jpg'}
```

# Agents

## Multiple Agents

- Attempted to make CoT using langchain, but not successful
- Nevertheless, multiple agents are established:

1. **"Enhanced" Metadata Generator:**
   Based on the 'specifications', it returns the enhanced_metadata in .json format

   ```
   # Generate raw response
   response = llm_pipeline(prompt, max_new_tokens=1000, temperature=1.6)[0]["generated_text"]
   ```

   → Finetuned with higher temperature and also higher max_new_tokens

2. **HTML Generator:**
   Given the input from "enhanced" metadata, it is able to generate HTML structure from enhanced_metadata
   → Finetuning was at a moderate level so that the HTML structure will be kept, temperature is moderate with lower max_new_tokens

   ```
   response = llm_pipeline(prompt, max_new_tokens=500, temperature=0.8)[0]["generated_text"]
   ```

- Both agents used same LLM: `Qwen/Qwen2.5-Coder-7B-Instruct`

# Approach

```python
def generate_html(metadata):
    prompt = f"""
    Create a simple HTML template for a company website based on the following metadata:
    Company Name: {metadata['company_name']}
    About Us: {metadata['about_us']}
    Product Title: {metadata['title']}
    Product Price: {metadata['price']}
    Product Rating: {metadata['rating']}
    Product Rating Number: {metadata['rating_number']}

    The HTML should include:
    - A header with the company name and a placeholder image for the company logo (logo-placeholder.png).
    - An "About Us" section with the provided content.
    - A "Products" section with a table containing product title, price, rating, and number of ratings, along with a placeholder image for the pro
    - A "Contact" section with placeholder contact details.

    Make sure to replace the HTML content below with metadata.

    Example HTML:
    <!DOCTYPE html>
    <html>
    <head>
        <title>{metadata['company_name']}</title>
```

You are a web development assistant. Create a fake company website based on the following product metadata. Products: {% for idx, product in enumerate(products) %} {{ idx + 1 }}. Title: {{ product['title'] }}

# Innovatech Global

![Company Logo]

## About Us

At Innovatech Global, we pride ourselves in offering cutting-edge technology products designed for gamers and content creators alike. We are committed to delivering high-performance solutions that enhance creativity, efficiency, and enjoyment in our customers' lives. With expertise in brands such as ASUS and Nvidia, our passion is to innovate and inspire the digital age through technology excellence.

## Products

| Title | Price | Rating | Number of Ratings | Image |
|---|---|---|---|---|
| Epicenter 2.0: Revolutionizing Graphics for the Ultimate Gaming Experience | $250.0 | 4.8 | 500 | ![Product Image] |

## Contact

Email: contact@company.com

Phone: (123) 456-7890

**Rating:** {{ product['average_rating'] }} stars

**Reviews:** {{ product['rating_number'] }} reviews

# Image Generation

- HTML page is made successfully!

- Now, image generation on company logo + product image

**Product Image**

- Model: `thu-ml/unidiffuser-v1`

- Image-to-text-to-image approach, as image is provided from the Amazon metadata

ASUS GeForce GTX 1060 Dual FX 2GB
Brand replaced in text: InnovaGraphics Technologies Pte Ltd. GeForce GTX 1060 Dual FX 2GB

- Able to retrieve the text in a similar way
  → Finetuned with guidance_scale = 8 to make it strict, temperature at default

# Image Generation

## Company Logo

- Model used: `ntc-ai/SDXL-LoRA-slider.futuristic-logo-design` [2]

- Searched 'logo' on HuggingFace, but somehow Flux was not usable on Jupyter Server

- This model uses LoRA in stable diffusion and makes "futuristic logo design"

- Other logo model (`artificialguybr/LogoRedmond-LogoLoraForSDXL-V2`) was also available, but documentation was completely(!) missing:

→ Finetuned with the parameters in the next slide
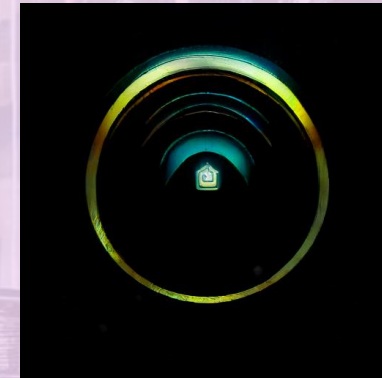
# Image Generation



Innovapic:
guidance_scale = 2

Pretty good! But
num_inference_steps
was lower

Some wing logo..?
guidance_scale = 6

Is this a logo?
guidance_scale = 9

```python
prompt = f"{enhanced_metadata['company_name']}, electronics, futuristic logo design"
negative_prompt = "nsfw"
width = 512
height = 512
num_inference_steps = 50
guidance_scale = 7.5
image = pipe(prompt, negative_prompt=negative_prompt, width=width, height=height, guidance_scale=guidance_scale, num_inference_s
image.save('logo-placeholder.png')
```

# InnovaGraphics Technologies Pte Ltd.



## About Us

At InnovaGraphics Technologies Pte Ltd., we strive to revolutionize the world of gaming and entertainment with our top-notch graphics solutions. With years of expertise in developing state-of-the-art products, we are dedicated to pushing the boundaries of what is possible in video card technology. Our mission is to provide cutting-edge graphics that offer unmatched performance, making it an absolute dream for gamers and professionals alike. At InnovaGraphics Technologies Pte Ltd., your experience is not just a game; it's a masterpiece!

## Products

| Title | Price | Rating | Number of Ratings | Image |
|---|---|---|---|---|
| Revolutionizing Gaming: The All-New InnovaGe Force GTX 1070 8GB Ultra-Fan Edition | $229.99 | 4.9 | 15 |  |

## Contact

Email: contact@company.com

Phone: (123) 456-7890

# Future Works

- Overall success! However, there needed to be some tweaks done in the functions, to make the codes work smoothly (i.e. agents with .json / .html format, the response itself had to be extracted)

- Simple HTML is not good enough: what about interactive websites (i.e. CSS, JavaScript)? How about mobile?

- → More prone to errors, the structures must be engineered for prompts

- More lengthy description?

- About ethics: would it be okay to use Amazon product pages as input and get inspirations from there? No copyright issues?

- Some things can just get better as time goes, with better LLMs suited for text/image generation, and for website builders

# References

Background image generated by DALL-E.

- [1] Recommender Systems and Personalization Datasets. https://cseweb.ucsd.edu/~jmcauley/datasets.html#amazon_reviews, https://amazon-reviews-2023.github.io

- [2] SDXL LoRA. https://huggingface.co/ntc-ai/SDXL-LoRA-slider.futuristic-logo-design