

REPORT

HP CHALLENGE 23-24

Introduction:

In this era of EdTech, the internet has transformed into an expansive repository of information. Accordingly, search engines have emerged as trusted conduits for accessing knowledge. This presents an enticing opportunity for organizations, especially in the educational domain, to connect with their audience through Search Engine Optimization (SEO). This approach holds enormous potential in the context of educational content as millions of relevant search queries are conducted every month, spanning across many subjects ranging from Maths, Science, English to Summer Fun and Festivals.

Building on this backdrop, the objective of the present work is to harness the innovative capabilities of Generative AI. Our goal is to revolutionize the creation of educational content, zeroing in on creating worksheets tailored for students aged 8-9 years. In particular, we propose a solution that generates worksheets on seven key topics: days of the week, phonics, telling time, time, clock, season and money. Towards the end of this report, we discuss the limitations and shed light on the future scope of the work.

Team details:

Team Name	Neural Ninjas
Member #0	Harsh Goyal
Member #1	Abhay Kumar
Member #2	Ratna Kandala
Member #3	Arsh Arora

Problem statement:

Create worksheets on the following life skills topics for 8-9 year old kids.

1. *Days of the week worksheets*
2. *Phonics worksheets*
3. *Telling time worksheets*
4. *Time worksheets*
5. *Clock worksheets*
6. *Season worksheets*
7. *Money worksheets*

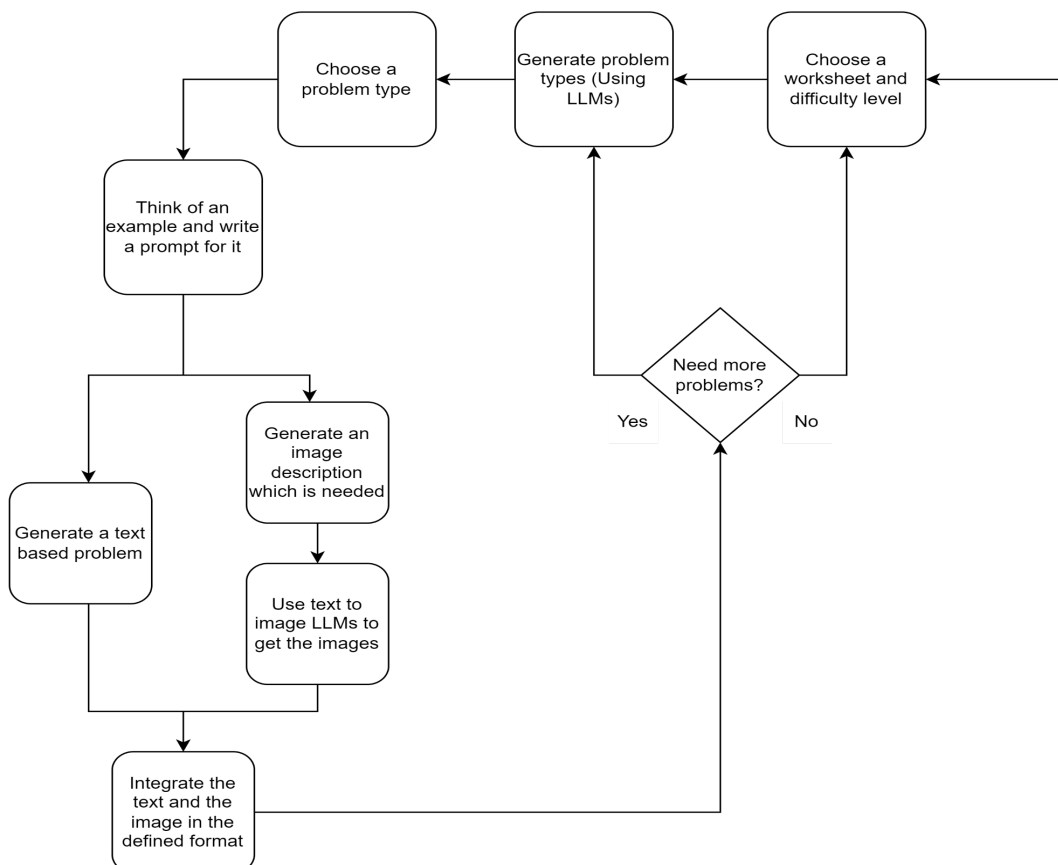
Deliverables (Provided in the GitHub Repository):

- **Prompts:** Sample prompt example for each worksheet which can be used to further generate similar worksheets.
- **Example:** An example worksheet which is being generated using the proposed methodology.

Proposed solution:

- **Flowchart**

The figure below depicts the flowchart for the proposed solution:



- **How to write prompts?**

By [OpenAI's documentation](#), a prompt should contain the following:

- Description of the task
- Instructions for the model
- Formatting instructions of the output
- Example(s)

Since the project's requirement is to generate a worksheet, we have divided the prompt into two parts:-

1. **Question type:** Uses the topic title to generate multiple question types.
2. **Question content:** Generates multiple questions of the above type with different questions modes such as fill in the blanks, multiple choice etc.

Examples are given in this prompting.md file:

<https://github.com/wetleaf/HP-Project/blob/master/Prompts/Generating%20Prompt/Prompting.md>

- **LLMs to use**

- ChatGPT - Web 3.5 (Free)
- GPT4 Plugin (Paid)
- GPT4 Dall-E3 (Paid)
- GPT4 Data-Analysis (Paid)

- **Integration**

Integrate the image generating models and question generating models to generate a PDF.

- **Deep exploration of GPT-4's features:** This step included researching GPT-4 capabilities, crafting refined prompts, iteratively testing the prompts, and ensuring high-quality content.
- **Mastering GPT-4's PDF generation plugin:** We have explored the capabilities of GPT-4 plugins, specifically focusing on the new GPT4PDF Lagan. This plugin offers a unique feature: it not only converts text into aesthetically pleasing PDFs but also places a significant emphasis on the layout and typography, ensuring the final output is both visually appealing

and easy to read. However, there's an interesting procedure to further enhance this. Once the PDF has been generated using GPT4PDF Lagan, one can take it a step ahead by converting it into a DOC file. For this purpose, one needs to visit a dedicated website that specializes in this conversion. Thereby, after uploading the PDF, the website processes it and provides a direct download link for the DOC file. Interestingly, ChatGPT provides users with a direct link to this particular website, streamlining the entire process and making it extremely user-friendly.

- **Harnessing DALL-E 3 for dynamic imagery:** Utilized DALL-E 3 for visuals, iteratively refined image prompts, and assessed image relevance and quality.
- **Integration of Visuals and Text:** Seamlessly integrated DALL-E images into the PDF, ensuring coherence between visual and textual elements.
- **Overall Commitment to Quality:** Harmonized content creation with AI technology, investing detailed effort in every project phase for a top-tier worksheet.

Limitations:

- 1. Text to image LLM:** Poor image generation by LLMs without dataset
- 2. Integration:** Manually integrating text and images into the worksheet
- 3. Unavailability of GPU:** Unable to train Multimodels without access to GPUs.
- 4. Subscription to paid LLMs:** Unable to test paid LLMs for image and text generation.
- 5. Late integration challenge:** With cutting-edge image generation software launched just before the submission deadline, our team did not have enough time to fully integrate these capabilities in our present work. This posed a constraint during our initial planning and execution.

Future scope:

- 1. Automate integration:** Usage of application(s) that can reduce the manual work of integration (Ex: Paid GPT4 plugins).
- 2. Dataset generation:** Generating a dataset to get a pipelined output for directly generating worksheets.
- 3. Multimodels:** Training data on multimodels (either paid or locally on GPUs).

References/Important links:

1. LLMs:
 - a. Text to Image LLMs:
 - i. <https://github.com/lucidrains/imagen-pytorch>
 - ii. <https://stablediffusionweb.com/#demo>
 - iii. <https://openai.com/dall-e-2>
 - b. Text to Text LLMs:
 - i. <https://chat.openai.com/>
 - ii. <https://llava.hliu.cc/>
2. Integration tools links:
 - a. GPT4 and its different features and plugins
 - b. Text to PDF softwares used by GPT4:
 - i. <https://www.aidocmaker.com>
 - ii. <https://openai.com/dall-e-3>
3. Github link: <https://github.com/wetleaf/HP-Project>