

Diploma Thesis Review

Charles University, Faculty of Mathematics and Physics

Thesis author Alexander Chubar
Thesis author Generating game content with generative language models
Year submitted 2024
Study program Computer Science - Visual Computing and Game Development
Branch of study Computer Science - Visual Computing and Game Development

Review author doc. Mgr. Martin Pilát, Ph.D. **Role** opponent
Department KTIML MFF UK

Review text:

The goal of Alexander Chubar's thesis was to use large language models for procedural content generation in computer games. This goal was fulfilled – the student created a JRPG game with content generated using ChatGPT.

The thesis is divided into five chapters (plus introduction and conclusion). The first chapter describes the context of the thesis – the JRPG genre, large language models, and procedural content generation. The description is generally good and easy to follow, but sometimes it may be too detailed (the description of the GPT architecture is not needed in the rest of the thesis), while, at the same time, some interesting details are missing – e.g. what are the constraints for levels in section 1.3.5? These are, however, mostly subjective preferences.

The second chapter describes the GPT JRPG game designed as part of the thesis. The game is complex enough, so that the content generation can be evaluated in detail. The description of the game is reasonably detailed, although some examples of the JSON files used for the representation of the game world would be nice to better understand what exactly is included and what the LLMs should generate.

The third chapter describes the prompting of LLMs in general and then shows how it is used in the context of the thesis. Here, again, I would appreciate more specific examples of the prompts used. While their general structure is described, including these more specific details would make it easier to follow the thesis.

The fourth chapter discusses the results – game generated by LLMs. It evaluates different settings of LLMs (and different models) both subjectively and objectively. The experiments and results are quite interesting and show both the strong and weak points of using LLMs for procedural content generation. The last chapter includes some interesting ideas for future research.

Overall, the thesis fulfilled the goal and showed that using LLMs for procedural content gen-

eration is possible and gives interesting results. The student has shown that he is capable of both implementing a relatively complex game and also integrate the implementation with LLMs. I have only two questions for the defense:

1. One of the problems mentioned in the text is the lack of existing graphical assets. Could this problem be solved by using image generating models? You mention DALL-E, however, local models, such as stable diffusion, can be better suited as they allow for finetuning of the style of the images and can also be used for style transfer.
2. You mention the significant cost of using the ChatGPT models. Have you considered using local models such as Llama 3.1? What changes would be required for that?

I recommend the thesis for defense.

I do not recommend the thesis for a special award.

Prague, September 2, 2024

Signature: