Group Name: The Best Group
Members: Simranjit Singh, Ngan Phan, Angad Kahlon
COMP 482 - Natural Language Processing

September 19 - 30, 2024:

Big idea: make a game incorporating a planning nlp
Right now I have two main games in mind:

- Survival game
    - includes quests that the nlp breaks up into sub quests
    - Item recipes are generated using the nlp
    - Player can ask how to do stuff, e.g. “I want to build a house, how can I do that?”, and the model can then generate the quest “build a house”, and it gives steps like
        - 1. Gather 5 wood
        - 2. Gather 2 Rope
        - 3. Create the house using the crafting bench
    - I'm not sure how realistic it is to have the model embedded into the game so that the player can directly interact with it, or if we should create the model separately, generate the recipes and quests beforehand, and then hard-code them into the game

- Puzzle game
    - The player needs to solve a series of puzzles
    - You can ask the nlp for hints and its solution
    - Or compare your solution to what the nlp comes up with
    - Could extend this, so that the puzzles are generated by the nlp
    - Or maybe the player generates the puzzles and the model tries to solve them
    - Chess endgames? Input is chessgames in chess notation
        - Pick the first legal move

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- Nlp provides hints/tips
- Nlp changes language when character travels to different locations in map

Russel’s response:

I think we can talk more about it this week. I will have instructions up for pitch presentations along with a small Assignment 2 soon.

Some early comments on your ideas:

- a prototype could be Twine with pre-generated tasks
    - Try playing and see if that is even fun or what you might want
    - games are extremely complex if your goal is to make money
    - a portfolio piece could go a longer way if you need to demonstrate creativity / teamwork in your future job applications, perhaps a way to connect with potential employers/colleagues based on interests
- You could fine tune a smaller model to focus on generating such subtask lists
    - This might even be more feasible if you program the tasks to follow the pattern of a CFG and approach things rule-based
    - Another middle-stage development model might be to make a Bayes classification for the different tasks and the user input is used to predict which task
- puzzles would be much more difficult for the logic needed to solve them
    - NLP models are designed to randomly choose next word, so they do not think logically
    - We have discussed this some, and HMM might make planning possible
    - To tie this with logic, the HMM can help the LLM to stay focused on the possible options that would be favourable to check---this is combined with a DFA / CFG
    - The data for solving puzzles, though, is not NLP unless the puzzles themselves are some kind of word game
    - There are already people testing the newer version of ChatGPT to see how well it can solve crosswords, so you could even collect others' work there

I think it is better to try to work on something too large for a project, because then you get a chance to try more and see what you like. I mostly end up doing this by having parallel projects on the go, and then pare down to which ones I like working on the most. I try to strategize them so that work on one will be possible to use results on the others.

See you this Thursday,

October 3, 2024:

- Use sentence piece for the chess idea

https://www.inovex.de/de/blog/playing-text-adventure-games-with-natural-language-processing-and-reinforcement-learning/

https://github.com/matthewsparr/Deep-Zork

1. Creating a game in Twine, text based (choose your own adventure).
    a. NLP will be used to generate player choices
2. Survival game with crafting and goals.
    a. NLP breaks down quests into a list of tasks for player
        i. Hardcode it in
        ii. Let player talk to model live through a network
    - Storyline: You are stranded on an island and you need to escape. So an idea could be you are making a boat with resources available on the island. Multiple ways to escape.
    - Storyline 2: So an adventure game where you are collecting stuff is the goal.
    - Storyline 3: Factory production, create products factory needs (ex. Launching rocket into space)

October 4, 2024 (Office Hours):

Finalizing the project idea (game + nlp)

Technology for the game - Twine vs Godot
- Twine
    - text based only
    - Easier, little to no coding
    - The story is the focus
    - More limited
- Godot
    - More flexible
    - Potentially more interesting game
    - Could be more complex to implement
    - I personally am quite interested in working on it

Game genre - Adventure vs Survival
- Survival
    - Trapped on an island
    - Goal is to escape
    - Crafting different items (weapons, boat, etc…)
- Adventure
    - Core gameplay is to collect 12 “power stones”
    - Walk around and explore
    - Different biomes

        - Enemies
        - Story can be very well fleshed out
            - Potentially more interesting than a survival
        - More potential mechanics
        - Quests
        - Crafting?
            - Maybe potions

NLP integration
- Ask to write sentences in a different style
- Twine
    - Create player choice
- Godot
    - Generate item recipes
    - Quests into subquests
    - Npc dialogue?
        - Each npc is a small model?
    - Implementation - separate vs integrated
        - separated
            - Nlp only used during the creation of the game
            - Player never directly interacts with it
            - Easier to implement
        - Integrated
            - Player can talk to the model through the network
            - Get hints
            - Npc dialogue generated on the fly
            - Harder to implement, but cool

What are the expectations for the agenda?
- What parts of the project are the most important
- Bullet point list?
    - Filled out post discussion
    - With AI?

Existing llm

Then train from scratch, Hmm to categorize words

Adaptable Logical Control For large language models

Fill in the token

October 6, 2024 (Finalizing Idea):

We will be using Twine to make a text based, branching narrative, multichoice, game.

Twine is a better choice than Gogot because, while Gogot has more options, Twine will let us focus on the story and hopefully make a better end product.

I think we can break down the project into 3 main components, and each of can focus on one:

1. Writing the story
2. Training the nlp model and using it to generate player actions
3. Convert the story into a Twine game

The nlp training will follow will be done like so:

1. Choose an existing large language model
2. Train an HMM (referencing this paper https://arxiv.org/pdf/2406.13892)
    a. This will allow us to control the output format
    b. And apply restrictions to the output
3. Ask the HMM to create output, which will follow some predefined conditions
4. If we can restrict the output and make it follow restrictions, then we can use it for planning

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October 10 - 16, 2024 (After Class Discussion and Offline Work):

In this meeting, we discussed our Workshop and Midterm submissions and the overall plan for the project.

Completing the Workshop Agenda:

- Working on next week during the workshop as we discuss and add bullet points about the video submission and project.

Planning for the Midterm and Video Submission:
To even out the recording, we are dividing the slides/recording into 3 parts where each member will complete one part.

Simranjit:

1. What, Why: Introduction, background of NLP and use in games, why we want to do this, etc.

Ngan:

2. How: do we plan to implement it (Twine, NLP implementation)
3. Find fantasy data we can use to feed into the model
    a. A good source would be dnd forums
    b. This paper might also be helpful, to see how they gathered data: https://ora.ox.ac.uk/objects/uuid:ff7e8df3-9a18-4dc8-a15c-b67004334e73/downlo

ad_file?file_format=pdf&safe_filename=Comic-Book%2BSuperheroes%2Band%2BProsocial%2BAgency.pdf&type_of_work=Journal+article

Angad:

4. Afterwards: Extra details (breakdown of work, sharing work) and future after project is completed

More about this will be discussed in next week's workshop class to make sure we fulfil the requirements of the submission:

- 4-minutes per team member in a pre-recorded presentation
- one PDF slide per team member
  Submission
    - Create 1 video by combining our parts and submit on to Blackboard

Topics for discussion in workshop:

- Availability for meetings outside of class time
- Finalize parts for video recordings

October 17, 2024 (Workshop):

- https://ora.ox.ac.uk/objects/uuid:ff7e8df3-9a18-4dc8-a15c-b67004334e73/download_file?file_format=pdf&safe_filename=Comic-Book%2BSuperheroes%2Band%2BProsocial%2BAgency.pdf&type_of_work=Journal+article

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November 6, 2024:

Some starting questions:

- how should I format my writing to best help?
    - a page per room with link connecting them
- do we have clear ideas of what everyone is doing?
    - do we need help with anything?
- are we happy with the theme of the story?
- how are creating the model?
    - what are we going to use it for?
    - look at the russel feedback
- Let's set some deadlines
- Twine mechanics
    - Heath
    - Inventory
        - Keep track implicitly

        - Safe rooms
            - You find potion that you can use to heal yourself
- Add flavour text using the nlp as you move between the rooms
    - Consistent with the level

- lava/water mechanic
    - You are on a timer

November 8 - 13, 2024 (Reading Break):

November 8:

Simplify the layout to 1 floor and 4 rooms
- room0 is the starting room
- room1 is earth themed with golems
- room2 is nature themed with fairies
- room3 is the floor guardian's room

a temporary ending where the game ends as the player moves to the next floor (as you ascend the steps... cut to black)

November 11:

Info added for all rooms

November 14 - 15, 2024:

Gemma 2 2b on hugging face:
https://huggingface.co/allenai/tulu-2-7b?local-app=vllm

outline all the choices and interactions by Saturday night
- nlp
- generate the room desc
- use diff tone depending on the companion

Stick with our goblin room
To make sure the game is not too simple
Developing based on existing codebase is fine with reference - you don't need to reference small stuff or stuff considered "general knowledge"

Ctrl-G

- the llm is already pretrained

November 23, 2024:

- Discussed how we are going to finish the project
    - What we need to assign to everyone
    - Make sure we can finish and submit on time

Tasks:

- generate text based on promps - Sim
    - companion 1
    - companion 2
- copy the generated text into the game - Angad
- add logic for choosing a companion - Ngan
- add "styling", colours, etc to the rooms - Angad

- And broke down the remaining tasks for the submission criteria

Criteria

Contents

Short Descriptions - Ngan (Sim for some of the Ctrl-g stuff)
- The development environment configuration needed.
- Programming languages.
- The project folder hierarchy.
- Installation steps.
- Compile commands.
- Changes to folder structure after compile.
- List of tools used.
- Corresponding licenses.

Tool-Generated Outputs - Sim
- Specify what was generated by tools along with the inputs that generated them.
- Note: Share URL does not always work.
- Print out a PDF version that is readable of the entire conversation.

Task Summary - Angad

- Include a log summary of tasks completed by each team member.

Images and Screenshots - Ngan
- Create an `images` subfolder.
- Add screenshots of debugging:
  - Filenames should include dates of the screenshot with the debug topic.
- Include screenshots of final results after bugs are fixed.

Source Code - Ngan / Angad / Sim (for stuff that each of us worked on)
- Store source code in a `src` folder.
- Do not include LLM model files; host them on HuggingFace or similar platforms if sharing.
- Provide the share URL link.

References - Angad
- Create a collection of references in an MS Word document.

Demonstration - Sim
- Record a short video of a few user interactions with the system.

November 28, 2024:

- Finished the rest of the rooms
- Format it / clean it up as you read through it

finish doing the colours for the rooms

- recording of the game as part of the submission

deadlines for us:
Finish supporting material by December 1st
Record/post the video by December 11th

November 29 - 30, 2024:

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finished all the formatting and backgrounds, however some errors

- Fairy room
- First page
    - Can access chest items before companion is chosen

December 1, 2024:

Game completed and submitted

Work on final presentation