Sustained Context-Aware Image Generation for the Dungeons & Dragons Domain

229403G - WAG Weerasundara

Supervisor – Dr. Nisansa de Silva

Content

- Introduction
- Literature Survey
- Phase 1: Named Entity Recognition (NER)
- Phase 2: Image Generation Pipeline
- Phase 3: Map Generation

Project scope proposed initially

- Phase 4: Adventure Book Generation

This is an extension to the initially proposed scope

Dungeons and Dragons

- Tabletop Role playing game
- A DM designs or follow a pre existing adventure
- Use props & images for immersion

A group of people playing D&D from the Critical Role web series.

Background	Reference	Character Hook
Acolyte	Player's Handbook	Temples are vexed by a widespread magical curse that is causing people to waste away and keep the dead from being raised. An expeditionary force is headed to Chult to find the origin of the curse, and you've decided to join it.
Anthropologist	Appendix A	A wizard-merchant named Syndra Silvane is wasting away, and she has hired you to join an expedition to Chult to find a cure. Syndra believes that your expertise will prove invaluable, and you've wanted to study the cultures there.
Archaeologist	Appendix A	You have learned that a wizard-merchant is planning an important expedition to Chult—a place full of lost cities you're anxious to explore. Your request to join the expedition was approved.
Charlatan	Player's Handbook	After a few successful scams, you've gotten into some trouble with local authorities and criminal gangs. You were about to make a run for it when you heard a rumor that a merchant named Syndra Silvane is offering good pay for an assignment far from home.
Cloistered Scholar	Sword Coast Adventurer's Guide	A terrible curse is sweeping across Faerûn, and a dying merchant is gathering adventurers for a bold mission to destroy the source of the curse, which lies deep in the jungles of Chult. Your expertise could prove helpful, so you've asked to join the expedition.
Criminal	Player's Handbook	Local authorities grant you a full pardon for past crimes. In exchange, you are to join an expedition to Chult and help put an end to the "death curse" affecting several wealthy citizens of the city.
Entertainer	Player's Handbook	Your sponsor is a retired adventurer and merchant named Syndra Silvane. A terrible curse has befallen her, and she needs your help to end it. The quest will take you to Chult, a distant and exotic land where you can win fame and renown.
Faction Agent	Sword Coast Adventurer's Guide	A widespread magical curse threatens to devour the bodies and souls of the living. The Harpers have learned that its source lies somewhere in Chult. You volunteered to join the expedition.
Folk Hero	Player's Handbook	You've garnered quite the reputation and caught the attention of a merchant and retired adventurer named Syndra Silvane. She wants you to explore Chult and discover the source of a curse.
Inheritor	Sword Coast Adventurer's Guide	A horrible curse threatens to claim the life of Syndra Silvane, a retired adventurer. She has blood ties to your family, and you have an obligation to help her. To do otherwise could jeopardize your inheritance and your future.
Mercenary Veteran	Sword Coast Adventurer's Guide	A merchant and retired adventurer named Syndra Silvane needs trained warriors to join an expedition to Chult. You've always wanted to visit Port Nyanzaru and see the dinosaur races. They say the jungles are full of riches and danger—two things you crave.
Noble	Player's Handbook	Your family owes a favor to a merchant named Syndra Silvane. She's calling in the favor by asking for help. The family is counting on you to fulfill its promise, and you've heard rumors that Syndra is planning an expedition.
Outlander	Player's Handbook	When you were young, you fled your homeland of Chult by stowing away aboard a ship. Now you're anxious to return home. A local merchant is mounting an expedition to Chult, and you've talked your way into joining it.
Sage	Player's Handbook	A wizard named Syndra Silvane has fallen prey to a magical curse. She's mounting an expedition to Chult to end the curse, and she believes your expertise will prove invaluable. You're inclined to agree.
Soldier	Player's Handbook	Your superiors in the military recommended you for an important expedition to Chult. The success of the mission is so vital that they promised to make you a captain if you help ensure the expedition's success.

WELCOME TO CHULT

With the exception of a few coastal settlements, Chult is untamed tropical wilderness: dense jungles and snaky rivers ringed by mountains, volcanoes, and sheer escarpments. Walls of mountains to the west, south, and east shield the interior from the sea and from the view of sailors. The rivers are so sluggish that it can be difficult determining which direction is upstream and which is down. The rivers pick up speed only where they thunder down through steep-sided gorges.

The safest entry points into this overgrown realm ("safest" is a relative term in this context) are on the north and east. The coast from the Bay of Chult to Refuge Bay offers beaches on which to embark into the uncharted jungle. Along the entire coast, the Bay of Chult is the only spot where travelers can find welcoming civilization. The rest of the peninsula is a breeding ground for bloodsucking, disease-bearing insects, monstrous reptiles, carnivorous birds and beasts of every variety, and murderous undead. The farther one moves from the coast, the more humid, hot, and inhospitable the land becomes.

WEATHER

Chult is hot, humid, and rainy throughout the year. The temperature regularly climbs as high as 95 degrees F (35 degrees C) during the day and seldom falls below 70 degrees F (20 degrees C) even at night. A day without rain is rare, but rain varies from a steady mist to drenching downpours.

Visibility in heavy rain is limited to 50 yards. Beyond that distance, only Huge or larger objects can be distinguished. Missile weapon ranges are halved during rain.

On days that receive heavy rain, there's a 25 percent chance of a full-blown tropical storm featuring sheets of rain, high wind, lightning, tall waves at sea, and immense surf along the coast. Guides who know the conditions in Chult recommend hunkering down and staying put on these days. Travel by river is impossible (canoes are swamped by waves within 15 minutes of launching). If characters insist on traveling by foot, every character gains 1 level of exhaustion automatically and must make a successful DC 10 Constitution check or gain another. Skill checks to avoid becoming lost are made with disadvantage on storm days.

RACES OF CHULT

Members of every race and nationality of Faerûn can be found in Port Nyanzaru, but few of them ever travel more than a hundred yards beyond the city walls. The native peoples must be divided into those that are commonly known and those whose presence is legendary or only suspected. The first group consists of Chultans (humans), aarakocra, Batiri (goblins), dwarves (including albino dwarves), pterafolk, and tabaxi. In the second category, weretigers are suspected to be present in small numbers; explorers and hunters sometimes report seeing grungs (frog folk) deep in the jungle; and yuan-ti are rumored to be making a resurgence in remote areas.

In addition to these known and suspected residents, a crew of frost giants has come to Chult seeking the Ring of Winter and an expedition of Red Wizards is looking for the Soulmonger, but the presence of these bands is still unknown to the larger population.

Finally, the deep jungle is overrun by skeletons, zombies, ghouls, and other types of undead. Everyone in Ch[...]

warning horns, day or night, they scramble for the safety of the Market Ward and Merchants' Ward until the all clear sounds.
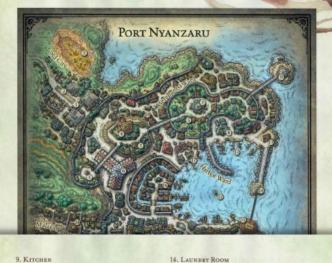
OLD CITY

Three ancient, vine-covered ziggurats tower above this crumbling ward. The whole district is a juxtaposition of ancient and decaying (but still occupied) stone structures interspersed with flimsy new huts and longhouses of bamboo and thatch.

The Old City is run by "beggar princes" in a mocking parallel to the merchant princes of the city proper. They have no official authority, but each of them sits atop a web of debts, favors, incriminating information, and loyal muscle that allows them to get things done with an efficiency that the merchant princes sometimes envy. Unlike the merchant princes, whose positions are based on wealth that passes from generation to generation in the same family, the identities and even the number of the beggar princes changes continually.

The Old City is run down but isn't a slum or a haven for thieves. Most of the residents are lower-class laborers or struggling artisans who can't afford the higher rents of homes inside the city walls.

1. BEGGARS' PALACES

The Beggars' Palaces are the two largest ziggurats of the Old City. Shops and tenements of bamboo are jammed onto the terraces of the ziggurats in wild profusion. The upper levels are cleaner and less crowded than those near street level. A narrow wooden bridge connects the upper levels above the press and noise of the street.

PORT NYANZARU

MERCHANT PRINCE'S VILLA

1 square = 5 feet

LOWER LEVEL   UPPER LEVEL

MAP 1.3: MERCHANT PRINCE'S VILLA

always on alert against tricksters and magicians trying to gain entrance to their master's home, so they have advantage on skill checks and saving throws against attempts to distract, bamboozle, or charm them.

The ceiling of the entryway is two stories tall. In some homes, it's open to the sky. In those cases, the fountain is sunk into the floor and doubles as a drain for rainwater.

2. SITTING AREA

This is both a waiting area and a meeting area for guests who aren't known to the villa's master, and therefore won't necessarily be given access to the inner chambers of the house. Decorative columns support the arched doorway from area 1. Rugs and comfortable pillows are arranged on the floor. Narrow windows look into the garden, but these double as arrow slits in case visitors aren't as friendly as they claim to be.

3. GRAND HALL

A magnificently tiled floor is flanked by two sweeping staircases that ascend to the upper floor. Decorations are in keeping with the individual merchant prince's taste and specialization.

4. GUEST ROOMS

Most of the right side of the house is devoted to accommodations for guests. Three private sleeping rooms with attached baths, plus two sitting rooms and access to the garden, make this far more luxurious than a typical inn.

5. GARDEN

Ferns, potted palms, orchids, and other exotic tropical flowers are cultivated in the garden, which is open to the sky. Chultan plants with useful properties or applications as poison might be found in the garden of a merchant prince with a horticultural bent, such as Jessamine. See appendix C for examples of rare plants.

6. DINING ROOM

The dining table is very low, just a few inches above the floor. Diners relax on pillows as they eat.

7. SAUNA

In addition to daily baths, well-to-do Chultans love relaxing in saunas. Dry heat is a welcome change from Chult's high humidity. Most home saunas are heated with charcoal burners or hot stones, but in the homes of the merchant princes, a trapped fire elemental provides round-the-clock heat, and a servant or slave is always available to massage tired muscles.

8. BATH

The bath is the cornerstone of a Chultan mansion, even more so than the dining room or family rooms. The family relaxes here during private times, but there's nothing unusual about a merchant prince holding meetings in the bath with trusted advisors and close business associates. Being invited into the household bath is considered an honor in Chultan society, and treating it as anything less risks offending the person [...]

9. KITCHEN

The kitchen is large, high-ceilinged, and well ventilated; otherwise, heat from cooking fires would make it unbearably hot. Stairs lead up to the laundry room (area 14).

UPPER LEVEL

The rooms on this level are decorated for comfort. The artwork and other decor reflects the taste of the merchant prince to whom the villa belongs.

10. LIBRARY

Chultans are fans of mythical romance, and the city has an active literary community with many book clubs. Port Nyanzaru's most successful novelists and playwrights concoct stirring tales about legendary heroes who pursue their lovers through unimaginable danger and save them from fates worse than death—which is more likely to involve a forced marriage to someone who doesn't love them than being eaten by an impossibly huge tyrannosaurus, although monstrous tyrannosauruses make regular appearances in these tales, too.

A character who spends a few hours sifting through the formulaic fiction and succeeds on a DC 15 Intelligence (Investigation) check finds useful books of Chultan lore mixed in with the romances. Use this as an opportunity to answer specific questions posed by the players. A library won't reveal the location of Omu, but a book of lore might mention the city and describe it as it was during its height.

11. FAMILY ROOMS

The merchant prince's children, spouses, and other close family members live in these apartments. They are richly appointed with pillows and tiger-skin rugs.

12. MASTER SUITE

The merchant prince's suite is the most opulent room in the palace. A pleasant breeze blows through large, lattice-covered windows, causing the potted plants to sway gently. The headboard of the master bed is fantastically carved in motifs suggestive of the merchant's business. Connected rooms contain a small, private bath and a walk-in closet filled with expensive clothing, mirrors, combs, and so forth.

Treasure. The suite contains personal items equivalent to two rolls on the "Gems or Art Objects" column of the Treasure Hoard, Challenge 0–4 table in the Dungeon Master's Guide. If the room contains jewelry, there is a 50 percent chance it is in a locked jewelry box requiring thieves' tools and a successful DC 15 Dexterity check to open.

13. GUARD ROOMS

This guard room is intentionally set in the midst of the family rooms and the master suite. The guards are responsible for safeguarding the family during their most vulnerable time, when they're sleeping or relaxing in their own chambers. This station is always manned by 1d4 + 1 gladiators who are fanatically loyal to the merchant prince and richly rewarded for their devotion.

14. LAUNDRY ROOM

Chultans are as scrupulous about their clothing as about their bodies—a fastidiousness that's almost essential, given how much everyone sweats in Port Nyanzaru's climate. Laundry is washed here every day, then hours are spent fanning it to and fro on lines trying to encourage the wet cloth to dry in the humid air.

15. SERVANTS' QUARTERS

The servants' quarters are isolated from the family sleeping areas for security. There is nothing remarkable about them.

16. RAIN TRAPS

Every room in the house contains (at minimum) a small water basin with running water coming either from a rooftop basin or lifted from barrels or an underground cistern by a water wheel.

FACTIONS AND THEIR REPRESENTATIVES

Port Nyanzaru is the lone civilized hub on a vast peninsula of great wealth. Many factions would like to tap into that wealth, and they all have agents vying for influence in the city or scouting the jungle for opportunities. Some of these can aid the characters, and others will try to hinder them.

EMERALD ENCLAVE

The Emerald Enclave is a widespread group of wilderness survivalists who preserve the natural order by rooting out unnatural threats. They struggle to keep civilization and the wilderness from destroying one another.

LAWS AND PUNISHMENTS

The merchant princes create or alter laws by decree as they see fit, and judges are expected to interpret laws freely but wisely. Such a system would seem to invite abuse and bribery, but the Chultan courts are surprisingly free of corruption.

Slavery isn't illegal in Port Nyanzaru, but it's frowned upon, and the merchant princes won't do business with slavers or show them any legal favor.

Murder is illegal, but "sanctions"—legal permission to kill someone or to have someone killed—can be purchased from the merchant prince Jessamine. The price depends on the prominence of the intended victim, the reason for the sanction, and the wealth of the purchaser. The minimum price possible is 150 gp; the maximum is limitless. The availability of sanctions doesn't mean they're common—it's rare for more than six to be sold in a year. That has less to do with price than with the fact that if word gets out who purchased a sanction, nothing can stop the friends of the victim from sanctioning the original purchaser.

Despite their high ambition, the merchant princes' power is entirely contained in the city. Elsewhere, Chult is ruled by the red law of tooth and claw. An individual is either predator or prey, and the predator might be a mob of undead, a ravenous allosaurus, a grung hunting party, Jahakan pirates, or a Flaming Fist patrol.

tej is an amber-colored, fermented drink made from honey. It's more common and popular in Chult than beer or ale. A mug of tej costs 4 cp in Port Nyanzaru or 6 cp in Fort Beluarian. A 1-gallon cask costs 2 sp in the city or 3 sp at the fort.

BETTING ON DINOSAUR RACES

Odds	Roll	Win on	Payout =	Racer Example
7:1	d8	2–8	Wager ÷ 7	Big Honker (crowd-pleasing young tyrannosaurus rex)
5:1	d6	2–6	Wager ÷ 5	Ubtao's Favorite (young triceratops on a streak)
3:1	d4	2–4	Wager ÷ 3	Banana Candy (well-trained hadrosaurus)
2:1	d3	2–3	Wager ÷ 2	Bonecruncher (young, ill-tempered allosaurus)
1:1	Any	Even	Wager	Grung Stomper (young ankylosaurus)
1:2	d3	1	Wager × 2	Scarback (young tyrannosaurus rex in its last race)
1:3	d4	1	Wager × 3	Nasty Boy (allosaurus with famous trainer)
1:5	d6	1	Wager × 5	Jungle Princess (deinonychus with frightened jockey)
1:7	d8	1	Wager × 7	Mountain Thunder (aging dimetrodon)

RACING DINOSAURS

Mount	Speed	Skill Check DC	AC	Hit Points	Attack	Damage	Constitution
Allosaurus, young	50/80	16*	13	30	+6	8 (1d10 + 3)	15 (+2)
Deinonychus	40/60	12*	13	26	+4	6 (1d8 + 2)	14 (+2)
Dimetrodon	30/50	8	12	19	+3	8 (2d6 + 1)	15 (+2)
Hadrosaurus	40/50	10	11	19	+3	6 (1d6 + 1)	13 (+1)
Other	40/60	12	12	24	+4	7 (1d8 + 3)	16 (+3)
Triceratops, young	50/75	14	13	38	+6	6 (1d10 + 1)	15 (+2)
Tyrannosaurus, young	50/100	18*	13	46	+6	9 (1d12 + 3)	17 (+3)

* If an Animal Handling check made with advantage due to lashing fails by 5 or more, the animal goes berserk and is out of the race.

a race actually covers a lot more ground. Every round, each rider makes a Wisdom (Animal Handling) check; the DCs for different types of dinosaurs are listed in the Racing Dinosaurs table. With each successful Animal Handling check, the first number listed as the dinosaur's speed is added to its "running tally." If the check fails, that dinosaur's tally doesn't increase that turn. When a racer's tally equals or exceeds 300, that dinosaur crosses the finish line. A racer can try to move at the higher listed speed by lashing the animal furiously; in this case, the Animal Handling check is made with advantage, but the dinosaur must also make a successful DC 10 Constitution check at the end of this round or its speed is halved for the rest of the race.

No initiative is involved. Riders can make their Animal Handling checks in any order, or all at the same time. If two or more dinosaurs cross the finish line on the same round, the one with the highest tally wins. If the tallies are the same, the racers tied. In the event of a tie, brawls are likely to break out trackside betting pools.

In the unchained event, dinosaurs are called dinosaurs if their tallies are within 50 of each other at the end of a round. Each dinosaur's pertinent combat statistics are listed on the Racing Dinosaurs table. If a dinosaur has half or fewer of its starting hit points, the rider makes Animal Handling checks with disadvantage.

For simplicity, dinosaurs can't attack or be attacked, but DMs with a cruel streak might be tempted to relax that rule. Just be aware that if rider attacks are allowed, [...]

done well when paired with Small riders. Most competitors in the two-legged race are hadrosauruses and deinonychuses (again with Small riders). The unchained race sees racers on anything, including young allosauruses and very young tyrannosauruses.

CHULTAN[...]

Research Problem

- Generating images consistent with the given narrative for a D&D adventure
  - Difficult to create art for a given narrative
  - Hard to maintain consistency of images across sessions
  - Images should be consistent with the lore
  - Pre existing or third party images needs to be incorporated

Tiamat
Picture credit: Forgotten Realms Fandom Wiki

Literature Survey

Key Phrase extraction

Prompt generation

Image generation

Evaluation

Consistency

Literature: Key Phrase Extraction

- Pre-processing & Summarization [1,2,3]

- Key phrase extraction using machine learning [4,5]

- Named Entity Recognition

[1] E. Papagiannopoulou and G. Tsoumakas, "A review of keyphrase extraction," Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, vol. 10, no. 2, p. e1339, 2020.

[2] S. Vijayarani, M. J. Ilamathi, M. Nithya et al., "Preprocessing techniques for text mining-an overview," International Journal of Computer Science & Communication Networks, vol. 5, no. 1, pp. 7–16, 2015.

[3] R. Srivastava, P. Singh, K. Rana, and V. Kumar, "A topic modeled unsupervised approach to single document extractive text summarization," Knowledge-Based Systems, vol. 246, p. 108636, 2022.

[4] A. P. B. Veyseh, N. Meister, F. Dernoncourt, and T. H. Nguyen, "Improving keyphrase extraction with data augmentation and information filtering," arXiv preprint arXiv:2209.04951, 2022

[5] S. Beliga, "Keyword extraction: a review of methods and approaches," University of Rijeka, Department of Informatics, Rijeka, vol. 1, no. 9, 2014.

Volo

Literature: Prompt generation

- Prompt Engineering and Design Principles [6]

- Control over Text Generation with Templates and Constraints [7]

- Generative Pretrained Transformer (GPT) Models

  - Task-specific finetuning [8]

  - Quantifying event boundaries in continuous narratives [9]

What's the difference between prompts ?

Original Prompt	Extended Prompt	Original Prompt	Extended Prompt
A dream of a distant galaxy	A dream of a distant galaxy, concept art, matte painting, HQ, 4k	photo of a riverbank	photo of a riverbank, concept art, matte painting, HQ, 4k
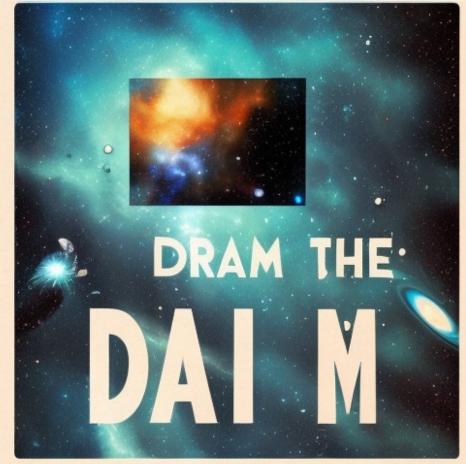
Negative prompts

- "A dream of a distant galaxy"

- Reduce artifacts

- out of frame, lowres, text, error, cropped, worst quality, low quality, jpeg artifacts, ugly, …

Example of a bad output generation.

Literature: Image Generation

- Image Synthesis with Generative Adversarial Networks [10]

- Variational Autoencoders (VAEs) for Image Generation [11]

- Diffusion models for Image Generation [12]

- Image Style Transfer [13]

- Image-to-Image Translation [14]

[10] Y. Lu, S. Wu, Y.-W. Tai and C.-K. Tang, "Image Generation from Sketch Constraint Using Contextual GAN," in Computer Vision – ECCV 2018, Lecture Notes in Computer Science, vol 11213. Springer, Cham, 2018

[11] AutoEncoders are Essential in Deep Neural Nets. Towards Data Science. Retrieved March 21, 2023, from https://towardsdatascience.com/autoencoders-are-essential-in-deep-neural-nets-f0365b2d1d7c

[12] J. Ho, C. Saharia, W. Chan, D. J. Fleet, M. Norouzi, and T. Salimans, "Cascaded diffusion models for high fidelity image generation." J. Mach. Learn. Res., vol. 23, no. 47, pp. 1–33, 2022.

[13] T. Karras, S. Laine, and T. Aila, "A style-based generator architecture for generative adversarial networks," in Proceedings of the IEEE/CVF conference on computer vision and pattern recognition, 2019, pp. 4401–4410.

[14] J. Ho, C. Saharia, W. Chan, D. J. Fleet, M. Norouzi, and T. Salimans, "Cascaded diffusion models for high fidelity image generation." J. Mach. Learn. Res., vol. 23, no. 47, pp. 1–33, 2022.

Tasha

Picture credit: Forgotten Realms Fandom Wiki

Literature: Consistency

- Document-Level Sentiment Analysis [15]

- Document-Level Relation Extraction [16]

- Image Temporal Consistency [17,18]

Video 1: Example of using temporal consistent images to form a video[9] .

Literature: Evaluation

- Evaluation Metrics for Text Generation [19]

- Image Evaluation [20]

- Consistency evaluation [21]

Mordenkainen
Picture credit: Forgotten Realms Fandom Wiki

Elminster
Picture credit: Forgotten Realms Fandom Wiki

Beholder
Picture credit: Forgotten Realms Fandom Wiki

Strahd
Generated by our Pipeline

Phase 1:

Comparative Analysis of Named Entity Recognition in the Dungeons and Dragons Domain

Model Comparison

- **Pre-trained Models:** BERT[22], ELECTRA[23], and XLM-RoBERTa[24] are general pre-trained models that can be fine-tuned for NER.

- **NER-specific Models:** WikiNEuRal[25], RoBERTaNER[26], and BERT-CRF[27] are specifically designed or adapted for NER.

- **Toolkits & Libraries:** Spacy[28] and Trankit[29] are comprehensive NLP libraries/toolkits that provide functionalities beyond just NER.

- **Domain-specific:** StanfordAIMI[30] is a domain-specific, focusing mainly on medical tasks.

- **Embedding Techniques:** Flair[31] is unique in its use of contextual string embeddings.

[22] Jacob Devlin, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova. 2018. Bert: Pre-training of deep bidirectional transformers for language understanding. arXiv preprint arXiv:1810.04805.
[23] Kevin Clark, Minh-Thang Luong, Quoc V Le, and Christopher D Manning. 2020. Electra: Pre-training text encoders as discriminators rather than generators. In International Conference on Learning Representations.
[24] Alexis Conneau, Kartikay Khandelwal, Naman Goyal, Vishrav Chaudhary, Guillaume Wenzek, Francisco Guzman, Edouard Grave, Myle Ott, Luke Zettle- ´moyer, and Veselin Stoyanov. 2019. Unsupervised cross-lingual representation learning at scale. arXiv preprint arXiv:1911.02116.
[25] Simone Tedeschi, Valentino Maiorca, Niccolo Campol- `ungo, Francesco Cecconi, and Roberto Navigli. 2021. WikiNEuRal: Combined neural and knowledgebased silver data creation for multilingual NER. In Findings of the Association for Computational Linguistics: EMNLP 2021, pages 2521–2533.
[26] Jean Baptiste. 2022. roberta-large-ner-english: model fine-tuned from roberta-large for ner task. https://huggingface.co/Jean-Baptiste/ roberta-large-ner-english. (Accessed on 05/10/2023).
[27] Fabio Souza, Rodrigo Nogueira, and Roberto Lotufo. ´2019. Portuguese named entity recognition using bert-crf. arXiv preprint arXiv:1909.10649.
[28] M. Honnibal and I. Montani, "spaCy 2: Natural language understanding with Bloom embeddings, convolutional neural networks and incremental parsing," unpublished.
[29] M. Van Nguyen, V. D. Lai, A. P. B. Veyseh, and T. H. Nguyen, "Trankit: A light weight transformer-based toolkit for multilingual natural language processing," arXiv preprint arXiv:2101.03289, 2021. 32
[31] A. Akbik, T. Bergmann, D. Blythe, K. Rasul, S. Schweter and R. Vollgraf, "FLAIR: An Easy-to-Use Framework for State-of-the-Art NLP," in Proceedings of the 2019 Conference of the North American Chapter of the Association for Computational Linguistics: System Demonstrations, pages 54-59, Minneapolis, Minnesota, 20191.

D&D adventure books

Book	Counts	
	Words	Topics
Lost mine of Phandelver (Baker and Perkins, 2014)	45947	29
Hoard of the Dragon Queen (Baur et al., 2014a)	74243	45
Rise of Tiamat (Baur et al., 2014b)	80065	48
Curse of Strahd (Perkins et al., 2016)	154519	62
Tomb of Annihilation (Perkins et al., 2017)	148605	35
Candlekeep Mysteries (Perkins et al., 2021)	141104	106
The Wild Beyond the Witchlight (Allan et al., 2021)	184135	60

[32] Wizards of the Coast, (2023, March 28). LOST MINE OF PHANDELVER. D&D Beyond. [Online]. Available: https://www.dndbeyond.com/sources/lmop
[33] Wolfgang Baur, Steve Winter, and Alexander Winter. 2014a. Hoard of the Dragon Queen. Wizards of the Coast.
[34] Wolfgang Baur, Steve Winter, and Alexander Winter. 2014b. Rise of Tiamat. Wizards of the Coast.
[35] Christopher Perkins, Tracy Hickman, and Laura Hickman. 2016. Curse of Strahd. Wizards of the Coast.
[36] Christopher Perkins, Will Doyle, and Steve Winter. 2017. Tomb of Annihilation. Wizards of the Coast.
[37] Christopher Perkins, Graeme Barber, Bill Benham, et al. 2021. Candlekeep Mysteries. Wizards of the Coast.
[38] Stacey Allan, Will Doyle, Ari Levitch, and Christopher Perkins. 2021. The Wild Beyond the Witchlight. Wizards of the Coast.
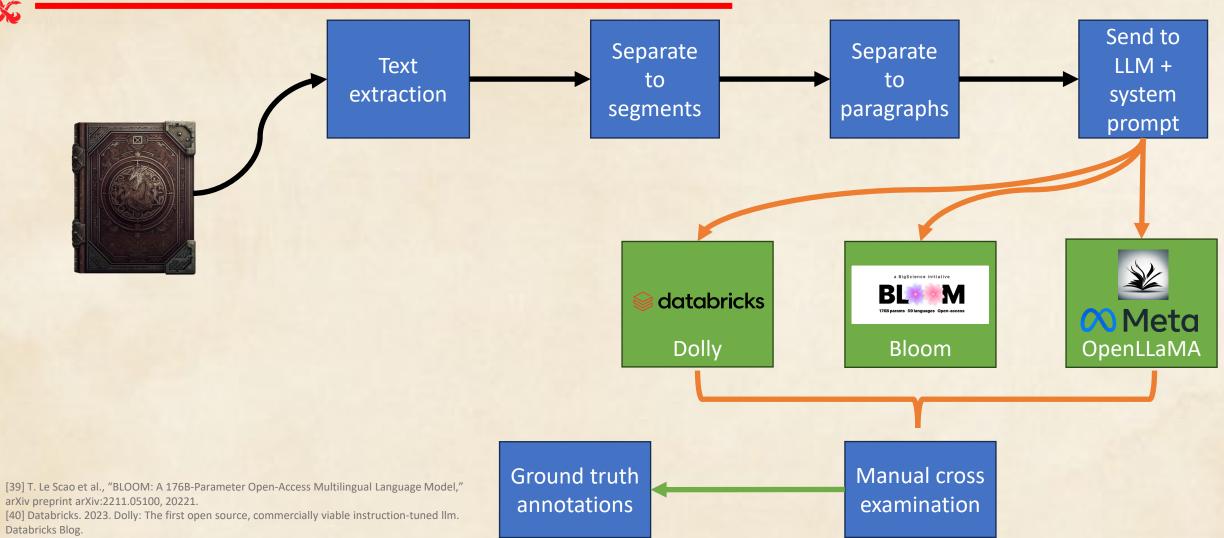
Data Collection and Annotation

[39] T. Le Scao et al., "BLOOM: A 176B-Parameter Open-Access Multilingual Language Model," arXiv preprint arXiv:2211.05100, 20221.
[40] Databricks. 2023. Dolly: The first open source, commercially viable instruction-tuned llm. Databricks Blog.
[41] Xinyang Geng and Hao Liu. 2023. Openllama: An open reproduction of llama.

Data Collection and Annotation

```
Input: Books;
Output: Named entities;
foreach book do
    segments ← divideIntoSegments(book);
    foreach segment in segments do
        paragraphs ←
            divideIntoParagraphs(segment);
        foreach paragraph in paragraphs
        do
            foreach LLM in LLMs do
                prompt ←
                    createPrompt(paragraph);
                namedEntities ←
                    LLM(prompt);
                processNamedEntities(namedEntities);
            end
        end
    end
end
removeDuplicates(namedEntities);
```

Annotation process

Chapter	Topic	Paragraph	Word Count
Introduction: Into the Feywild	Adventure Summary	The main antagonists of this story are three hags...	131
		One of the many novelties of this adventure is that...	43
		The characters are drawn into the adventure by one of two adventure hooks. You choose...	31
		Chapter 1 describes the Witchlight Carnival...	40
		...	...
Running the Adventure		The Monster Manual contains stat blocks for most of the creatures encountered in this...	72
		Spells and equipment mentioned in the adventure are described in the Players Handbook...	31

Text segmentation process

Please identify and list all named entities in the following text using the BIO (beginning-inside-outside) scheme:

"The traveling extravaganza known as the Witchlight Carnival visits your world once every eight years. You have a dim memory of sneaking into the carnival as a child without paying... ...pair of elves named Mister Witch and Mister Lightwere decidedly unhelpful."

B-Organization:	Witchlight	Carnival
I-Person:	Mister	Witch
I-Person:	Mister	Light

System prompt, Text to be annotated and result (Bloom, OpenLLaMA)

Using the BIO (beginning-inside-outside) tagging scheme, identify and label named entities in the provided text from D&D adventure books. The entities of interest are Persons (Person), Locations (Location), Organizations (Organization), and Miscellaneous. The text is: "The traveling extravaganza known as the Witchlight Carnival visits your world once every eight years. You have a dim memory of sneaking into the carnival as a child without paying... ...pair of elves named Mister Witch and Mister Light were decidedly unhelpful." Any ambiguities or errors in entity recognition should be removed.

System prompt, Text to be annotated (Dolly)
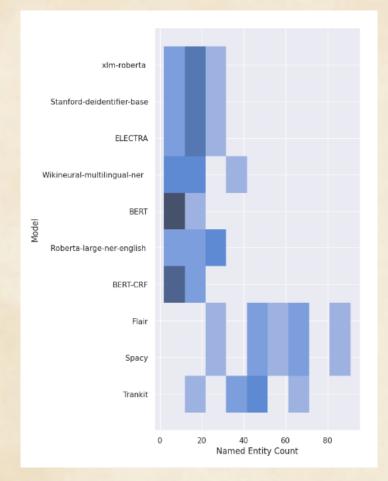
Result Comparison between LLMs

Book	Bloom		Dolly		OpenLLaMA		Total Unique Entities
	Count	Recall	Count	Recall	Count	Recall	
Lost Mine of Phandelver	21	0.47	32	0.73	40	0.91	44
Hoard of the Dragon Queen	58	0.89	62	0.95	60	0.92	65
Rise of Tiamat	54	0.88	57	0.93	53	0.87	61
Curse Of Strahd	92	0.90	96	0.94	101	0.99	102
Tomb of Annihilation	101	0.80	99	0.79	112	0.89	126
Candle keep Mysteries	60	0.87	61	0.88	64	0.93	69
The Wild Beyond Witch Light	66	0.84	67	0.85	71	0.89	79

Results
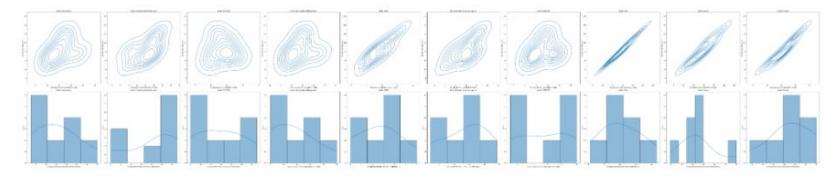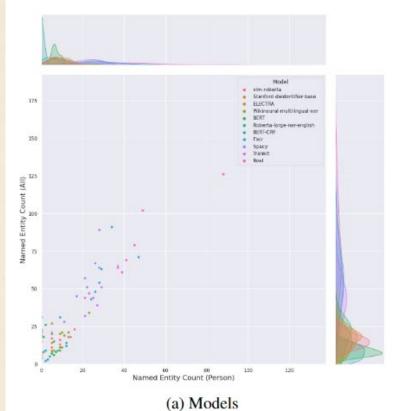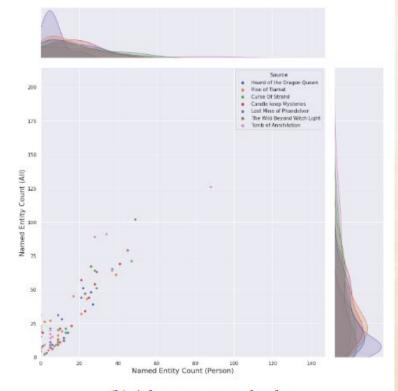
Figure 4: Distribution plot for each model

(a) Models
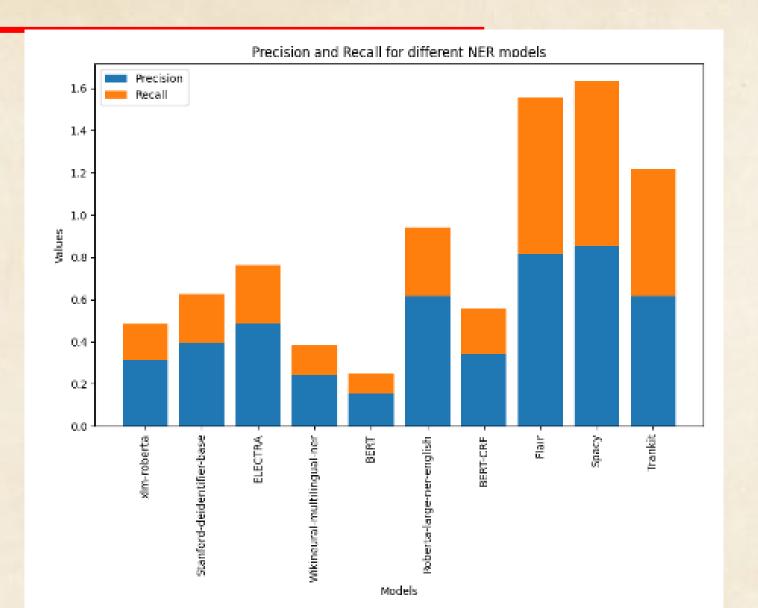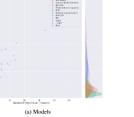
(b) Adventure sourcebooks.

Results

Precision and Recall for different NER models

[42] Weerasundara, G., & de Silva, N. (2023). Comparative analysis of named entity recognition in the dungeons and dragons domain. arXiv preprint arXiv:2309.17171..

Phase 2:

A Multi-Stage Approach to Image Consistency in Zero-Shot Character Art Generation for the D&D Domain

Literature: Generative AI & LLMs

- LLMs (Bloom, Dolly, OpenLLaMA etc.)
- Diffusion models (Stable diffusion [43], DALL-E etc [44])
- Multi-agent LLM Orchestration (Autogen [45], MetaGPT [46] etc)

[43] Rombach, R., Blattmann, A., Lorenz, D., Esser, P., and Om- mer, B. (2022). High-resolution image synthesis with la- tent diffusion models. In Proceedings of the IEEE/CVF conference on computer vision and pattern recognition, pages 10684–10695
[44] Betker, J., Goh, G., Jing, L., Brooks, T., Wang, J., Li, L., ... & Ramesh, A. (2023). Improving image generation with better captions. Computer Science. https://cdn. openai. com/papers/dall-e-3. pdf, 2(3), 8.
[45] Q. Wu, G. Bansal, J. Zhang, Y. Wu, S. Zhang, E. Zhu, B. Li, L. Jiang, X. Zhang, and C. Wang, "Autogen: Enabling next-gen llm applications via multi-agent conversation framework," arXiv preprint arXiv:2308.08155, 2023.
[46] Hong, S., Zheng, X., Chen, J., Cheng, Y., Wang, J., Zhang, C., ... & Wu, C. (2023). Metagpt: Meta programming for multi-agent collaborative framework. arXiv preprint arXiv:2308.00352.

Literature: Stable Diffusion

Art generated by Stable diffusion

Experiment: Applying style to images

portrait (painting) of tabaxi, de Rivia closeup, suit, collar, formal attire, D&D, fantasy, intricate, elegant, highly detailed, artstation, concept art, matte, sharp focus, (brush strokes), (oil on canvas), hearthstone, art by Titian and Greg Rutkowski and Rembrandt van Rijn and Alphonse Mucha

No style transfer

With style transfer

Experiment: Iterative changes

Image of a dragon, concept art, matte painting, HQ, 4k (Stable diffusion)

make only the dragon red (InstructPix2Pix [36])

dragon is inside a cave

cave is a crystal cave
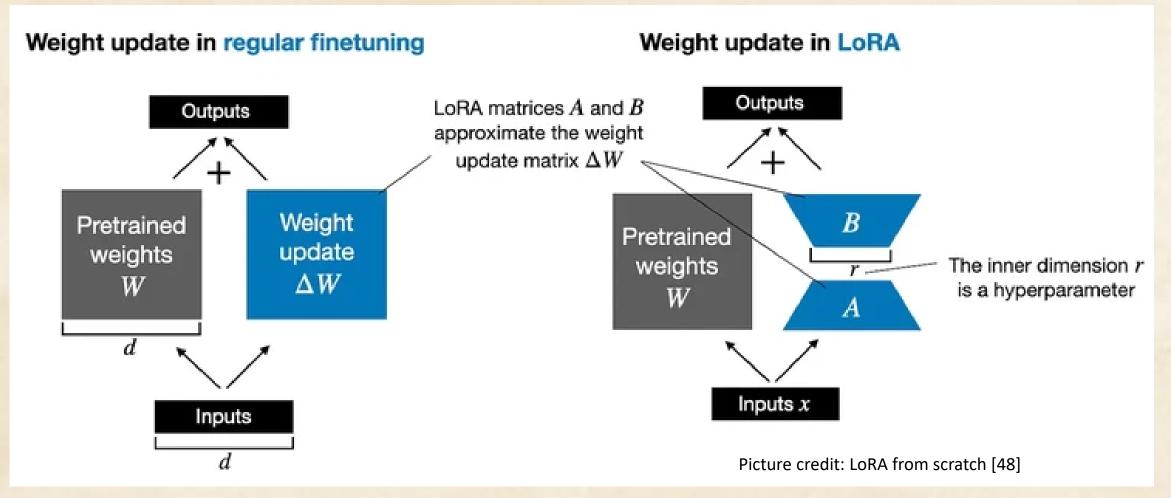
make only the dragon red

[47] T. Brooks, A. Holynski, and A. A. Efros, "Instructpix2pix: Learning to follow image editing instructions," arXiv preprint arXiv:2211.09800, 2022. 97

Image Generation Pipeline

Literature : Low Rank Aduptation (LoRA)

Picture credit: LoRA from scratch [48]

[48] Aisuko (2024) Lora from scratch, Kaggle. Available at: https://www.kaggle.com/code/aisuko/lora-from-scratch (Accessed: 10 June 2024).
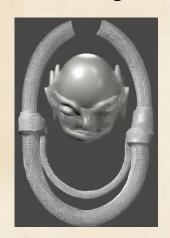
Experiment: Training a General Art Style
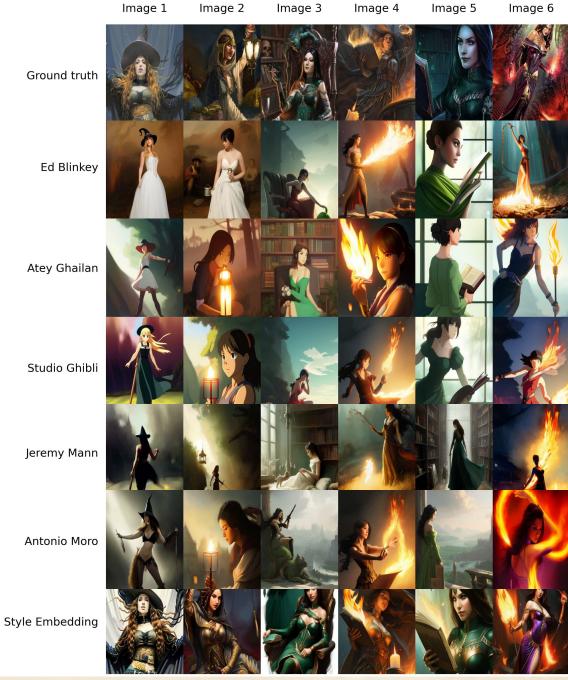
Elf in a general built model
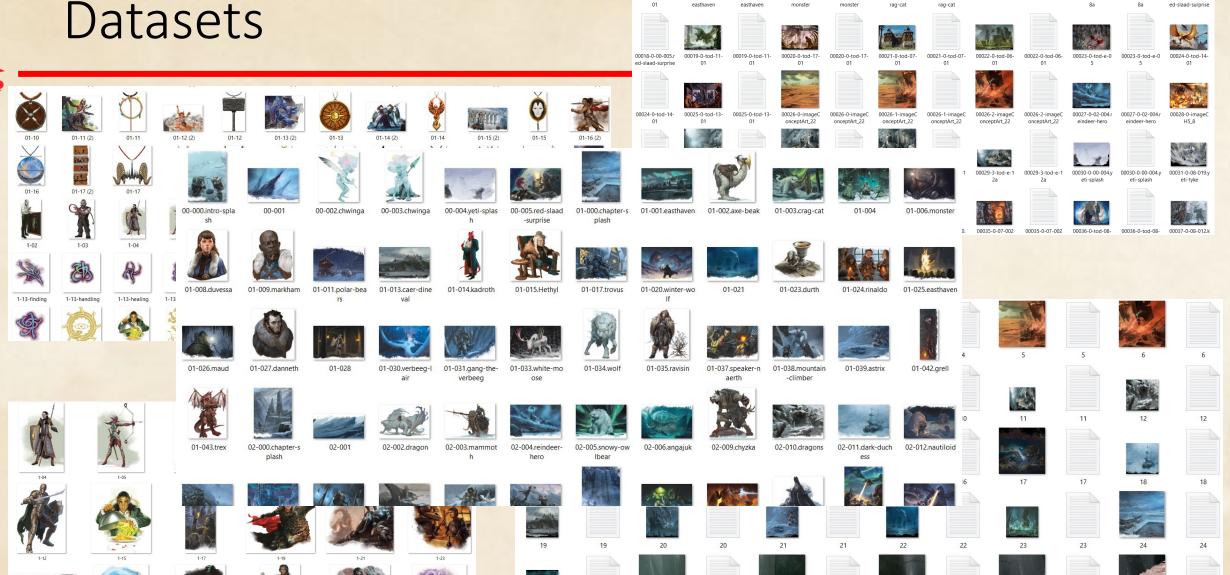
Elf in a style embedded model

	Image 1	Image 2	Image 3	Image 4	Image 5	Image 6
Ground truth						
Ed Blinkey						
Atey Ghailan						
Studio Ghibli						
Jeremy Mann						
Antonio Moro						
Style Embedding						

Datasets
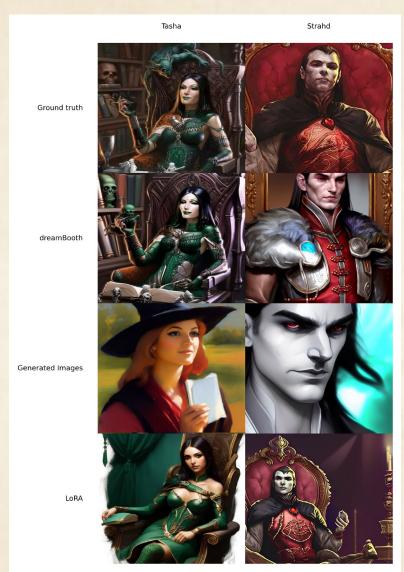
Experiment: Training a Specific Character Generation
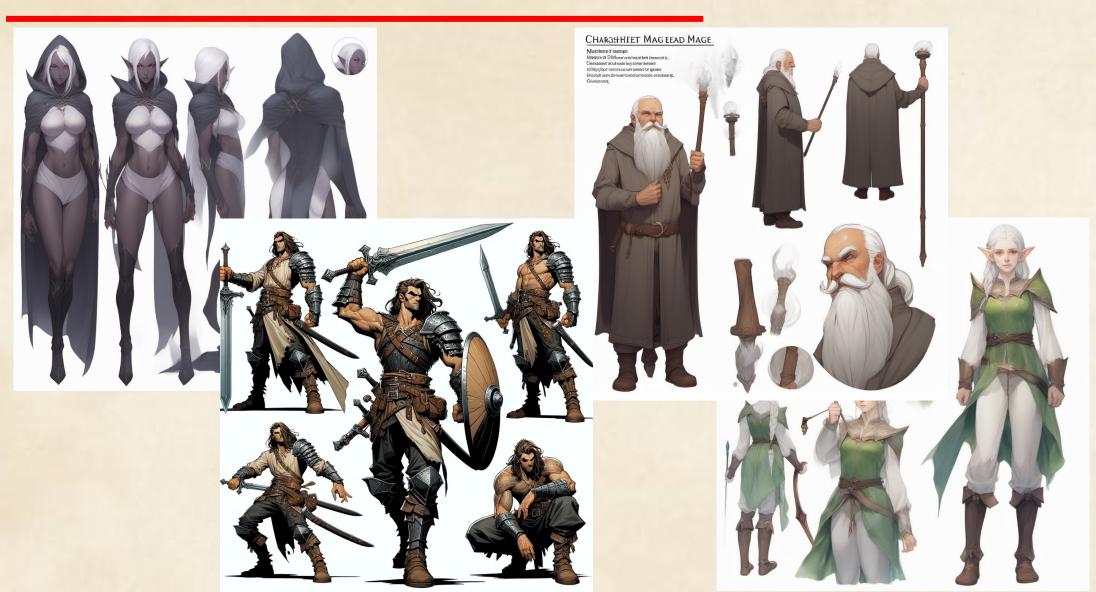
Dreambooth	LORA
Greater in Size	Minute in Size
More VRAM/ resources	Less VRAM/ resources
Need much less data but more dependent on dataset quality	Can supplement dataset quality with relevant text/ descriptions but need more data

Experiment: Character Sheet Generation

Datasets

Literature: Controlnet

(a) Stable Diffusion (b) ControlNet

[49] Zhang, L., Rao, A., & Agrawala, M. (2023). Adding conditional control to text-to-image diffusion models. In Proceedings of the IEEE/CVF International Conference on Computer Vision (pp. 3836-3847).

Literature: Controlnet

Experiment: Pose Sheets
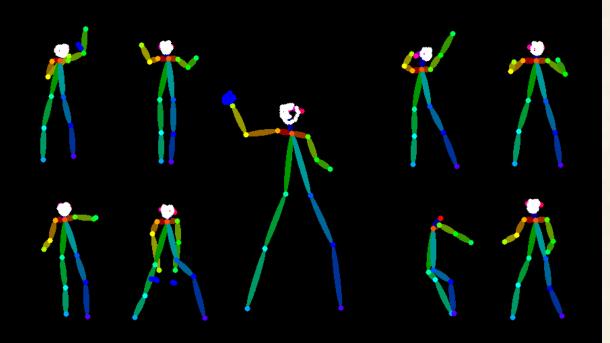
Experiment: Control Output

Literature : YOLO

[50] Hussain, M. (2023). YOLO-v1 to YOLO-v8, the rise of YOLO and its complementary nature toward digital manufacturing and industrial defect detection. Machines, 11(7), 677.
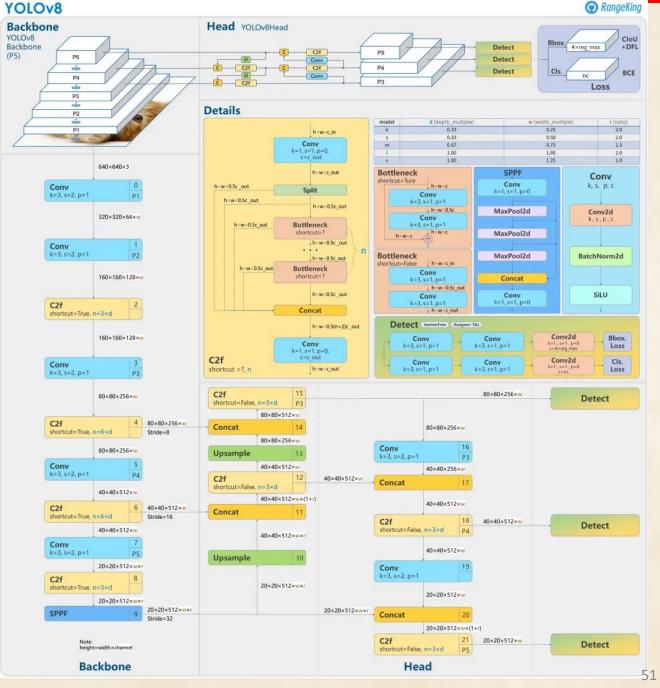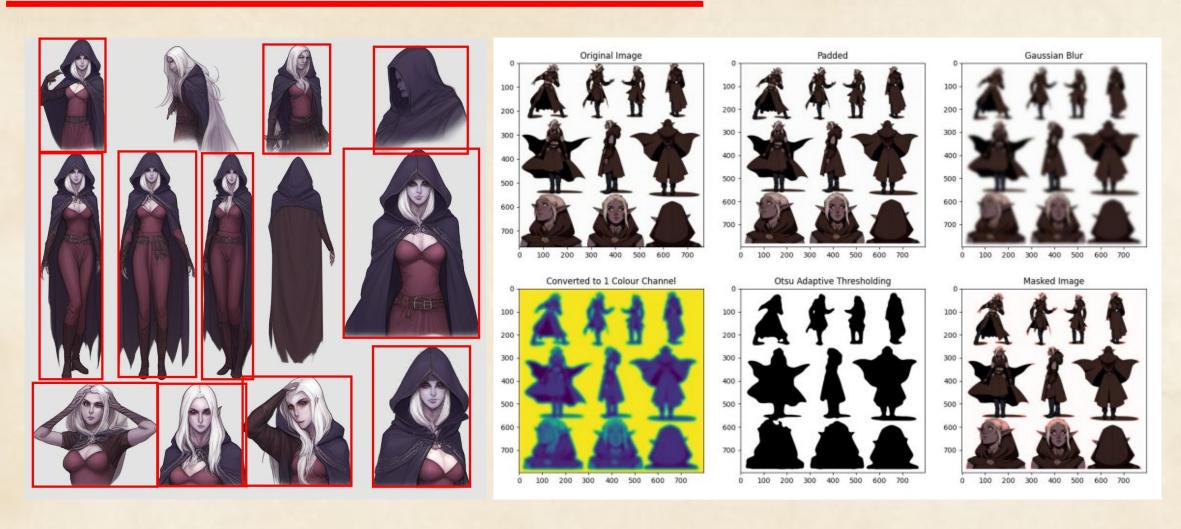
Experiment: Separation and Training for Specific Character

Experiment: Clustering

- DINOv2 (feature extractor) [51]
- K-MEANS++ (clustering method) [52]

[51] Oquab, M., Darcet, T., Moutakanni, T., Vo, H., Szafraniec, M., Khalidov, V., ... & Bojanowski, P. (2023). Dinov2: Learning robust visual features without supervision. arXiv preprint arXiv:2304.07193.
[52] Kapoor, A., & Singhal, A. (2017, February). A comparative study of K-Means, K-Means++ and Fuzzy C-Means clustering algorithms. In 2017 3rd international conference on computational intelligence & communication technology (CICT) (pp. 1-6). IEEE.

Workflow

Literature: LLaVA

Results

	Image to Image	InstructPix2Pix	Proposed Method
LLaVA (Liu et al., 2023)	6.4	7.5	8.3
FID (Heusel et al., 2017)	51.7	38.9	13.2

Clustered SSIM Comparison

On a scale of 1 to 10, how similar do you find the generated images in terms of style and quality to official D&D images?

291 responses

How similar do you think each image to each other

291 responses

Specifications

Parameter	Pre-trained Character LoRA	Zero-Shot Character LoRA	D&D Style LoRA	Character-sheet LoRA
Number of Images	40 - 60	4 - 12	676	488
Repeats	10 - 15	20 - 40	2	4
Epochs	15 - 25	20 - 30	12	15
Precision	bf16	bf16	bf16	bf16
Learning Rate	0.0001	0.0001	0.0003	0.0002
Warmup	0	0	0 - 5%	0 - 5%
Resolution	1024x1024	1024x1024	1024x1024	1024x1024
Optimizer	Adafactor	Adafactor	Adafactor	Adafactor
Batch Size	2 - 4	1	4	4
Gradient Checkpointing	True	True	True	True
Xformers	False	False	False	False

Table 1: Training configurations for LoRA models trained for the proposed pipeline

Component	Specification
GPU	Nvidia RTX 4090
VRAM	24GB
RAM	61GB
CPU	16vCPU

International Conference on Agents and Artificial Intelligence (ICCART) 2023

Figure 8: Architecture of the pipeline used for the system

runpod.io[3] using the Kohya ss GUI[4]. The parameters were fine-tuned, and multiple iterations were conducted to optimize the performance of the Stable Diffusion (SD) model and the LORA model.
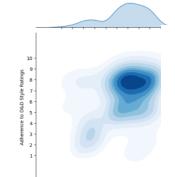
5 RESULTS

The results of our experiments were promising, showcasing the capability of our methodology in generating high-fidelity and consistent character images. The generated images exhibited remarkable consistency in style, pose accuracy, and visual quality, adhering to the predefined artistic style of the D&D universe.

To validate the effectiveness of our approach, we conducted a comparative study against established benchmarks, focusing on the structural similarity index measure (SSIM) (Zermani et al., 2021). SSIM is a widely recognized metric for comparing the similarity between two images, providing insights into perceptual changes between the generated images and the ground truth.

Figure 9 presents the average SSIM comparison between the official images, baseline generations, and the images generated using the trained model per each category of images which indicates a greater consistency between official art with trained models compared to base models.

In our study, we evaluated the consistency and D&D style adherence of generated images through an

on a scale of 1 to 10.

Figure 10: Density Distribution of Feedback Images

Figure 10 density plot synthesizes The x-axis shows character consistency, the y-axis indicates style adherence. ... eas represent a higher consensus amo ... The results demonstrate that our me produces images that are both consis depiction and faithful to the D&D sty by the concentration of responses in th of the plot.

The plot reveals a notable cluster in the high-density regions, suggest agreement among participants. The a significant trend wherein our imag proach has successfully maintained consistency in character portrayal a

Abstract: In the evolving landscape of computer graphics, the pursuit o compelling challenge. This paper delineates a comprehensive r the Stable Diffusion (SD) model, an adept open-source image g fidelity imagery. Beginning with the training of a generalized game Dungeons and Dragons, our research journeyed through sp exhaustive character sheets, culminating in the generation of con

1 INTRODUCTION

The computer graphics field has recently transformed with new image generation techniques, emphasizing realism and consistency, crucial in gaming, animation, and virtual reality. This is particularly relevant for the Dungeons & Dragons (D&D) universe, where consistent, high-fidelity character images are vital to maintaining its authentic high-fantasy (Peiris and de Silva, 2022) atmosphere. However, most recent studies (Peiris and de Silva, 2023; Weerasundara and de Silva, 2023) focused on natural language processing aspects of the game rather than image generation. Recent strides in diffusion models, especially the Stable Diffusion (SD) model (Rombach et al., 2022), noted for producing quality images consistently (Ho et al., 2020), have not been fully explored in D&D character generation.

Our paper explores using the SD model to create consistent, high-quality D&D character images. We discuss training a generalized art style, transitioning to character generation, and producing character sheets and consistent poses. Our approach combines recent research with the SD model's capabilities, aiming to advance computer graphics applications, particularly in the D&D realm. We detail our methodology, compare it with existing techniques, and analyze our results. Our goal is to present a new approach to computer graphics, focusing on the D&D universe.

a https://orcid.org/0000-0003-1419-8938
b https://orcid.org/0000-0002-5361-4810

2 RELATED WORK

In the evolv story visual notable con et al. (2022 transformers story contin as PororoSV et al., 2018) 2017), achie tion.

Jeong et creating stor Rahman et a ally consiste et al. (2022) tent diffusio into the reas ers. The wo resolution in Liang et al. image synth

Other stu ing Mahara sistency in v ration of tex (2018)'s dev thesis mode foundation of our research, influencing our approach and objectives in text-to-image synthesis and story visualization.

Figure 4: Character sheets generated using the trained LORA

deavours. It juxtaposes the images generated using LoRA, DreamBooth, and the base model against the official character art of Tasha and Strahd. The results were illuminating. The LoRA model, in particular, stood out for its exceptional capability.

3.3 Character Sheet Generation

Leveraging a generated character image, our objective was to create a comprehensive character sheet using a specialized LORA and a ControlNet (Zhang and Agrawala, 2023).

3.3.1 ControlNet

We selected controlnet-openpose-sdxl-1.0[1] due to its bias towards generating full-body images. First, we generated an image of a character and then keeping the seed value, prompt, scale and negative embedding consistent, we provided a reference pose sheet to the ControlNet. The system then extrapolated this image, generating a detailed character sheet inclusive of different poses and variations.

Figure 3 shows character sheets generated using ControlNet. Generated images consist of specific characters in various poses in a blank background. The first image shows a sample reference sheet.

3.3.2 Training a LORA

While ControlNet allows the generation of character sheets, it is not consistent. In a random generation, it is possible to get distorted images very easily. To make the generation more consistent, we need to embed the concept of a character sheet into the generated images. For that, we used a LORA model. To train a LORA, we need to create a labelled dataset of reference images. We used web scraping on Google images with keywords such as Character sheet and reference sheet and manually filtered undesired images. Resultant images were captioned with WD14[2] tagger to get preliminary labels. Next tags which are common to most of the images such as white background, Character sheet, reference sheet, turnover are removed while adding a common unique identifier as a trigger word. Finally, a LORA for that specific character can be trained on the labelled image dataset. Results for character sheet LORA can be seen in Figure 4.

3.4 Separation and Training for Specific Character

Upon obtaining the character sheet, our focus shifted towards extracting undistorted and apt images that

[53] Weerasundara, G., & de Silva, N. (2024, January). A Multi-Stage Approach to Image Consistency in Zero-Shot Character Art Generation for the D&D Domain. In ICAART (3) (pp. 235-242).
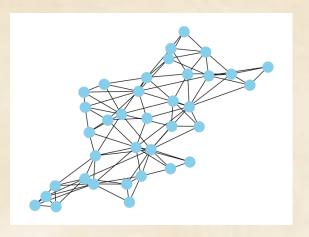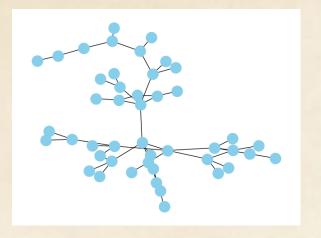
Phase 3:
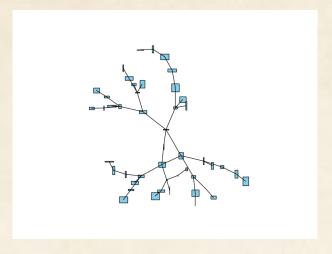
Map Generation
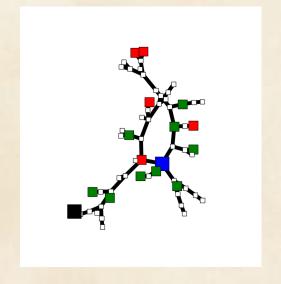
Experiment: Force Directed Graph Drawing
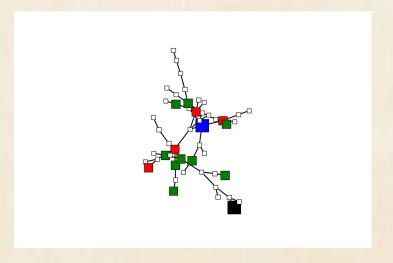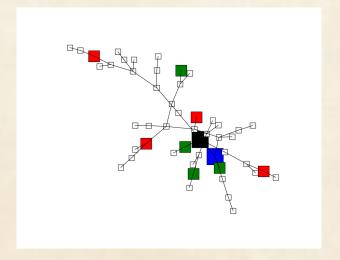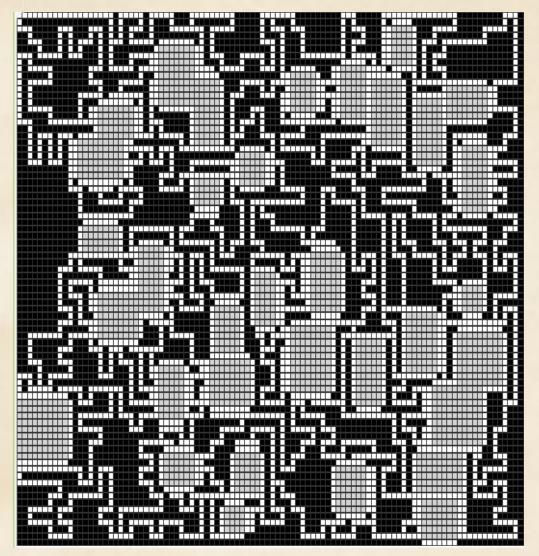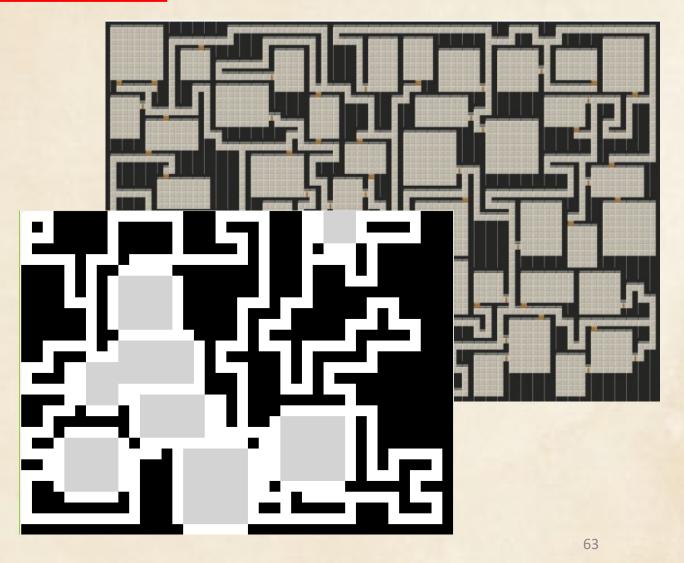
Experiment: Wave Function Colapse
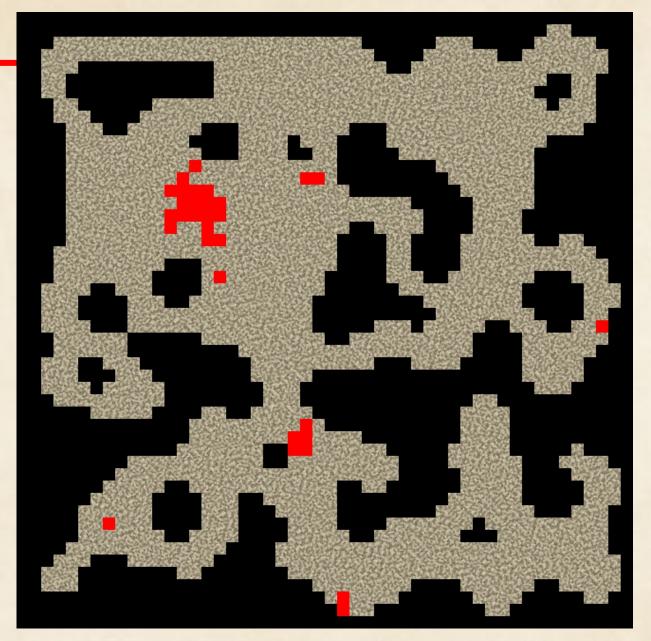
Experiment: Consistent Dungeon Generation
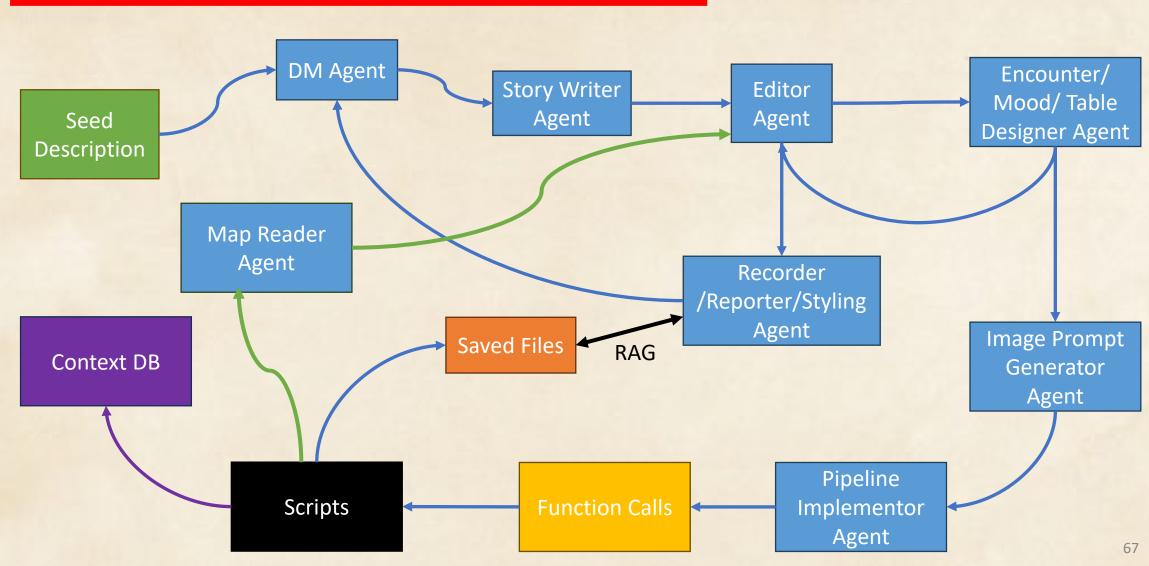
Phase 4:

Multi Agent Workflow for Adventure Generation

(This is beyond the initial scope)

Multi Agent Workflow

Agents
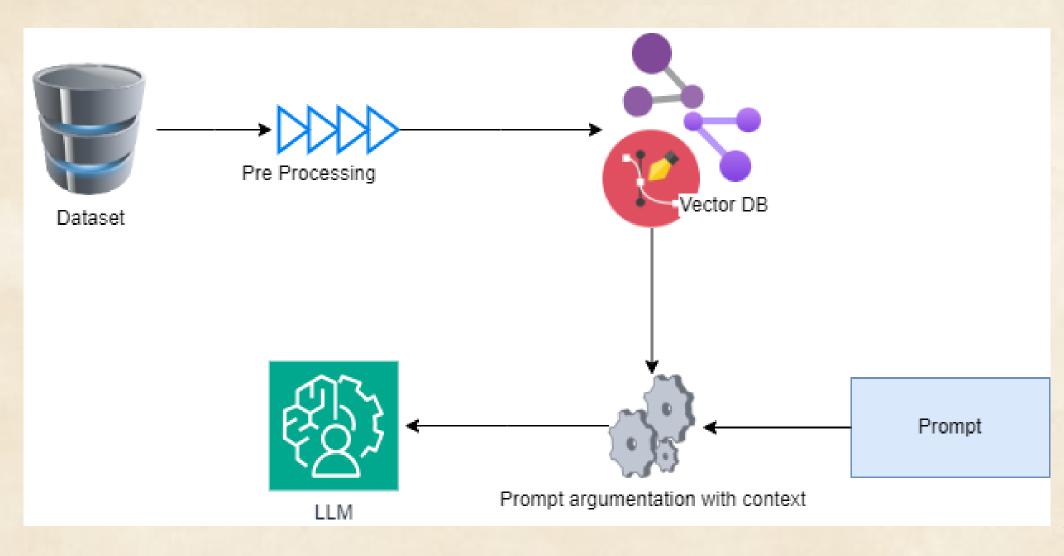
Agent	Role	Access
Dungeon Master Agent	This agent is tasked with crafting immersive quests, integrating storylines, NPCs, and encounters. It serves as the central coordinator, aligning the contributions of other agents with the overarching narrative. Cordinate content creation agents with formatting agents such as Table Designer Agent, Stylize Agent and Mood Planner Agent	Chat history, Agent Control
Story Writer Agent	This agent is tasked with writing the overall story. This agent gets feedback from the Dm agent, editor agent and reporter agent.	Chat history
NPC Designer Agent	Responsible for creating compelling NPCs, this agent builds characters that add depth and complexity to the campaign, ensuring they fit seamlessly into the storyline.	Chat history
Encounter Designer Agent	Specializes in designing detailed combat scenarios, contributing to the dynamic and challenging aspects of the adventure.	Chat history
Table Designer Agent	Identifies what type of table is needed for a given situation, for example an encounter table, a loot table, a stat block or any other, and create corresponding tags to generate a table based on markdown syntax	Chat history

Agent	Role	Access
Mood Planner Agent	This agent work on visual aids, settings, and atmosphere, enhancing the overall mood and tone of the campaign. This agent identifies which areas need visual aid and describe what type of visual aid is needed. For example, if an image is needed in a certain place or a table is needed. It gives a description of the mood and surrounding for important places that require visual aids.	Chat history
Recorder Agent	Save content created by different agents as appropriate .txt, .csv files	Chat history, Function Calls, Write access
Reporter Agent	Tasked with tracking and summarizing the campaign's progress, ensuring coherence and continuity in the narrative and keeping track of special annotations done by formatting agents.	Chat history, RAG Access, Function Calls
Editor Agent	Ask agents to modify or improve their content, stop the conversation or breakaway from a conversation loop	Chat history
Stylize Agent	Add styling to different content created by agents	Chat history
Image prompt generator Agent	Generate tag based prompts for an image for a given situation	Chat history
Pipeline implementing Agent	Use generated image prompts to generate images through running required python script with given arguments	Chat history, Function Calls, File Execution

Literature: Retrieval augmented generation (RAG)
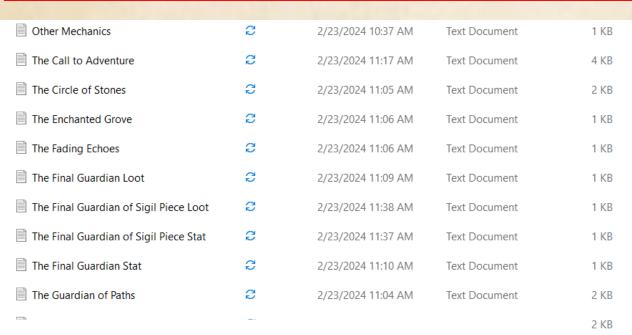
Tables

File	Content Type	Description
npc.csv	Non-Player Characters	Contains detailed information about NPCs including names, backstories, roles in the campaign, and other characteristics.
mood.csv	Campaign Mood Settings	Lists various mood settings and atmospheres for different parts of the campaign, helping to set the tone and feel for each scene.
encounter.csv	Encounter Details	Provides specifics of encounters including type, difficulty, location, and involved NPCs or monsters.
lootTable.csv	Loot Tables	Details the loot available in various encounters or locations, including items, rarity, and any special attributes.
encounterTable.csv	Encounter Structuring Elements	Structuring elements for encounters, detailing the sequence and interaction of events within an encounter.
interactionTable.csv	Interaction Framework	Outlines the framework for NPC and player interactions, setting guidelines for dialogue and engagement.

Styling

Other Mechanics	⟳	2/23/2024 10:37 AM	Text Document	1 KB
The Call to Adventure	⟳	2/23/2024 11:17 AM	Text Document	4 KB
The Circle of Stones	⟳	2/23/2024 11:05 AM	Text Document	2 KB
The Enchanted Grove	⟳	2/23/2024 11:06 AM	Text Document	1 KB
The Fading Echoes	⟳	2/23/2024 11:06 AM	Text Document	1 KB
The Final Guardian Loot	⟳	2/23/2024 11:09 AM	Text Document	1 KB
The Final Guardian of Sigil Piece Loot	⟳	2/23/2024 11:38 AM	Text Document	1 KB
The Final Guardian of Sigil Piece Stat	⟳	2/23/2024 11:37 AM	Text Document	1 KB
The Final Guardian Stat	⟳	2/23/2024 11:10 AM	Text Document	1 KB
The Guardian of Paths	⟳	2/23/2024 11:04 AM	Text Document	2 KB

Rule	Annotation	Format
Main title	_M	[content]_M
Heading	_H	[content]_H
Table	_T	[content]_T
Stat block	_S	[content]_S
General text content	_G	[content]_G
List	_	_[content]
File	@	@[path]_[Heading]_[Content type]_[file type]

The Summoning_T
@./The Summoning.png_I_png
The adventure kicks off when the players are summoned by Archmage Eldrin, a respected and powerful wiz[   ]reassembly of the Sigil. The Archmage explains the dire situation—that the balance of the world is at risk due to the Sigil's destr[   ]ent a cataclysmic event. Eldrin provides the players with their first clue, pointing them towards the ancient ruins hidden deep within[   ]ce of the Sigil./n

Eldritch Forest_T
The journey to the ruins is not straightforward. The Eldritch Forest is a living, breathing entity fil[   ]n and malevolent. Players will have to navigate through the forest's deceptive paths, facing challenges that test their survival skil[   ]troduces the players to the mystical side of Eirandel, as they encounter spirits, ancient guardians, and possibly even the forest'[   ]er their progress./n

@./The Whispering Glade.txt_The Whispering Glade_T_txt
@./The Guardian of Paths.txt_The Guardian of Paths_T_txt
@./The Mirror Lake.txt_The Mirror Lake_T_txt
@./The Circle of Stones.txt_The Circle of Stones_T_txt
@./The Enchanted Grove.txt_The Enchanted Grove_T_txt
@./The Fading Echoes.txt_The Fading Echoes_T_txt
@./The Final Guardian.txt_The Final Guardian: The Entwined Serpent_G_txt
@./The Final Guardian Stat.txt_The Final Guardian: The Entwined Serpent Stat Block_S_txt
@./The Final Guardian Loot.txt_The Final Guardian Loot Table_T_txt

The Ancient Ruins_T
Upon reaching the ruins, the players must breach its defenses, which include not only physical barrier[   ]geon crawl segment of Act 1, filled with traps, puzzles, and enemies that guard the Sigil piece. This segment is designed to challe[   ]bilities, encouraging them to explore their characters' capabilities and how they can synergize as a group./n

The First Piece and Return_T
The climax of Act 1 occurs when the players face the final guardian of the Sigil piece. This encounter[   ]he players on everything they have learned so far about combat in Eirandel. Upon securing the Sigil piece, the players must make their wa[   ]eroes. However, the return is also a moment of realization that their journey is only just beginning. Archmage Eldrin, upon seeing the first piece recovered, reiterates the importance of their quest and hints at the dangers and wonders that await them as they seek out the remaining pieces./n

@./The Final Guardian of Sigil Piece Stat.txt_The Final Guardian of Sigil Piece Stat Block_S_txt
@./The Final Guardian of Sigil Piece Loot.txt_The Final Guardian of Sigil Piece Loot Table_T_txt

Act 1 Objectives_T
_Introduce players to the world of Eirandel and the main quest.
_Foster team cohesion and allow players to explore their characters' abilities.
_Challenge players with a mix of combat, exploration, and puzzle-solving.
 Set the tone for the adventure, highlighting the significance of their mission and the mix of dark and light elements they will encounter.

THE SUMMONING

The adventure kicks off when the players are summoned by Archmage Eldrin, a respected and powerful wizard who has taken a keen interest in the prophesied reassembly of the Sigil. The Archmage explains the dire situation—that the balance of the world is at risk due to the Sigil's destruction and that its pieces must be recovered to prevent a cataclysmic event. Eldrin provides the players with their first clue,

The Summoning_T
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Eldritch Forest_T
The journey to the ruins is not straightforward. The Eldritch Forest is a living, breathing entity fil[led with creatures both beni]gn and malevolent. Players will have to navigate through the forest's deceptive paths, facing challenges that test their survival skil[ls. This part of the adventure in]troduces the players to the mystical side of Eirandel, as they encounter spirits, ancient guardians, and possibly even the forest'[s own attempts to hind]er their progress./n

@./The Whispering Glade.txt_The Whispering Glade_T_txt
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@./The Mirror Lake.txt_The Mirror Lake_T_txt
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@./The Fading Echoes.txt_The Fading Echoes_T_txt
@./The Final Guardian.txt_The Final Guardian: The Entwined Serpent_G_txt
@./The Final Guardian Stat.txt_The Final Guardian: The Entwined Serpent Stat Block_S_txt
@./The Final Guardian Loot.txt_The Final Guardian Loot Table_T_txt

The Ancient Ruins_T
Upon reaching the ruins, the players must breach its defenses, which include not only physical barrier[s but also magical ones. This is the dun]geon crawl segment of Act 1, filled with traps, puzzles, and enemies that guard the Sigil piece. This segment is designed to challe[nge the players' problem-solving a]bilities, encouraging them to explore their characters' capabilities and how they can synergize as a group./n

The First Piece and Return_T
The climax of Act 1 occurs when the players face the final guardian of the Sigil piece. This encounter [will test t]he players on everything they have learned so far about combat in Eirandel. Upon securing the Sigil piece, the players must make their wa[y back to Eldrin as h]eroes. However, the return is also a moment of realization that their journey is only just beginning. Archmage Eldrin, upon seeing the fi[rst piece recovered, reiterates the importance of their quest and hints at the dangers and wonders that await them as they seek out the remaining pieces./n

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@./The Final Guardian of Sigil Piece Loot.txt_The Final Guardian of Sigil Piece Loot Table_T_txt

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THE WHISPERING GLADE

Check	Result	Effect
Intelligence (Nature) DC 10	Basic guidance - A general direction to proceed that avoids natural hazards.	Avoid minor natural hazards like quicksand or thorny thickets.
Intelligence (Nature) DC 15	Detailed guidance - Identifies a safe path and hints at a nearby hidden cache of supplies or a natural remedy.	Discover a cache with a healing potion or herbs that can be used to craft a potion.
Wisdom (Perception) DC 12	Sense of unease - Detects a malevolent presence or a natural hazard nearby.	Advantage on the next saving throw against a natural hazard encountered within the forest.
Wisdom (Perception) DC 18	"Clear warning - Identifies the source of danger, allowing the party to prepare or avoid it."	"Gain a temporary +1 bonus to AC for the next encounter within the forest, as the party is prepared for the danger."
Charisma (Persuasion) DC 10 (to the forest spirits)	Temporary alliance - A forest spirit appears and offers to guide the party through a small part of the forest.	"The guide ensures safe passage, reducing travel time by half for a certain distance."
Charisma (Persuasion) DC 15 (to the forest spirits)	Insightful revelation - A forest spirit reveals a significant shortcut or the location of a beneficial magical anomaly.	"Party gains a one-time use of a spell-like effect (e.g., Pass without Trace) without expending a spell slot."

THE GUARDIAN OF PATHS

Challenge	Result	Effect
"Present a token of nature's beauty (e.g., a rare flower or a beautifully crafted wooden item)."	Thalor allows safe passage and blesses the party with a hint of nature's favor.	Party members receive a temporary boon such as advantage on saving throws against natural hazards for the next 24 hours.
Plant a new tree or restore a damaged area of the forest.	"The party's actions heal a small part of the forest, earning Thalor's respect and a safe passage."	The restored area contains a natural remedy or herb that can be used in potion making.
Share a story or song that celebrates the spirit of nature.	"The shared story or song pleases Thalor, who offers wisdom about the forest or a clue to the ruins."	Thalor's wisdom grants the party an insight into avoiding or dealing with a specific upcoming challenge.
"Engage in combat to prove strength and resolve (non-lethal, respect for nature's balance)."	"Demonstrating strength and respect for nature convinces Thalor of the party's worth, granting passage."	"Thalor gifts the party a token of nature's strength, which can be used to summon a minor nature ally in a future encounter."
Solve Thalor's riddle about the forest and its inhabitants.	Correctly solving the riddle reveals a secret path or a hidden cache of supplies.	Discovering the secret path or cache shortens the journey or equips the party with useful supplies.

Outcome

The Enchanted Grove

Action	Result	Effect
Identify and neutralize the source of the poison.	"The grove begins to heal immediately, rewarding the party with the growth of rare herbs."	Party can harvest herbs for potent healing potions or to sell for a high price.
Use magic to cleanse the area of its corruption.	"The magical cleansing purifies the grove, and the party is blessed with a protective aura."	Each party member gains resistance to a type of damage for 24 hours.
Convince local wildlife to assist in the grove's restoration.	"The animals help spread the cure through the grove, revealing a hidden path or treasure."	Discover a shortcut that saves time or a treasure chest with magical items.
Offer a significant personal sacrifice to the spirits of the grove for its healing.	"The spirits accept the sacrifice, fully restoring the grove and granting the party a boon."	Receive a significant magical item or a permanent increase to an ability score.

The Fading Echoes

Action	Result	Effect
Listen and interpret the echoes to learn from the past.	The echoes reveal a secret about the forest or the ruins that aids the party.	Gain insight into solving a puzzle or avoiding a dangerous encounter.
Perform a ritual to honor the guardians and their sacrifices.	"The ritual strengthens the party's bond with the forest, granting a	Boon could be a temporary increase to hit points or advantage on skill checks.

The Final Guardian: The Entwined Serpent Stat Block

Attribute	Value
AC (Armor Class)	18
Hit Points	150
Speed	"30 ft., swim 60 ft."
STR (Strength)	18 (+4)
DEX (Dexterity)	15 (+2)
CON (Constitution)	17 (+3)

providing Dungeon Masters with the necessary information to bring these elements to life.

High Priestess Vara

- AC: 12 (15 with Mage Armor)
- Hit Points: 98

THE SHATTERED SIGIL

growth and discovery. As the adventurers venture forth, they will find themselves tested not just by their enemies, but by the very land they seek to save. They will have to forge alliances with unlikely allies, from reclusive mages to ancient spirits of the forest, and confront their deepest fears and desires. The path to reassembling the Sigil is fraught with challenges that will require not only strength and courage but wisdom and sacrifice. The fate of Eirandel hangs in the balance, and the heroes stand at the center of this cosmic struggle, their actions echoing through the annals of time, shaping the future of this enchanted realm.

How to Run the Adventure

The Shattered Sigil Adventure: Overview

"The Shattered Sigil" is an epic adventure set in the [mystic]al lands of Eirandel, where the fabric of reality [is] interwoven with the arcane and the d[...] [...]rich in history and magic, faces an [unprec]edented threat that could unravel its v[ery] [...]ce. The Sigil of Creation, an ancient a[nd] [...]se power, once kept the forces of cha[os] [...] balance. However, it has been shatte[red] [...]scattered across the land, each hidde[n] [...]d by forces both natural and supernat[ural]

The Void Cult's Final Stand Table

As the adventurers approach the climax of their quest to reform the Sigil of Creation, the Void Cult, led by the enigmatic High Priestess Vara, makes a desperate and formidable stand to thwart their efforts. This guide will help you, the Dungeon Master (DM), to create an epic and memorable confrontation that challenges your players both tactically and narratively.

The final stand occurs as the adventurers navigate the Dimensional Pathway to the Altar of Creation, a realm where the fabric of reality is thin, and magic is potent. This battleground should feel surreal and unstable, with the cult's dark magic causing the environment to shift unpredictably.

Cult Forces:

- High Priestess Vara: A powerful spellcaster and the cult leader. Her abilities should challenge the party's strengths and exploit their weaknesses.
- Void Cultists: A mix of melee fighters, spellcasters, and assassins. They are fanatically loyal and willing to sacrifice themselves for their cause.
- Dark Entities: Summoned creatures or constructs bound by the cult's magic, adding a wild card element to the battle./n

Encounter Design:

High Priestess Vara Stat Block

Attribute	Value
AC (Armor Class)	17 (mage armor)
Hit Points	142
Speed	30 ft.
STR (Strength)	10 (+0)

Outcome

THE MARKET SQUARE

The heart of Stonebridge, filled with various stalls selling food, clothing, tools, and trinkets. The square also serves as a place for villagers to gather and share news.

THE VILLAGE SHRINE
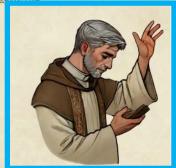
A small shrine dedicated to the gods of protection and harvest. It is tended by Father Eamon, a kind-hearted priest.

- Old Maud: An elderly woman who claims to have seen spirits near Blackstone Keep.
- Father Eamon: A gentle priest who provides healing and spiritual guidance to the villagers.

HILDA THORNBREW
NATURALCRIT

FATHER EAMON
NATURALCRIT

VILLAGE RUMORS AND QUESTS

Upon arrival, the adventurers can gather information by interacting with villagers. Use the following table to determine what rumors they hear:
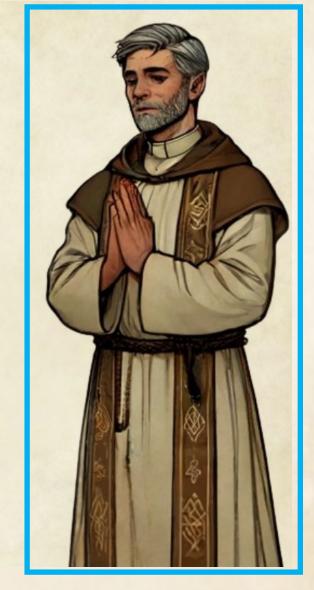
d6	Rumor
1	Basic guidance - A general direction to proceed that avoids natural hazards.
2	Detailed guidance - Identifies a safe path and hints at a nearby hidden cache of supplies or a natural remedy.
3	Sense of unease - Detects a malevolent presence or a natural hazard nearby.
4	"Clear warning - Identifies the source of danger, allowing the party to prepare or avoid it."
5	Temporary alliance - A forest spirit appears and offers to guide the party through a small part of the forest.
6	Insightful revelation - A forest spirit reveals a significant shortcut or the location of a beneficial magical anomaly.

INITIAL ENCOUNTERS

As the heroes explore Stonebridge, they may encounter the following scenarios:

Quest	Setup	Details
The Disappearance	A distressed mother, Eliza, approaches the party, begging for help to find her missing son, Tom.	Tom disappeared while playing near the edge of the forest. The party can investigate the area, finding signs of a struggle and strange tracks leading into the vale.
The Desecrated Shrine	Father Eamon requests the adventurers' help in cleansing the shrine after it was desecrated.	The party must confront a minor undead threat (such as skeletons or zombies) and perform a ritual to restore the shrine's sanctity.

Outcome

GARRICK, THE GUARD CAPTAIN
NATURALCRIT

- Garrick, the Guard Captain: A stern but fair leader, concerned about the recent events.

THE MARKET SQUARE

The heart of Stonebridge, filled with various stalls selling food, clothing, tools, and trinkets. The square

OLD MAUD
NATURALCRIT

APPENDIX

This appendix provides detailed descriptions for key characters featured in "The Shadows of Blackstone Keep" adventure. These can be used by dungeon masters to enhance the lore.

OLD MAUD

reminder of what was lost to the curse of Blackstone Keep.

Old Maud is a frail yet resilient elderly woman who has lived in Stonebridge for as long as anyone can remember. With her long, gray hair tied back in a loose braid and her deeply wrinkled skin, she looks every bit the part of a village elder. Dressed in simple, tattered clothes, she moves slowly, often leaning on a sturdy wooden staff adorned with charms and trinkets. Despite her age and appearance, Old Maud possesses a sharp

HILDA THORNBREW'S SHOP

Hilda Thornbrew, the friendly and knowledgeable innkeeper of The Black Boar Inn, also runs a small shop within the inn where adventurers can find various supplies, potions, and items to aid them in their quests. Known for her warm hospitality and fair prices, Hilda ensures that every adventurer is well-equipped before they venture into the dangers of Blackstone Vale.

HILDA THORNBREW'S SHOP:

As you enter the cozy common room of The Black Boar Inn, you notice a small corner dedicated to an array of items neatly displayed on wooden shelves. The warm glow of the fireplace illuminates the various potions, weapons, and adventuring gear available for purchase. Hilda Thornbrew, the stout and friendly innkeeper, stands behind the counter, ready to assist you with a welcoming smile.

Item	Description	Price
Healing Potion	Restores 2d4 + 2 hit points when consumed.	50 gp
Antidote	Cures poison and grants advantage on saving throws against poison for 1 hour.	25 gp
Torch	Burns for 1 hour, providing bright	1 cp

FATHER EAMON

Father Eamon is the gentle and kind-hearted priest of Stonebridge, devoted to providing spiritual guidance and solace to the villagers. He is a man of average height with a serene demeanor, short gray hair, and soft, compassionate eyes that seem to reflect the weight of his wisdom. Dressed in simple priestly robes and always carrying a holy symbol around his neck, Father Eamon is often seen tending to the small village shrine, performing blessings, and offering prayers for the well-being of the community. His voice is calm and reassuring, capable of soothing even the most troubled souls. Despite the darkness that has befallen the vale, Father Eamon remains a beacon of hope and faith, tirelessly working to protect and heal those in need. His deep connection to the divine grants him the ability to

Despite his tough exterior, Garrick cares deeply [for the] people and will go to great lengths to protect [the] often coordinating with adventurers to safegua[rd the] village from the encroaching darkness of Black[stone] Vale.

SETTING THE SCENE

- Hilda Thornbrew: A stout and friendly woman with a wealth of local knowledge.

HILDA THORNBREW
NATURALCRIT

THE THRONE ROOM

The final confrontation site, a grand hall with a dilapidated throne at the far end.

KEY FEATURES:

- The Betrayer: The corrupted former ally of Lord Blackstone, now a powerful antagonist.
- Malevolent Spirit: The ultimate foe, whose defeat is necessary to lift the curse.

ENCOUNTERS AND CHALLENGES

The party will face various encounters and challenges as they navigate the vale. Use the following table to determine random encounters:

d6	Encounter
1	A group of animated suits of armor attacks the party.
2	Ghostly figures appear, offering cryptic warnings or attacking if provoked.
3	The party triggers a magical trap, releasing spectral guardians.
4	Cursed books fly off the shelves in the library, casting harmful spells.
5	A shadowy figure ambushes the party, attempting to sow fear and confusion.
6	The Betrayer himself appears, taunting the party and testing their resolve.

NOTABLE QUESTS AND OBJECTIVES

Quest	Objective	Details
Cleanse the Forsaken Chapel	Disrupt the dark rituals and cleanse the chapel of its malevolent influence.	The party must defeat dark druids and purify the ritual altar to weaken the malevolent spirit's power.
Retrieve the Ancient Tome	Find an ancient tome in the Haunted Library that contains the ritual to banish the malevolent spirit.	The party must navigate magical traps and cursed books to retrieve the tome with Eldrin the Sage's assistance.
Confront The Betrayer	Defeat or redeem the Betrayer, who has become a powerful servant of the malevolent spirit.	The party must face the Betrayer in the throne room, making a choice to defeat him in combat or find a way to redeem his corrupted soul.

CONCLUSION OF ACT III

By the end of Act III, the adventurers will have faced their greatest challenges and unraveled the deepest mysteries of Blackstone Keep. Their final victory over the malevolent spirit will lift the curse, restore peace to Blackstone Vale, and solidify their status as true heroes. The adventure concludes with the party emerging from the keep, triumphant and forever changed by their harrowing journey.

FINAL BOSS
The Betrayer

Armor Class 18 (Plate Armor)
Hit Points 150 (20d8+60)
Speed 30ft.

STR	DEX	CON	INT	WIS	CHA
18 (+4)	12 (+1)	16 (+3)	14 (+2)	10 (+0)	16 (+3)

Saving Throws Str +8, Con +7, Wis +4, Cha +7
Skills Athletics +8, Intimidation +7, Perception +4
Damage Resistances necrotic; bludgeoning, piercing, and slashing from nonmagical attacks
Senses darkvision 60 ft., passive Perception 14
Languages Common, Infernal
Challenge 10 (5,900 XP)

Legendary Resistance (3/Day). If the Betrayer fails a saving throw, he can choose to succeed instead.

Dark Aura. A 15-foot radius of darkness surrounds the Betrayer. Creatures that start their turn in this aura take 7 (2d6) necrotic damage.

Magic Resistance. The Betrayer has advantage on saving throws against spells and other magical effects.

ACTIONS

Multiattack. The Betrayer makes three attacks: two with his longsword and one with his necrotic blast.

Longsword. Melee Weapon Attack: +8 to hit, reach 5ft., one target. Hit 10 (1d8 + 4) slashing damage, or 11 (1d10 + 4) slashing damage if used with two hands, plus 7 (2d6) necrotic damage.

Necrotic Blast. Ranged Spell Attack: +7 to hit, range 60 ft., one target. Hit 18 (4d8) necrotic damage.

Frightful Presence. Each creature of the Betrayer's choice within 60 feet of him and aware of him must succeed on a DC 15 Wisdom saving throw or be frightened for 1 minute. A frightened target can repeat the saving throw at the end of each of its turns, with disadvantage if the Betrayer is within line of sight, ending the effect on itself on a success.

LEGENDARY ACTIONS

The Betrayer can take 3 legendary actions, choosing from the options below. Only one legendary action option can be used at a time and only at the end of another creature's turn. The Betrayer regains spent legendary actions at the start of his turn.

Attack. The Betrayer makes a longsword attack.

Move. The Betrayer moves up to his speed without provoking opportunity attacks.

Dark Summon (Costs 3 Actions). The Betrayer summons 1d4 shadowy figures to unoccupied spaces he can see within 30 feet. The summoned shadowy figures act on their own initiative count and disappear after 1 minute.

Pipeline Specifications

- Timing

- Zero shot character generation pipeline (in RTX 4090 | 24GB VRAM)
  - 10-20 minutes per pipeline (generation, processing, segmenting, captioning and clustering) * 6 => 1 to 2 hours
  - 15-30 minutes per LoRA
  - 1-2 seconds for generation

- ~1-4 hours for content generation

- 5-6 minutes for map generation

Conclusion

- **Consistent image generation pipeline**
  - **Generating character sheets**
  - **Training a character specific LoRA**
  - **Saving to Context DB**
  - **Evaluation**

- D&D based map generation
  - Map generation with cellular automata
  - Map to image
  - Using Maps to retrieve context

- End to end pipeline for d&d adventure generation
  - Multi agent content generation
  - RAG
  - Function calls with pre made scripts

- Published 2 papers (RANLP 2023, ICCART 2023, 3rd paper)

- https://github.com/gayashan2020/consistantChar.git

Reference

[1] E. Papagiannopoulou and G. Tsoumakas, "A review of keyphrase extraction," Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, vol. 10, no. 2, p. e1339, 2020.

[2] S. Vijayarani, M. J. Ilamathi, M. Nithya et al., "Preprocessing techniques for text mining-an overview," International Journal of Computer Science & Communication Networks, vol. 5, no. 1, pp. 7–16, 2015.

[3] R. Srivastava, P. Singh, K. Rana, and V. Kumar, "A topic modeled unsupervised approach to single document extractive text summarization," Knowledge-Based Systems, vol. 246, p. 108636, 2022.

[4] A. P. B. Veyseh, N. Meister, F. Dernoncourt, and T. H. Nguyen, "Improving keyphrase extraction with data augmentation and information filtering," arXiv preprint arXiv:2209.04951, 2022

[5] S. Beliga, "Keyword extraction: a review of methods and approaches," University of Rijeka, Department of Informatics, Rijeka, vol. 1, no. 9, 2014.

[6] J. Oppenlaender, "Prompt engineering for text-based generative art," arXiv preprint arXiv:2204.13988, 2022.

[7] S. W. McRoy, S. Channarukul, and S. S. Ali, "An augmented template-based approach to text realization," Natural Language Engineering, vol. 9, no. 4, pp.381–420, 2003.

[8] A. Radford, K. Narasimhan, T. Salimans, I. Sutskever et al., "Improving language understanding by generative pre-training," 2018.

[9] S. Michelmann, M. Kumar, K. A. Norman, and M. Toneva, "Large language models can segment narrative events similarly to humans," Jan 2023. [Online]. Available: https://arxiv.org/abs/2301.10297

[10] Y. Lu, S. Wu, Y.-W. Tai and C.-K. Tang, "Image Generation from Sketch Constraint Using Contextual GAN," in Computer Vision – ECCV 2018, Lecture Notes in Computer Science, vol 11213. Springer, Cham, 2018

[11] AutoEncoders are Essential in Deep Neural Nets. Towards Data Science. Retrieved March 21, 2023, from https://towardsdatascience.com/autoencoders-are-essential-in-deep-neural-nets-f0365b2d1d7c

[12] J. Ho, C. Saharia, W. Chan, D. J. Fleet, M. Norouzi, and T. Salimans, "Cascaded diffusion models for high fidelity image generation." J. Mach. Learn. Res., vol. 23, no. 47, pp. 1–33, 2022.

[13] T. Karras, S. Laine, and T. Aila, "A style-based generator architecture for generative adversarial networks," in Proceedings of the IEEE/CVF conference on computer vision and pattern recognition, 2019, pp. 4401–4410.

[14] J. Ho, C. Saharia, W. Chan, D. J. Fleet, M. Norouzi, and T. Salimans, "Cascaded diffusion models for high fidelity image generation." J. Mach. Learn. Res., vol. 23, no. 47, pp. 1–33, 2022.

[15] S. Behdenna, F. Barigou, and G. Belalem, "Document level sentiment analysis: a survey," EAI Endorsed Transactions on Context-aware Systems and Applications, vol. 4, no. 13, pp. e2–e2, 2018.

[16] X. Han and L. Wang, "A novel document-level relation extraction method based on bert and entity information," IEEE Access, vol. 8, pp. 96 912–96 919, 2020.

[17] G. Kim, H. Shim, H. Kim, Y. Choi, J. Kim, and E. Yang, "Diffusion video autoencoders: Toward temporally consistent face video editing via disentangled video encoding," arXiv preprint arXiv:2212.02802, 2022.

[18] B. Kim, I. Han, and J. C. Ye, "Diffusemorph: Unsupervised deformable image registration along continuous trajectory using diffusion models," arXiv preprint arXiv:2112.05149, 2021.36

Reference

[19] "Corridor Crew. (2023, 03 07). VFX Reveal Before & After - Anime Rock, Paper, Scissors [Video]. YouTube. https://www.youtube.com/watch?v=IjBSmQdL_Ow"

[19] T. Zhang, V. Kishore, F. Wu, K. Q. Weinberger, and Y. Artzi, "Bertscore: Evaluating text generation with bert," arXiv preprint arXiv:1904.09675, 2019.

[20] Z. Wang, A. C. Bovik, H. R. Sheikh, and E. P. Simoncelli, "Image quality assessment: from error visibility to structural similarity," IEEE transactions on image processing, vol. 13, no. 4, pp. 600–612, 2004.

[21] A. Cherian and A. Sullivan, "Sem-gan: Semantically-consistent image-to-image translation," in 2019 ieee winter conference on applications of computer vision (wacv). IEEE, 2019, pp. 1797–1806.

[22] Jacob Devlin, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova. 2018. Bert: Pre-training of deep bidirectional transformers for language understanding. arXiv preprint arXiv:1810.04805.

[23] Kevin Clark, Minh-Thang Luong, Quoc V Le, and Christopher D Manning. 2020. Electra: Pre-training text encoders as discriminators rather than generators. In International Conference on Learning Representations.

[24] Alexis Conneau, Kartikay Khandelwal, Naman Goyal, Vishrav Chaudhary, Guillaume Wenzek, Francisco Guzman, Edouard Grave, Myle Ott, Luke Zettle- ´moyer, and Veselin Stoyanov. 2019. Unsupervised cross-lingual representation learning at scale. arXiv preprint arXiv:1911.02116.

[25] Simone Tedeschi, Valentino Maiorca, Niccolo Campol- `ungo, Francesco Cecconi, and Roberto Navigli. 2021. WikiNEuRal: Combined neural and knowledgebased silver data creation for multilingual NER. In Findings of the Association for Computational Linguistics: EMNLP 2021, pages 2521–2533.

[26] Jean Baptiste. 2022. roberta-large-ner-english: model fine-tuned from roberta-large for ner task. https://huggingface.co/Jean-Baptiste/ roberta-large-ner-english. (Accessed on 05/10/2023).

[27] Fabio Souza, Rodrigo Nogueira, and Roberto Lotufo. ´2019. Portuguese named entity recognition using bert-crf. arXiv preprint arXiv:1909.10649.

[28] M. Honnibal and I. Montani, "spaCy 2: Natural language understanding with Bloom embeddings, convolutional neural networks and incremental parsing," unpublished.

[29] M. Van Nguyen, V. D. Lai, A. P. B. Veyseh, and T. H. Nguyen, "Trankit: A light weight transformer-based toolkit for multilingual natural language processing," arXiv preprint arXiv:2101.03289, 2021. 32

[31] A. Akbik, T. Bergmann, D. Blythe, K. Rasul, S. Schweter and R. Vollgraf, "FLAIR: An Easy-to-Use Framework for State-of-the-Art NLP," in Proceedings of the 2019 Conference of the North American Chapter of the Association for Computational Linguistics: System Demonstrations, pages 54-59, Minneapolis, Minnesota, 20191.

[32] Wizards of the Coast, (2023, March 28). LOST MINE OF PHANDELVER. D&D Beyond. [Online]. Available: https://www.dndbeyond.com/sources/lmop

[33] Wolfgang Baur, Steve Winter, and Alexander Winter. 2014a. Hoard of the Dragon Queen. Wizards of the Coast.

Reference

[34] Wolfgang Baur, Steve Winter, and Alexander Winter. 2014b. Rise of Tiamat. Wizards of the Coast.

[35] Christopher Perkins, Tracy Hickman, and Laura Hickman. 2016. Curse of Strahd. Wizards of the Coast.

[36] Christopher Perkins, Will Doyle, and Steve Winter. 2017. Tomb of Annihilation. Wizards of the Coast.

[37] Christopher Perkins, Graeme Barber, Bill Benham, et al. 2021. Candlekeep Mysteries. Wizards of the Coast.

[38] Stacey Allan, Will Doyle, Ari Levitch, and Christopher Perkins. 2021. The Wild Beyond the Witchlight. Wizards of the Coast.

[39] T. Le Scao et al., "BLOOM: A 176B-Parameter Open-Access Multilingual Language Model," arXiv preprint arXiv:2211.05100, 20221.

[40] Databricks. 2023. Dolly: The first open source, commercially viable instruction-tuned llm. Databricks Blog.

[41] Xinyang Geng and Hao Liu. 2023. Openllama: An open reproduction of llama.

[42] Weerasundara, G., & de Silva, N. (2023). Comparative analysis of named entity recognition in the dungeons and dragons domain. arXiv preprint arXiv:2309.17171..

[43] Rombach, R., Blattmann, A., Lorenz, D., Esser, P., and Om- mer, B. (2022). High-resolution image synthesis with la- tent diffusion models. In Proceedings of the IEEE/CVF conference on computer vision and pattern recognition, pages 10684–10695

[44] Betker, J., Goh, G., Jing, L., Brooks, T., Wang, J., Li, L., ... & Ramesh, A. (2023). Improving image generation with better captions. Computer Science. https://cdn. openai. com/papers/dall-e-3. pdf, 2(3), 8.

[45] Q. Wu, G. Bansal, J. Zhang, Y. Wu, S. Zhang, E. Zhu, B. Li, L. Jiang, X. Zhang, and C. Wang, "Autogen: Enabling next-gen llm applications via multi-agent conversation framework," arXiv preprint arXiv:2308.08155, 2023.

[46] Hong, S., Zheng, X., Chen, J., Cheng, Y., Wang, J., Zhang, C., ... & Wu, C. (2023). Metagpt: Meta programming for multi-agent collaborative framework. arXiv preprint arXiv:2308.00352.

[47] T. Brooks, A. Holynski, and A. A. Efros, "Instructpix2pix: Learning to follow image editing instructions," arXiv preprint arXiv:2211.09800, 2022. 97

[48] Aisuko (2024) Lora from scratch, Kaggle. Available at: https://www.kaggle.com/code/aisuko/lora-from-scratch (Accessed: 10 June 2024).

[49] Weerasundara, G., & de Silva, N. (2024, January). A Multi-Stage Approach to Image Consistency in Zero-Shot Character Art Generation for the D&D Domain. In ICAART (3) (pp. 235-242).

[50] Hussain, M. (2023). YOLO-v1 to YOLO-v8, the rise of YOLO and its complementary nature toward digital manufacturing and industrial defect detection. Machines, 11(7), 677.

Thank You