

A dramatic fantasy illustration featuring a large, dark-scaled dragon with glowing red eyes breathing a massive stream of fire. In the foreground, a knight in full plate armor, including a helmet with a visor, stands on a rocky ledge, holding a sword and a shield. The knight is positioned to the right, facing the dragon. The background shows a hazy, mountainous landscape under a warm, orange-hued sky. The overall scene is one of intense action and fantasy.

DUNGEONS AND DRAGONS FANTASY ADVENTURE GENERATION

Student	: Akila Peiris
Student ID	: 219381B
Supervisor	: Dr. Nisansa de Silva

(Image credit: Wizards of the Coast)

CONTENT



Dungeons and
Dragons



Research Problem



Literature Survey



FRW Data Set



Forgotten Realms
Free Text Generator



Manual Hierarchical
Data Annotation



Infilling to Create a
Narrative



Adventure Module
Generation with LLM
Agents



Discussion



Dungeons and Dragons

DUNGEONS AND DRAGONS (D&D, DnD)

- Open-ended
- Pen and paper
- Tabletop
- Role Playing Game (RPG)
- Since 1974 [1]
- Predefined rules
 - Rule books and guides
- D&D Setting
 - lore, species, locations, artifacts, statistics, and rules

[1] G. Gygax and D. Arneson, *dungeons & dragons*. Tactical Studies Rules Lake Geneva, WI, 1974, vol. 19.

DUNGEON MASTER (DM)

- Conducts gameplay
- Plays Non-Playable Characters (NPC)
- Regulate player actions



(Image credit: Critical Role)

ADVENTURE

- A guide
- Self-contained game narrative
- Quest
- States:
 - Initial state
 - Intermediate states + transition conditions
 - End state(s) (goal)
- NPCs, rewards, objects + Narrative



(Image credit: Wizards of the Coast)

CHAPTER 4: CASTLE RAVENLOFT

CASTLE RAVENLOFT WAS BUILT ATOP THE RUIN of an older fortress by artisans, wizards, and workers loyal to Strahd's family. Strahd rewarded the castle's genius architect, Artimus, with a crypt in the castle's catacombs. The castle was named after Strahd's mother, Ravenovia, who also lies entombed below.

The poster map that accompanies this book displays the castle in its entirety. Map 1 on the poster shows a diagram of the castle's face, and the other maps show the castle's interior and exterior areas. All those locations are described in this chapter, starting in the "Walls of Ravenloft" section on page 52.

RANDOM ENCOUNTERS

The first time the characters enter a castle area that isn't otherwise occupied, check for a random encounter. Also check for a random encounter every 10 minutes the characters spend resting in the castle.

In most circumstances, a random encounter occurs on a roll of 18 or higher on a d20. To determine what the characters encounter, consult the table below.

RANDOM ENCOUNTERS IN CASTLE RAVENLOFT

d12 + d8	Encounter
2	Ezmerelda d'Avenir (see appendix D)
3	Rahadin (see appendix D)
4	1 black cat
5	1 broom of animated attack (see appendix D)
6	1d4 + 1 flying swords
7	Blinsky toy
8	Unseen servant
9	1d4 Barovian commoners
10	2d6 crawling claws
11	1d6 shadows
12	1d6 swarms of bats
13	1 crawling Strahd zombie (see appendix D)
14	1d4 + 1 Vistani thugs
15	1d4 wights
16	Trinket
17	Giant spider cocoon
18	1 Barovian witch (see appendix D)
19	1d4 + 1 vampire spawn
20	Strahd von Zarovich (see appendix D)

I CALLED FOR MY FAMILY, LONG
unseated from their ancient thrones,
and brought them here to settle in
the castle Ravenloft.

—Tome of Strahd

Use the descriptions that follow to run each encounter.

BAROVIAN COMMONERS

A loud clamor fills the unhallowed halls of Ravenloft. Cries of "Kill the vampire!" are mixed with bold voices shouting, "Never again!" and "To the crypts!"

Angry villagers who have entered the castle brandish torches and pitchforks in a ridiculous display of force. Everywhere they go, they shout for justice. They follow the characters unless prevented from doing so. As long as these Barovians are with the adventurers, random encounters occur on a roll of 9 or higher.

BAROVIAN WITCH

You hear a woman's scratchy voice calling out a name. "Grizzlegut! Grizzlegut, where are you? A pox on you, you mangy cat!"

Through the darkness comes a crone wearing a pointed black hat and a burlap gown stained with soot.

Characters can try to hide from the witch (who has darkvision) or catch her by surprise. This Barovian witch is one of the servants of Strahd dwelling in area K56. She is calling out the name of her black cat familiar, which has gone missing. If the characters confront her, the old bat spits at them and begins casting a spell.

This encounter happens only once. If this result comes up again, treat it as no encounter.

BLACK CAT

The darkness lets out a demonic hiss as a black cat darts out of the shadows, trying its best to avoid you.

This familiar is searching for its mistress (a Barovian witch). It wants nothing to do with the characters but attacks if cornered.

If the characters capture or kill the cat, this encounter doesn't occur again. If this result comes up again, treat it as no encounter.

BLINSKY TOY

A Blinsky toy is encountered only if the characters are moving about the castle (not resting); otherwise, treat this result as no encounter.

You find a discarded toy—something no child could love.

The toy has a slogan stitched or printed on it in tiny letters: "Is No Fun, Is No Blinsky!" Roll a d6 to determine the specific toy:

d6 Toy

- 1 A plush werewolf stuffed with sawdust and tiny wood-carved babies. It has dull knife blades for claws and retractable teeth.
- 2 A smiling jester marionette with tangled strings and tiny copper bells sewn into its cap.
- 3 A wooden puzzle box, 6 inches on a side, carved with silhouettes of leering clown faces. The box rattles when shaken. A character who spends a short rest fiddling with the box can figure out how to open it with a successful DC 20 Intelligence check. The box is empty, with nothing inside to explain the rattling.
- 4 A faceless doll in a wedding dress that has yellowed and frayed with age.
- 5 A vaguely coffin-shaped jack-in-the-box containing a pop-up Strahd puppet.
- 6 A spring-loaded set of wooden teeth with fangs, all painted white. The teeth gnash and chatter for 1 minute when the spring is wound tight (requiring an action) and released.

BROOM OF ANIMATED ATTACK

You hear a scratching noise. Out of the shadows comes a broom, sweeping its way toward you as though held by invisible hands.

When it gets within 5 feet of a party member, the broom attacks.

CRAWLING CLAWS

A mob of severed hands, their mummified flesh black with soot, skitters out of the darkness across the dusty floor.

The crawling claws gang up on one party member. During the confusion, one of the claws tries to crawl into the character's backpack and hide there. It makes a Dexterity (Stealth) check contested by the character's passive Wisdom (Perception) score. If the claw loses the contest, the character sees the claw enter the backpack. If the claw wins the contest, it waits until the character takes a long rest before scuttling out to attack.

CRAWLING STRAHD ZOMBIE

You hear the deathly groans of something vile.

The groans are coming from a Strahd zombie that is missing both of its legs, so that only its head, torso, and arms remain. It uses its arms to drag itself across the floor. The crawling zombie has 15 hit points remaining.

If the characters are moving quietly and not using light sources, they can try to hide from the crawling zombie.

EZMERELDA D'AVENIR

Ezmerelda has cast a *greater invisibility* spell on herself and is stealthily exploring the castle. Choose one character in the back rank of the party's marching order, and read the following text to that character's player:

You feel a gentle tap on your shoulder but see nothing behind you.

If the character who is touched by Ezmerelda reacts in an alarming or threatening manner, she hastily whispers, "Don't be frightened. We're on the same side."

Ezmerelda is hunting Strahd, but her efforts to corner the vampire have so far been thwarted, and she fears that she might be in over her head. If the characters don't ask her to join the party, she wishes them well and goes on her way (perhaps to be encountered again later). If they invite her to accompany them, Ezmerelda tests the characters' knowledge about vampires by asking them questions such as "Have you ever seen a vampire change its form?" and "Do you know how to counteract a vampire's regenerative ability?" Whatever their answers, she ultimately agrees to come along.

This random encounter happens only once. If this result comes up again, treat it as no encounter.

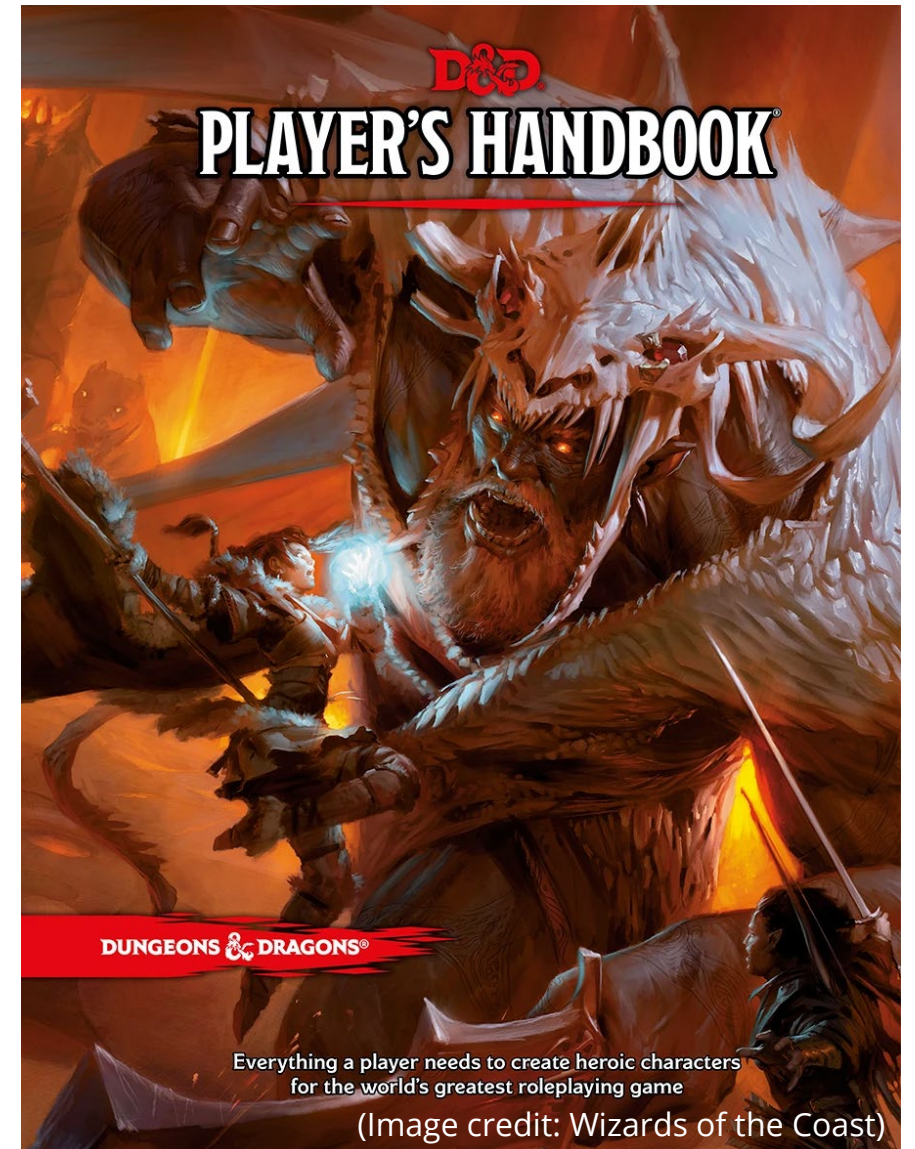
FLYING SWORDS

Out of the gloom flies a rusty blade, followed by another!



FORGOTTEN REALMS

- De-facto default setting for D&D 5e
- High fantasy setting
- Themes influenced by:
 - Medieval
 - Middle Eastern
 - Asian
 - ... and many others
- Has the most resources





Research Problem

RESEARCH PROBLEM

- “Generating self-standing adventures for Dungeons and Dragons game-play.”
- DMs create their own adventures
- 3-4 hours preparation for 1 hour of game-play
- Current adventure generators generate either,
 - Only the basic plot outline
 - A single section at a time
 - Generic adventure pieced together from databases
- Fails to create **good, cohesive** stories and **complete, standalone** adventure module





Literature Survey

NATURAL LANGUAGE GENERATION

- Mimic human-like text patterns for summarization, translation, storytelling
- Template based methods [2, 3]
 - Uses pre-defined text templates
 - Most common but tedious and non-scalable
- Rule based [4, 5]
 - Text planning - meaning representation retrieval from a knowledge base
 - Sentence planning - words and their order
 - Surface realization - sentence plan → actual sentences
- Data-driven/ Statistical [6, 7]
 - Learn patterns and relationships between input data and corresponding outputs

[2] S. Busemann and H. Horacek, "A flexible shallow approach to text generation," arXiv preprint cs/9812018, 1998.

[3] E. Reiter and R. Dale, "Building applied natural language generation systems," Natural Language Engineering, vol. 3, no. 1, pp. 57–87, 1997.

[4] R. Turner, S. Sripada, and E. Reiter, "Generating approximate geographic descriptions," in Empirical methods in natural language generation. Springer, 2009, pp. 121–140.

[5] E. Reiter, S. Sripada, J. Hunter et al., "Choosing words in computer-generated weather forecasts," AI, vol. 167, no. 1-2, pp. 137–169, 2005.

[6] R. Barzilay and M. Lapata, "Collective content selection for concept-to-text generation," in Proceedings of the conference on Human Language Technology and Empirical Methods in Natural Language Processing, 2005, pp. 331–338.

[7] P. Liang, M. I. Jordan, and D. Klein, "Learning semantic correspondences with less supervision," in Proceedings of the Joint Conference of the 47th Annual Meeting of the ACL and the 4th IJCNLP of the AFNLP, 2009, pp. 91–99.

NATURAL LANGUAGE GENERATION, A NEW PARADIGM

- Earlier trends
 - LSTM – Long Short-Term Memory [8]
 - GRU – Gated Recurrent Unit [9]
- Newer deep-learning trends
 - GAN – General Adversarial Networks [10, 11]
 - VAE – Variational Auto Encoders [12, 13]
 - Transformers [14, 15]

[8] S. Hochreiter and J. Schmidhuber, “Long short-term memory,” *Neural computation*, vol. 9, no. 8, pp. 1735–1780, 1997.

[9] S. Mangal, P. Joshi, and R. Modak, “Lstm vs. gru vs. bidirectional rnn for script generation,” *arXiv preprint arXiv:1908.04332*, 2019

[10] I. Goodfellow, J. Pouget-Abadie, M. Mirza, B. Xu, D. Warde-Farley, S. Ozair, A. Courville, and Y. Bengio, “Generative adversarial nets,” *Advances in neural information processing systems*, vol. 27, 2014

[11] J. Guo, S. Lu, H. Cai, W. Zhang, Y. Yu, and J. Wang, “Long text generation via adversarial training with leaked information,” in *Proceedings of the AAAI Conference on Artificial Intelligence*, vol. 32, no. 1, 2018.

[12] D. P. Kingma and M. Welling, “Auto-encoding variational bayes,” *arXiv preprint arXiv:1312.6114*, 2013.

[13] Z. Yang, Z. Hu, R. Salakhutdinov, and T. Berg-Kirkpatrick, “Improved variational autoencoders for text modeling using dilated convolutions,” in *International conference on machine learning*. PMLR, 2017, pp. 3881–3890.

[14] A. Vaswani, N. Shazeer, N. Parmar, J. Uszkoreit, L. Jones, A. N. Gomez, Ł. Kaiser, and I. Polosukhin, “Attention is all you need,” *Advances in neural information processing systems*, vol. 30, 2017.

[15] A. Radford, J. Wu, R. Child, D. Luan, D. Amodei, I. Sutskever et al., “Language models are unsupervised multitask learners,” *OpenAI blog*, vol. 1, no. 8, p. 9, 2019.

AUTOMATED STORY GENERATION

- S. Sato's [16] automated short story generator
 - Passed the first of four screenings at a Japanese literature award
- Laclaustra et al. [17] proposed a simulation-based story generator
 - Multiple agents try to achieve different goals
 - World state is recorded
- Character driven story generator by Si et al. [18]
 - Dialogue based stories using extended version of CRD3 [19]
 - D&D domain
- Limitations with automated story generation
 - Evaluating the goodness – plot devices, cohesion, engagement



[16] S. Sato, "A challenge to the third hoshi shinichi award," pp. 31–35, 12 2016.

[17] I. M. Laclaustra, J. Ledesma, G. Méndez, and P. Gervás, "Kill the dragon and rescue the princess: Designing a plan-based multi-agent story generator." in ICCG, 2014, pp. 347–350.

[18] W. M. Si, P. Ammanabrolu, and M. O. Riedl, "Telling stories through multi-user dialogue by modeling character relations," arXiv preprint arXiv:2105.15054, 2021.

[19] R. Rameshkumar and P. Bailey, "Storytelling with dialogue: A Critical Role Dungeons and Dragons Dataset," in Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics. Online: Association for Computational Linguistics, Jul. 2020, pp. 5121–5134.

DOMAIN SPECIFIC TEXT GENERATION

- Generate text based on a specific domain [20, 21]
 - Medical [22, 23], Biographies [24], Fashion domain [25]
- Should be **semantically** and **pragmatically truthful** to the domain
- Models from generic domain do not seamlessly transfer to tasks in a specific domain [26]
- Fantasy literature deviates from the general domain both lexically and semantically
 - For example,
 - Dwarfs vs. Dwarves – Tolkien influence
 - Ghost vs Wraith – Synonyms in general domain, but different entities in fantasy
 - Asmodeus – Historical/ mythical figures can have different traits, backgrounds in fantasy domain

[20] T. Liu, K. Wang, L. Sha, B. Chang, and Z. Sui, "Table-to-text generation by structure-aware seq2seq learning," in Thirty-Second AAAI Conference on Artificial Intelligence, 2018

[21] H. Zhang, H. Song, S. Li, M. Zhou, and D. Song, "A survey of controllable text generation using transformer-based pre-trained language models," arXiv preprint arXiv:2201.05337, 2022.

[22] A. Amin-Nejad, J. Iye, and S. Velupillai, "Exploring transformer text generation for medical dataset augmentation," in Proceedings of the Twelfth Language Resources and Evaluation Conference. Marseille, France: European Language Resources Association, May 2020, pp. 4699–4708.

[23] D. Hüske-Kraus, "Text generation in clinical medicine—a review," Methods of information in medicine, vol. 42, no. 01, pp. 51–60, 2003.

[24] R. Lebre, D. Grangier, and M. Auli, "Neural text generation from structured data with application to the biography domain," arXiv preprint arXiv:1603.07771, 2016.

[25] V. Munigala, A. Mishra, S. G. Tamilselvam, S. Khare, R. Dasgupta, and A. Sankaran, "Persuaide! an adaptive persuasive text generation system for fashion domain," in Companion Proceedings of the The Web Conference 2018, 2018, pp. 335–342.

[26] I. Rajapaksha, C. R. Mudalige et al., "Rule-Based Approach for Party-Based Sentiment Analysis in Legal Opinion Texts," in 2020 20th International Conference on Advances in ICT for Emerging Regions (ICTer). IEEE, 2020, pp. 284–285.

AUTOMATED QUEST GENERATION

- High demand by digital games for new content
 - MMORPG paradigm
- Types of quests [27]:
 - Objective oriented quests – achieve a specific objective
 - e.g. save a princess, kill a dragon, find an artifact
 - Place oriented quests – navigate from point A to B/ explore
 - e.g. explore a dungeon, reach the summit of a mountain
 - Time oriented quests – perform given task for the given duration
 - e.g. evade enemies for a 2 days
- Digital games vs. D&D
 - Open ended actions - quests need to be complex



(Image credit: u/TheAlpineDM)

[27] E. Aarseth, "From hunt the wumpus to everquest: Introduction to quest theory," in International Conference on Entertainment Computing. Springer, 2005, pp. 496–506.

SENTENCE INFILLING

- Goal is missing text generation [28]
 - Predict spans of missing text based on preceding and subsequent text
 - Consistent and coherent text as a whole
 - A form of Cloze task [29]
- Useful applications
 - Text revision [30] – post-edit text to refine their quality
 - Restoring ancient documents that are missing content [31]
 - Mixed initiative machine translation [32]

[28] Y. Huang, Y. Zhang, O. Elachqar, and Y. Cheng, “Inset: Sentence infilling with inter-sentential transformer,” arXiv preprint arXiv:1911.03892, 2019.

[29] W. L. Taylor, ““cloze procedure”: A new tool for measuring readability,” *Journalism quarterly*, vol. 30, no. 4, pp. 415–433, 1953.

[30] Y.-S. Shih, W.-C. Chang, and Y. Yang, “XI-editor: Post-editing sentences with xlnet,” arXiv preprint arXiv:1910.10479, 2019.

[31] Y. Assael, T. Sommerschild, and J. Prag, “Restoring ancient text using deep learning: a case study on greek epigraphy,” arXiv preprint arXiv:1910.06262, 2019.

[32] Y. Xiao, L. Liu, G. Huang, Q. Cui, S. Huang, S. Shi, and J. Chen, “BiTIIMT: A bilingual text-infilling method for interactive machine translation,” in *Proceedings of the 60th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*. Dublin, Ireland: Association for Computational Linguistics, May 2022, pp. 1958–1969

WHAT MAKES A GOOD QUEST...?

- Choices and constraints vs game-play experience
 - Sullivan et al. [33] observe that most game quests are task oriented and lack interesting choices
 - Pitfall of too many choices in open ended games
 - Players feel lost and unsure of where to go, overwhelmed
 - DM must balance with constraints
- Meaningful quest engagement
 - Quests offered by NPCs [34] → more organic narrative
 - World map grows as player progresses [35] → terrain to control player progression
 - Key-lock games – unlock the next part of the map by finding a key
 - Map is influenced by player past behaviour



(Image credit: amazon.com)

[33] A. Sullivan, M. Mateas, and N. Wardrip-Fruin, "Questbrowser: Making quests playable with computer-assisted design," 2009.

[34] J. Doran and I. Parberry, "A prototype quest generator based on a structural analysis of quests from four mmorpgs," in PCGames '11, 2011.

[35] C. Ashmore and M. Nitsche, "The quest in a generated world." in DiGRA conference. Citeseer, 2007

QUALITIES IN WIKIPEDIA DATA

- Information rich sections in a Wikipedia page
 - Lead section*
 - Infoboxes**
- Importance of Wikipedia first paragraph
 - Lead Section
 - 92% chance of finding infobox information within the Lead Section [36]
- 1 / 3 Wikipedia pages contain an infobox [36]
 - Forgotten Realms Wikia – 73%



The Northern hemisphere of Toril, showing the continents of *Faerûn* and *Kara-Tur*.

Toril	
Size E spherical earth body ^[1]	
Type	Planet
Classification Code	E•E
Radius	3,980 mi (6,410 km) (equator) 3,960 mi (6,370 km) (poles) ^[2]
Satellites	Selûne Tears of Selûne ^[1]
Satellite of	The sun ^[1]
Orbital distance	200,000,000 mi (320,000,000 km)
Day length	24 hours ^[1]
Year length	365 days ^[1]
Demonym	Torilian ^[3]
Population	Humans Humanoids ^[1]

[Inhabitants of Toril](#)
[Locations on Toril](#)
[Organizations on Toril](#)

(Image credit: forgottenrealms.fandom.com)

[36] D. Lange, C. Böhm, and F. Naumann, “Extracting structured information from wikipedia articles to populate infoboxes,” in Proceedings of the 19th ACM international conference on Information and knowledge management, 2010, pp. 1661–1664.

* https://en.wikipedia.org/wiki/Wikipedia:Manual_of_Style/Lead_section
** <https://www.mediawiki.org/wiki/Infobox>



Forgotten Realms Wiki Data Set

A MISSING CORPUS

- Train ML models -> data
- No D&D domain specific corpus
- Fandom Wikia
 - <https://forgottenrealms.fandom.com/>
- Same structure as Wikipedia
 - Media Wiki stack
- 54000 articles
- 12000 new articles in the last 2 years

The screenshot shows the 'Wizard' article on the Forgotten Realms Wiki. The article is titled 'Wizard' and is categorized under 'Classes, Arcane spellcasters'. It features a detailed description of wizards, their abilities, and their role in the Forgotten Realms universe. A red box highlights the 'Wizard (Mage, Magic-User)' section, which includes a table of 'Class Statistics' and '5th Edition Statistics'. The table shows the wizard's progression from level 1 to 20, including their base class, arcane traditions, weapons, and magic use. The article also includes a 'Contents' table of contents and a 'Popular Pages' sidebar.

Class Statistics	5th Edition Statistics
5e	4e 3e 2e 1e
Base Class	
Arcane Traditions	
Abjuration	
Bladesinging	
Conjuration	
Divination	
Enchantment	
Evocation	
Illusion	
Necromancy	
Transmutation	
War magic	
Proficiencies	
Weapons	
Daggers	
Darts	
Slings	
Quarterstaves	
Light crossbows	
Magic Use	
Magic type	
Arcane	
Spell preparation	
Prepared	

Figure 2: Forgotten Realms Wikia article for Wizard.
(Green – first link, Red – Wikipedia Infobox)

PROGRESS MAP FOR THE FIRST PUBLICATION



Export

Forgotten Realms Wiki
Markdown text + XML
schema



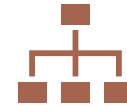
Clean

<text>, <title> tags
Templates



Text

Remove templates
Parse markdown



Graph

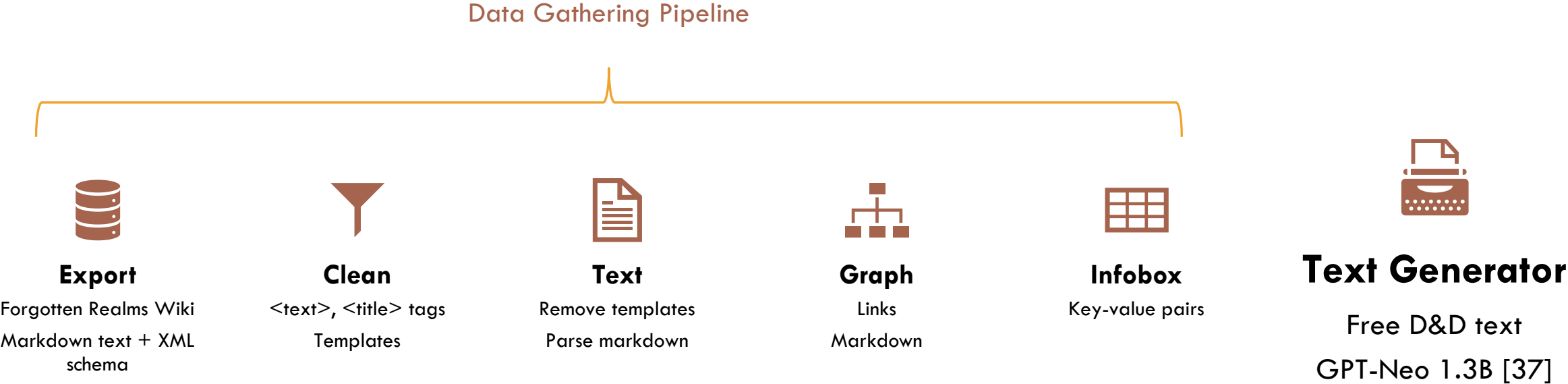
Links
Markdown



Infobox

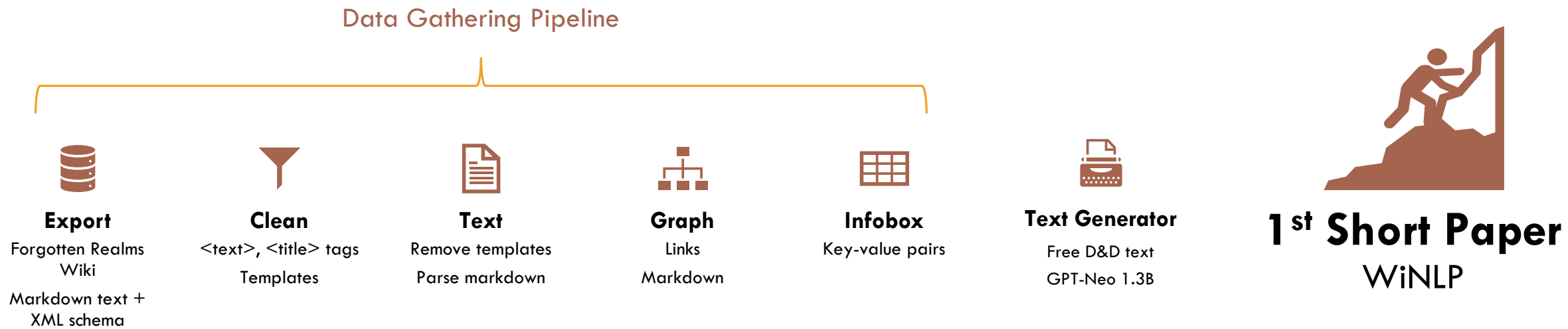
Key-value pairs

PROGRESS MAP FOR THE FIRST PUBLICATION



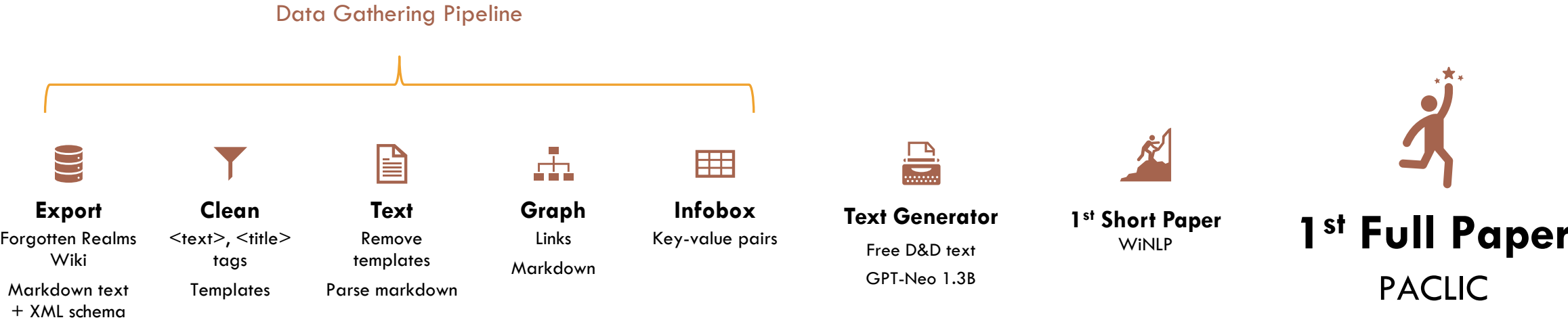
[37] L.Gao, S.Biderman,S.Black,L.Golding,T.Hoppe,C.Foster,J.Phang,H.He, A. Thite, N. Nabeshima et al., “The pile: An 800gb dataset of diverse text for language modeling,” arXiv preprint arXiv:2101.00027, 2020.

PROGRESS MAP FOR THE FIRST PUBLICATION



A Primer on Synthesis and Evaluation of a Domain-specific Large Data Set for Dungeons & Dragons

PROGRESS MAP FOR THE FIRST PUBLICATION



Synthesis and evaluation of a domain-specific large data set for dungeons & dragons

FORGOTTEN REALMS WIKI (FRW) DATASET

Dataset	Description
FRW-P	Raw plain text
FRW-J	A JSON structure with plain text indexed by article title
FRW-FJ	A JSON structure with only the first paragraph of articles indexed by article title
FRW-L	A directional graph indicating all the references in the articles to other articles
FRW-FL	A directional graph indicating the first references in the articles to other articles
FRW-CL	A directional graph indicating the category references in the articles to category articles
FRW-I	A JSON structure for the Wikipedia infobox substructures indexed by article title
FRW-PE	Poincaré embedding for the first links
FRW-W	2 Word2Vec models for full text (CBOW and Skip-gram)
FRW-D	2 Doc2Vec models for full text (PV-DBOW and PV-DM)
FRW-FD	2 Doc2Vec models for first paragraph text (PV-DBOW and PV-DM)

FORGOTTEN REALMS WIKI (FRW) DATASET

Dataset	Description	Type
FRW-P	Raw plain text	Text
FRW-J	Plain text indexed by article title	JSON
FRW-FJ	First paragraph of articles indexed by article title	JSON
FRW-L	All the internal references(links) in the articles	Directed Graph
FRW-FL	First internal reference(link) in each article	Directed Graph
FRW-CL	Category references(links) in the articles	Directed Graph
FRW-I	Wikipedia infobox key-value pairs indexed by article title	JSON
FRW-PE	Poincaré embedding for the first links	Poincaré Embedding
FRW-W	CBOW and Skip-gram models for full text	Word2Vec
FRW-D	PV-DBOW and PV-DM models for full text	Doc2Vec
FRW-FD	PV-DBOW and PV-DM models for first paragraph text	Doc2Vec

FORGOTTEN REALMS WIKI (FRW) DATASET

Dataset	Description	Type
FRW-P	Raw plain text	Text
FRW-J	Plain text indexed by article title	JSON
FRW-FJ	First paragraph of articles indexed by article title	JSON
FRW-L	All the internal references(links) in the articles	Directed Graph
FRW-FL	First internal reference(link) in each article	Directed Graph
FRW-CL	Category references(links) in the articles	Directed Graph
FRW-I	Wikipedia infobox key-value pairs indexed by article title	JSON
FRW-PE	Poincaré embedding for the first links	Poincaré Embedding
FRW-W	CBOW and Skip-gram models for full text	Word2Vec
FRW-D	PV-DBOW and PV-DM models for full text	Doc2Vec
FRW-FD	PV-DBOW and PV-DM models for first paragraph text	Doc2Vec

DATASET : FRW-P

- No markdown
- No templates

Statistic	Value
Total number of words (excluding article titles)	9,189,536
Total number of words (including article titles)	9,287,670
Total number of unique words	145,624
Total number of sentences	517,248

DATASET : FRW-J

- JSON structure
- Raw corpus indexed by article name

Statistic	Value
Total number of articles	48,892
Average number of words per sentence	17.77
Average number of words per article	187.96
Average number of sentences per article	10.58

DATASET : FRW-FJ

- First paragraph only
- Further cleaned – removed redirect pages, pages without proper first paragraph
- Wikipedia lead section – Self-contained summary (information rich [36])
- 10% compression

Statistic	Value
Total number of articles	41,204
Total number of words	980,047
Total number of sentences	98,244
Average number of words per sentence	9.98
Average number of words per article	23.78
Average number of sentences per article	2.38

DATASET : FRW-L

- Directed graph
- Edges – References from 1 article to another

Statistic	Value
Total number of nodes	46,910
Total number of edges	570,857
Average number of edges per node	12.16

DATASET : FRW-FL

- First link of the article
- Places the article in context
 - Wikipedia lead section guidelines
- First link traversal property [38]

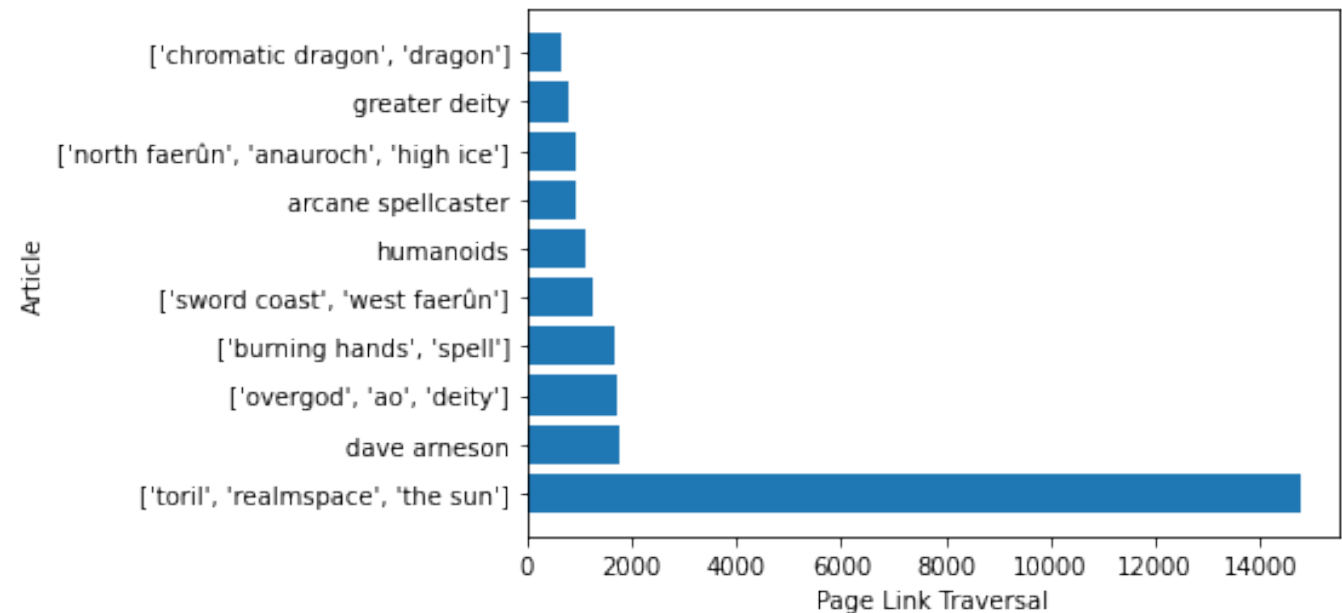


Figure 4: First Link Page Traversal summary for Forgotten Realms

Statistic	Value
Total number of nodes	43,329
Total number of edges	41,213
Number of nodes not referenced by others	34,881
Number of nodes with no references	2,151

[38] D. Lamprecht, D. Dimitrov, D. Helic, and M. Strohmaier, "Evaluating and improving navigability of wikipedia: a comparative study of eight language editions," in Proceedings of the 12th international symposium on open collaboration, 2016, pp. 1–10.

* https://en.wikipedia.org/wiki/Wikipedia:Manual_of_Style/Lead_section

DATASET : FRW-CL

- Special references in a page
- Directs to virtual pages (automatically generated)
- Flat hierarchy
- No ordering

Statistic	Value
Total number of nodes	52,022
Total number of edges	290,292
Average number of edges per node	5.58

DATASET : FRW-I

- Key-value format
- JSON structure
- Forgotten Realms wikia: 73% of pages contain infoboxes
 - Wikipedia: 1 / 3 of pages contain infoboxes [36]

Statistic	Value
Average number of attributes per infobox	40.54
Average number of completed (filled) attributes per infobox	10.40
Total number of articles containing infoboxes	35,923

DATASET : FRW-PE

- Poincaré embeddings [39] for first links
- Convergence: initial state and after 50 epochs

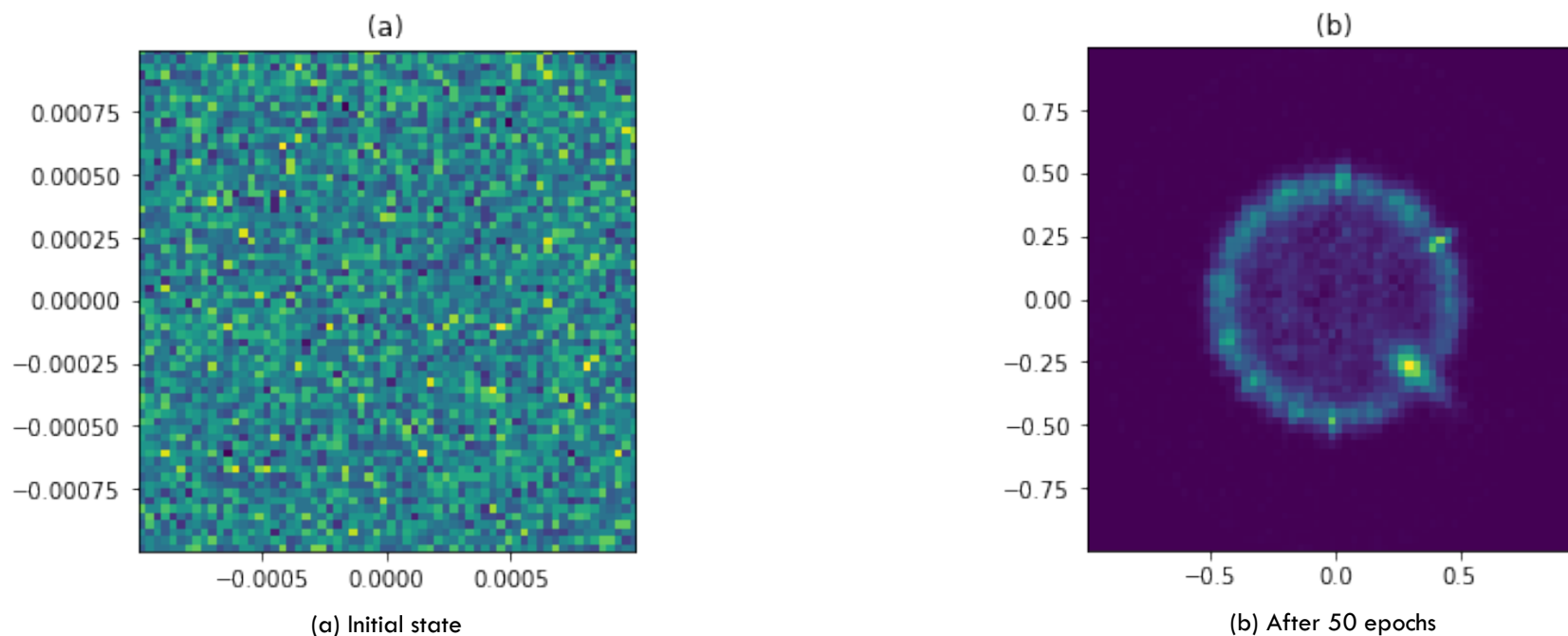


Figure 5: Poincaré convergence

DATASETS: WORD AND DOCUMENT EMBEDDINGS

Embedding	Dataset	Uses data from	Techniques
Word embedding (Word2Vec) [40]	FRW-W	FRW-P	CBOW Skip-gram
Document embedding (Doc2Vec) [41]	FRW-D	FRW-J	PV-DBOW PV-DM
First paragraph document embedding (Doc2Vec)	FRW-FD	FRW-FJ	PV-DBOW PV-DM

FRW EVALUATION

SEMANTIC SIMILARITY COMPARISON

- 1 million non-repeating word pairs
- *FRW-FL* data set
- Weighed random sampling with replacement

$$P(i) = \frac{\sqrt{N} - k_i}{N\sqrt{N} - \sum_{j=1}^N k_j} \quad (1)$$

- N - total number of pairs we generate
- k_j - the number of times the j^{th} item has already been selected.

FRW EVALUATION

SEMANTIC SIMILARITY COMPARISON

- *FRW-FL* data set
- Convert to a directed acyclic graph.

$$E' = \begin{cases} E \cup (root, v) & \text{if } deg^-(v) = 0 \text{ and } v \neq root \\ E \cup (root, v') \cup (v', v) & \text{if } v \in G_c \\ E & \text{otherwise} \end{cases} \quad (2)$$

- G - graph in the set of disconnected graphs $G = (V, E) \in G_1, G_2, \dots, G_n$ where $E \subseteq E'$ and $V \in V'$
- G_c - subgraph of a given graph $G_c = (V_c, E_c) \in G$ where e_1, \dots, e_n is a trail with vertex sequence a_1, \dots, a_n (cyclic graph)
- $\forall G \in G_1, \dots, G_n$ apply Equation 2 to obtain the final unified graph, $G' = (V', E')$

FRW EVALUATION

SEMANTIC SIMILARITY COMPARISON

			Hierarchical			Embedding					
			WP	JC	P	Word2Vec		Doc2Vec			
						(FRW-J)		(FRW-FJ)		(FRW-J)	
						CBOW	SG	DM	DBOW	DM	DBOW
Embedding	Hierarchical	WP	1.0000								
		JC	0.6346	1.0000							
		P	0.0097	0.0624	1.0000						
	Doc2Vec	(FRW-J)	CBOW	0.0581	0.0212	0.0013	1.0000				
			SG	0.0553	0.0188	-0.0043	0.9412	1.0000			
		(FRW-FJ)	DM	0.0040	-0.0298	0.0548	-0.0626	-0.0791	1.0000		
			DBOW	0.0466	0.0155	0.0359	0.0362	0.0222	0.5691	1.0000	
		(FRW-J)	DM	0.0259	0.0186	0.0175	-0.1865	-0.2593	0.1724	0.1484	1.0000
			DBOW	0.0361	0.0287	0.0453	-0.0896	-0.1601	0.1511	0.1825	0.5493

Pearson Correlation for the pairwise text similarities across multiple similarity metrics:

- 1) WP – Wu & Palmer similarity 2) JC – Jiang-Conrath Similarity* 3) P – Poincaré metric 4) CBOW – Continuous Bag of Words 5) SG – Skip-gram
6) DM – Distributed Memory 7) DBOW – Distributed Bag of Words

* Jiang-Conrath distance was converted to a similarity metric normalized between 0 and 1



Forgotten Realms Free Text Generator

FORGOTTEN REALMS FREE TEXT GENERATOR

Input prompt

"A Bard, A Wizard, and a Paladin walk into a tavern. The bard hides behind a group of tables, drinking and hiding his face. The Wizard hands over the Handbook of All Things Magical to the paladin, who hangs it up and begins to read. The bard steals the book, dissolves the rules and instructions, and replaces them with his own. The party meets up at the next table and learn that the wizard took the book because it was to be penned by him. Bards make a sign of the wizard to politely take the book and tell him the party is there to do his bidding. The wizard read the book, the bard says his or her name and uses it to vanish out into the night. As the wizard takes off, the bard doorstep knights and spells a silent alarm before whispering, "He is a wizard, and his old book was the Handbook of All Things Magical. I will guard it for him. [...]"

"A Bard, A Wizard, and a Paladin walk into a tavern. The Bard says that he lives in Baldur's Gate in a tavern dedicated to a wizard named Juiblex. The Bard tells Xanatos about his origin story. In the tavern, the Bard mentions non-existence of its streets. The Bard explains that the people of Baldur's Gate rarely go outside of the city, and are plagued by strange things. The Bard meets a human man. The Bard asks the man why he is "always" being summoned by Juiblex, whereas he is a cast-away person who wandered the Realms. The Bard mentions a dream he had in which he was being magically summoned to the tavern to meet the wizard, and the man says he has ably catalogued the madness of the city. The Bard asks why people don't leave, and the man counters that only the rich can afford to leave. The Bard asks the man if he agrees with the praise of his dream, and he agrees by telling him that 50% of the people in his fantasy life are less important than the other 50% . [...]"

FORGOTTEN REALMS FREE TEXT GENERATOR

“A Bard, A Wizard, and a Paladin walk into a tavern. The Bard says that he lives in Baldur's Gate in a tavern dedicated to a wizard named Juiblex. The Bard tells Xanatos about his origin story. In the tavern, the Bard mentions non-existence of its streets. The Bard explains that the people of Baldur's Gate rarely go outside of the city, and are plagued by strange things. The Bard meets a human man. The Bard asks the man why he is "always" being summoned by Juiblex, whereas he is a cast-away person who wandered the Realms. The Bard mentions a dream he had in which he was being magically summoned to the tavern to meet the wizard, and the man says he has ably catalogued the madness of the city. The Bard asks why people don't leave, and the man counters that only the rich can afford to leave. The Bard asks the man if he agrees with the praise of his dream, and he agrees by telling him that 50% of the people in his fantasy life are less important than the other 50% . [...].”



FORGOTTEN REALMS FREE TEXT GENERATOR

“A Bard, A Wizard, and a Paladin walk into a tavern. The bard hides behind a group of tables, drinking and hiding his face. The Wizard hands over the Handbook of All Things Magical to the paladin, who hangs it up and begins to read. The bard steals the book, dissolves the rules and instructions, and replaces them with his own. The party meets up at the next table and learn that the wizard took the book because it was to be penned by him. Bards make a sign of the wizard to politely take the book and tell him the party is there to do his bidding. The wizard read the book, the bard says his or her name and uses it to vanish out into the night. As the wizard takes off, the bard doorstep knights and spells a silent alarm before whispering, "He is a wizard, and his old book was the Handbook of All Things Magical. I will guard it for him. [...]"

“A Bard, A Wizard, and a Paladin walk into a tavern. The Bard says that he lives in Baldur's Gate in a tavern dedicated to a wizard named Juiblex. The Bard tells Xanatos about his origin story. In the tavern, the Bard mentions non-existence of its streets. The Bard explains that the people of Baldur's Gate rarely go outside of the city, and are plagued by strange things. The Bard meets a human man. The Bard asks the man why he is "always" being summoned by Juiblex, whereas he is a cast-away person who wandered the Realms. The Bard mentions a dream he had in which he was being magically summoned to the tavern to meet the wizard, and the man says he has ably catalogued the madness of the city. The Bard asks why people don't leave, and the man counters that only the rich can afford to leave. The Bard asks the man if he agrees with the praise of his dream, and he agrees by telling him that 50% of the people in his fantasy life are less important than the other 50% . [...]"

SIDE QUEST:



Manual Hierarchical Data Annotation

THE PROBLEM WITH FIRST LINKS AS A GENERALIZATION

- First links

“ Tiamat was the [lawful evil] [dragon] goddess of greed, queen of [evil dragons] and, for a time, reluctant servant of the [greater gods] [Bane] and later [Asmodeus]. Before entering the [Faerûnian pantheon], she was a member of the [Draconic pantheon], and for some time she was also a member of the [Untheric pantheon]. “

- Which is it?
 - Dragon, diety
- First link?
 - Lawful evil



(Image credit: forgottenrealmsfandom.com)

WHY DO WE NEED AN APP FOR ANNOTATIONS?

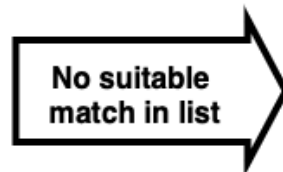
- Why a new app?
 - Why not use a spreadsheet?
- Inter Annotator Agreement (IAA) [42]
- Consistency of annotations
 - Different annotators, different patterns
- Control the annotation options
 - e.g. omit entities without pages of their own from label options
- Reduce human error
 - Faerûnian vs. Faerunian
 - Outright wrong spellings leading to different labels

[42] R. Artstein and M. Poesio, "Inter-coder agreement for computational linguistics," CL, vol. 34, no. 4, pp. 555–596, 2008.

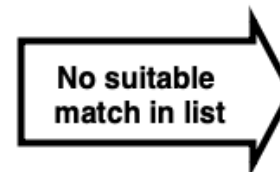
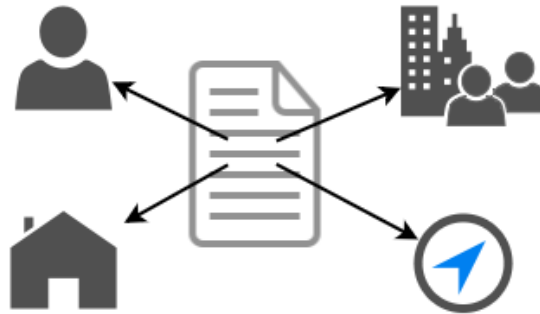


HOW TO TAG ENTITY DATA?

Select from a list of links



Select from a list of named entities



Type in the category

Enter the category

Dragon God

SEMANTIC HYPERNYM ANNOTATOR FOR DOMAIN-SPECIFIC ENTITIES

The screenshot shows a web browser window with the title "Forgotten Realms Entity Annotator". The address bar shows the URL "annotate_app.test/view/main_page.php". The page has a dark blue header with the word "Annotate" on the left and navigation links for "akila" and "Logout" on the right. The main content area has a title "1001 Ways to Cook Beans" in blue. Below the title is a text box containing the sentence: "1001 Ways to Cook Beans was a collection of recipes revolving around beans that was published in the 14 century DR by the eccentric Ravenian street vendor Hephtos." Below the text box is a form with a label "Categorical Entity" and a dropdown menu showing "bean". To the right of the dropdown is a blue button labeled "Not in this list". Below the form are two buttons: a green "Save" button and a pink "Skip Page" button.

Forgotten Realms Entity Annotator

Not Secure | annotate_app.test/view/main_page.php

Update

Annotate

akila Logout

1001 Ways to Cook Beans

1001 Ways to Cook Beans was a collection of recipes revolving around beans that was published in the 14 century DR by the eccentric Ravenian street vendor Hephtos.

Categorical Entity

bean

Not in this list

Save Skip Page

S H A D E

The screenshot shows a web browser window with the address bar displaying 'annotate_app.test/view/main_page.php'. The page title is 'Annotate'. The main content area features a blue header with the title '1001 Ways to Cook Beans'. Below the title, a text box contains the following description: '1001 Ways to Cook Beans was a collection of recipes revolving around beans that was published in the 14 century DR by the eccentric Ravenian street vendor Hephtos.' At the bottom of the page, there is a form with a 'Categorical Entity' label, a dropdown menu currently showing 'bean', a blue button labeled 'Not in this list', a green button labeled 'Save', and a pink button labeled 'Skip Page'.

Forgotten Realms Entity Annot. x +

← → ↻ ⚠ Not Secure | annotate_app.test/view/main_page.php 🔍 📄 ☆ B 🧩 📺 👤 Update ⋮

Annotate 🏠 👤 akila ➡ Logout

1001 Ways to Cook Beans

1001 Ways to Cook Beans was a collection of recipes revolving around beans that was published in the 14 century DR by the eccentric Ravenian street vendor Hephtos.

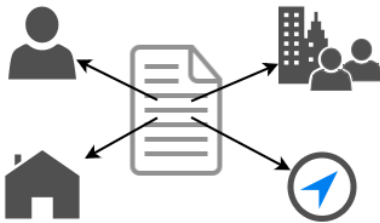
Categorical Entity

Select from a list of links



No suitable match in list

Select from a list of named entities



No suitable match in list

Tye in the category

Enter the category

Dragon God



Alberik

Alberik was the captain of the guards at the path leading to Adama's Tooth, posted by the Datharathi to protect the access to their mine. In , he allowed Eined Datharathi into the mine despite being under standing orders not to let anyone in, as he had not been notified her family wanted her captured. Alongside her, he allowed in Ususi Manaallin and Iahn Qoyllor. The man had been a part to the indiscretions of the Datharathi heiress around the year , which made it more likely for him to take her statements at face value.

Categorical Entity

Adama's Tooth

Not in this list

Save

Skip Page

SHADE

PROCESS FLOW — LINKS LIST



Annotate

akila Logout

Alberik

Alberik was the captain of the guards at the path leading to Adama's Tooth, posted by the Datharathi to protect the access to their mine. In , he allowed Eined Datharathi into the mine despite being under standing orders not to let anyone in, as he had not been notified her family wanted her captured. Alongside her, he allowed in Ususi Manaallin and Iahn Qoyllor. The man had been a part to the indiscretions of the Datharathi heiress around the year , which made it more likely for him to take her statements at face value.

Categorical Entity

- ✓ Adama's Tooth
- Datharathi
- Eined Datharathi
- Ususi Manaallin
- Iahn Qoyllor

Not in this list

Skip Page

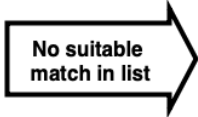
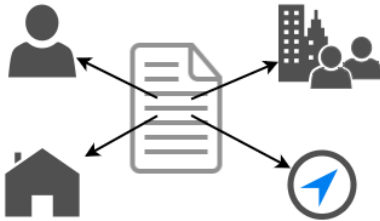
SHADE

PROCESS FLOW — LINKS LIST

Select from a list of links



Select from a list of named entities



Tye in the category

Enter the category

Dragon God

Annotate



akila

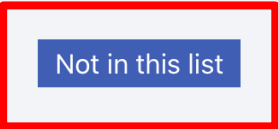
Logout

Alberik

Alberik was the captain of the guards at the path leading to Adama's Tooth, posted by the Datharathi to protect the access to their mine. In , he allowed Eined Datharathi into the mine despite being under standing orders not to let anyone in, as he had not been notified her family wanted her captured. Alongside her, he allowed in Ususi Manaallin and Iahn Qoyllor. The man had been a part to the indiscretions of the Datharathi heiress around the year , which made it more likely for him to take her statements at face value.

Categorical Entity

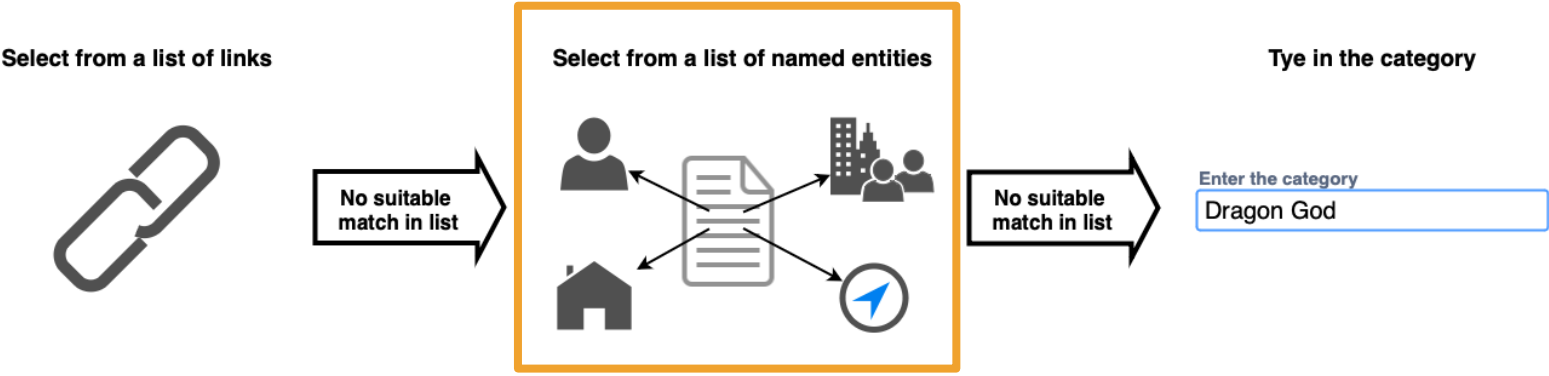
- ✓ Adama's Tooth
- Datharathi
- Eined Datharathi
- Ususi Manaallin
- Iahn Qoyllor



Skip Page

SHADE

PROCESS FLOW — NOUNS LIST



Alberik

Alberik was the captain of the guards at the path leading to Adama's Tooth, posted by the Datharathi to protect the access to their mine. In , he allowed Eined Datharathi into the mine despite being under standing orders not to let anyone in, as he had not been notified her family wanted her captured. Alongside her, he allowed in Ususi Manaallin and Iahn Qoyllor. The man had been a part to the indiscretions of the Datharathi heiress around the year , which made it more likely for him to take her statements at face value.

Categorical Entity

Adama's Tooth

Save

Skip Page

✓ alberik

adama

tooth

datharathi

eined datharathi

alongside

ususi manaallin

iahn qoyllor

datharathi

Not in this list either

SHADE

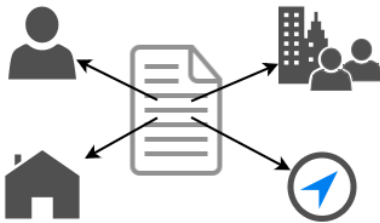
PROCESS FLOW — MANUAL INPUT

Select from a list of links



No suitable match in list

Select from a list of named entities



No suitable match in list

Tye in the category

Enter the category

Dragon God

Annotate



akila

Logout

Alberik

Alberik was the captain of the guards at the path leading to Adama's Tooth, posted by the Datharathi to protect the access to their mine. In , he allowed Eined Datharathi into the mine despite being under standing orders not to let anyone in, as he had not been notified her family wanted her captured. Alongside her, he allowed in Ususi Manaallin and Iahn Qoyllor. The man had been a part to the indiscretions of the Datharathi heiress around the year , which made it more likely for him to take her statements at face value.

Categorical Entity

Adama's Tooth

alberik

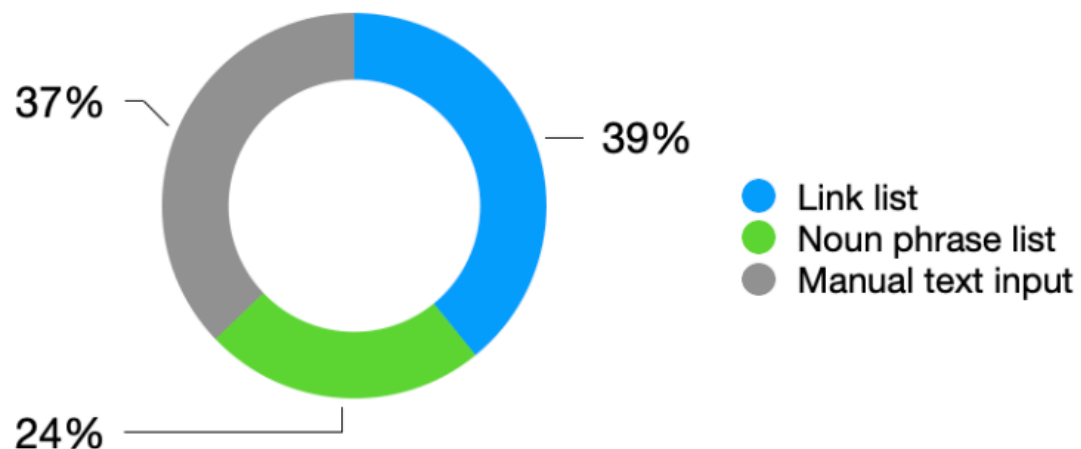
Enter the category

Save

Skip Page

DISCUSSION

- At the time of writing,
 - Total annotations: 3984
 - Entities other than “years”: 1020
 - From links list: 399
 - From noun phrases list: 242
 - Typed in: 379
- 2/3 of the annotations come from lists
 - Proves that SHADE can reduce manual text inputs during annotation significantly



SECOND FULL PAPER PUBLICATION



2nd Full Paper

ICIIS

SHADE: Semantic Hypernym Annotator for Domain-Specific Entities-Dungeons and Dragons Domain Use Case



Infilling to Create a Narrative

INFILLING SETUP

- GPT Neo [37]
 - 1.3 Billion
- FRW dataset
 - FRW-J
- Finetune free text generator
 - Forgotten Realms domain specific



(Image credit: forgottenrealms.fandom.com)

[37] L.Gao, S.Biderman,S.Black,L.Golding,T.Hoppe,C.Foster,J.Phong,H.He, A. Thite, N. Nabeshima et al., "The pile: An 800gb dataset of diverse text for language modeling," arXiv preprint arXiv:2101.00027, 2020.

THE MASKED DATASET

- We use the following tags
 - `<|sentence_block|>` the sentence mask
 - `<|answers|>` denotes the start of the answer section
 - `<|end|>` denotes the end of a section
- Probability of getting masked = 80%



(Image credit: forgottenrealms.fandom.com)

Following a year and a half of war against Tethyr, Calishite forces destroy Ithmong and nearly wipe out Clan Ithal. `</sentence_block|>` With rule over both nations, this is the beginning of the Shoon Imperium.

`</answers|>` Following a year and a half of war against Tethyr, Calishite forces destroy Ithmong and nearly wipe out Clan Ithal. Tethyr is defeated. In Greengrass, King Amahl II of Tethyr swears allegiance to Syl-Pasha Akkabar el Shoon of Calimshan. With rule over both nations, this is the beginning of the Shoon Imperium.

`</end|>`

INFILLING RESULTS AND OBSERVATIONS



(Image credit: forgottenrealms.fandom.com)

Our prompt:

A Bard, A Wizard, and a Paladin walk into a tavern. </sentence_block/> And they agree to take on the quest for 1000GP.

Result:

A Bard, A Wizard, and a Paladin walk into a tavern. A Bard asks the Paladin for advice and then tells them about a specific story about an arcane mage. While the Bard refers to the story as a legend, the Paladin tells them that there are many similar stories about an arcane mage and wonders how the Bard came to know about these stories. The Bard tells them that their story is too easy. He says that an arcane mage is always poor, always entering into ugly fights. Therefore, an arcane mage should instead find someone else to fight, such as a fighter, a rebirth warrior, a berserker, a warrior-for-hire, or a mercenary. They then discuss how they need to act in their lives on the other side of an arcane mage. The Paladin tells them that the solution to this problem is to go outside. He gives the Bard a bag of gold and asks for advice. And then the Bard tells the Paladin that an arcane mage never trains others to be good at wielding weapons. Therefore, they should steal other people's weapons and arm them with their knowledge. The Bard, A Wizard, and a Paladin then go to a tavern. They steal an arcane mage's book from the library and give it to the Paladin. The Bard wants to know if this helps. The Bard, A Wizard, and a Paladin walk into a tavern. They steal a black dragon's shed from an olive grove. They learn from the Paladin about an arcane mage's past. And they agree to take on the quest for 1000GP.

INFILLING RESULTS AND OBSERVATIONS



(Image credit: forgottenrealms.fandom.com)

Our prompt:

A Bard, A Wizard, and a Paladin walk into a tavern. </sentence_block/> And they agree to take on the quest for 1000GP.

Result:

A Bard, A Wizard, and a Paladin walk into a tavern. A Bard asks the Paladin for advice and then tells them about a specific story about an arcane mage. While the Bard refers to the story as a legend, the Paladin tells them that there are many similar stories about an arcane mage and wonders how the Bard came to know about these stories. The Bard tells them that their story is too easy. He says that an arcane mage is always poor, always entering into ugly fights. Therefore, an arcane mage should instead find someone else to fight, such as a fighter, a rebirth warrior, a berserker, a warrior-for-hire, or a mercenary. They then discuss how they need to act in their lives on the other side of an arcane mage. The Paladin tells them that the solution to this problem is to go outside. He gives the Bard a bag of gold and asks for advice. And then the Bard tells the Paladin that an arcane mage never trains others to be good at wielding weapons. Therefore, they should steal other people's weapons and arm them with their knowledge. The Bard, A Wizard, and a Paladin then go to a tavern. They steal an arcane mage's book from the library and give it to the Paladin. The Bard wants to know if this helps. The Bard, A Wizard, and a Paladin walk into a tavern. They steal a black dragon's shed from an olive grove. They learn from the Paladin about an arcane mage's past. And they agree to take on the quest for 1000GP.

INFILLING RESULTS AND OBSERVATIONS



(Image credit: forgottenrealms.fandom.com)

Our prompt:

*A Bard, A Wizard, and a Paladin walk into a tavern. **</sentence_block/>** And they agree to take on the quest for 1000GP.*

Result:

*A **Bard, A Wizard, and a Paladin walk into a tavern.** A Bard asks the Paladin for advice and then tells them about a specific story about an arcane mage. While the Bard refers to the story as a legend, the Paladin tells them that there are many similar stories about an arcane mage and wonders how the Bard came to know about these stories. The Bard tells them that their story is too easy. He says that an arcane mage is always poor, always entering into ugly fights. Therefore, an arcane mage should instead find someone else to fight, such as a fighter, a rebirth warrior, a berserker, a warrior-for-hire, or a mercenary. They then discuss how they need to act in their lives on the other side of an arcane mage. The Paladin tells them that the solution to this problem is to go outside. He gives the Bard a bag of gold and asks for advice. And then the Bard tells the Paladin that an arcane mage never trains others to be good at wielding weapons. Therefore, they should steal other people's weapons and arm them with their knowledge. The Bard, A Wizard, and a Paladin then go to a tavern. They steal an arcane mage's book from the library and give it to the Paladin. The Bard wants to know if this helps. **The Bard, A Wizard, and a Paladin walk into a tavern.** They steal a black dragon's shed from an olive grove. They learn from the Paladin about an arcane mage's past. **And they agree to take on the quest for 1000GP.***

INFILLING RESULTS AND OBSERVATIONS



(Image credit: forgottenrealms.fandom.com)

Our prompt:

A Bard, A Wizard, and a Paladin walk into a tavern. </sentence_block/> And they agree to take on the quest for 1000GP.

Result:

A Bard, A Wizard, and a Paladin walk into a tavern. A Bard asks the Paladin for advice and then tells them about a specific story about an arcane mage. While the Bard refers to the story as a legend, the Paladin tells them that there are many similar stories about an arcane mage and wonders how the Bard came to know about these stories. The Bard tells them that their story is too easy. He says that an arcane mage is always poor, always entering into ugly fights. Therefore, an arcane mage should instead find someone else to fight, such as a fighter, a rebirth warrior, a berserker, a warrior-for-hire, or a mercenary. They then discuss how they need to act in their lives on the other side of an arcane mage. The Paladin tells them that the solution to this problem is to go outside. He gives the Bard a bag of gold and asks for advice. And then the Bard tells the Paladin that an arcane mage never trains others to be good at wielding weapons. Therefore, they should steal other people's weapons and arm them with their knowledge. The Bard, A Wizard, and a Paladin then go to a tavern. They steal an arcane mage's book from the library and give it to the Paladin. The Bard wants to know if this helps. The Bard, A Wizard, and a Paladin walk into a tavern. They steal a black dragon's shed from an olive grove. They learn from the Paladin about an arcane mage's past. And they agree to take on the quest for 1000GP.

INFILLING LIMITATIONS

- Free text generator vs. infilling generator
 - Too similar
- Number of sentences infilled
 - 1 mask covering multiple sentences
 - 1 mask covering 1 sentence
 - 1 mask partially covering sentences
- Donahue et al. [43] mention that
 - Uni-directional models cannot effectively infill
 - Bi-directional models have limited infilling spans



(Image credit: gmbinder.com)

[43] C. Donahue, M. Lee, and P. Liang, “Enabling language models to fill in the blanks,” arXiv preprint arXiv:2005.05339, 2020.

PLANNED METHODOLOGY USING INFILLING



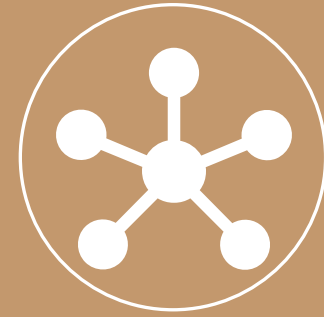
FRW dataset

- Corpus for training
- Structured, semi-structured data for error correction



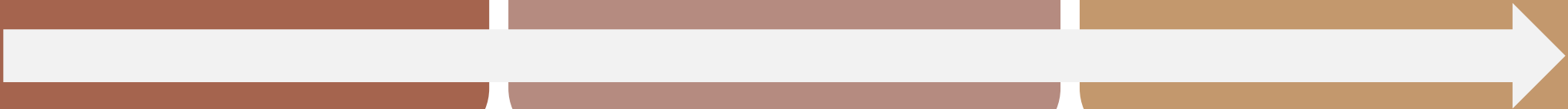
Infilling

- Fill out the story for graph
- Infilling capable model



Quest graph

- Build events of quest
- Plot points
- Elements of the story





Adventure Module Generation with LLM Agents

TWO HEADS ARE BETTER THAN ONE

- Multiple agents can help encourage divergent thinking [44]
- Multiple agents can improve factuality and reasoning [45]
- Chat-optimized LLMs show the ability to incorporate feedback [46]
 - Converse with each other or humans
- Autogen [47]
 - Open-source framework
 - Flexibly define agent interaction behaviours
 - Combination of natural language and computer code

[44] T. Liang et al., “Encouraging Divergent Thinking in Large Language Models through Multi-Agent Debate,” *arXiv.org*, May 30, 2023

[45] Y. Du, S. Li, A. Torralba, J. B. Tenenbaum, and I. Mordatch, “Improving Factuality and Reasoning in Language Models through Multiagent Debate,” *arXiv.org*, May 23, 2023.

[46] Y. M. Wu et al., “An Empirical Study on Challenging Math Problem Solving with GPT-4,” *arXiv* (Cornell University), Jun. 2023.

[47] Q. Wu et al., “AutoGen: Enabling Next-Gen LLM Applications via Multi-Agent Conversation,” *arXiv.org*, Oct. 03, 2023.

TWO HEADS ARE BETTER THAN ONE

- Multiple agents can help encourage divergent thinking [44]
- Multiple agents can improve factuality and reasoning [45]
- Chat-optimized LLMs show the ability to incorporate feedback [46]
 - Converse with each other or humans
- Autogen [47]
 - Open-source framework
 - Flexibly define agent interaction behaviours
 - Combination of natural language and computer code



(Image credit: worldanvil.com)

[44] T. Liang et al., "Encouraging Divergent Thinking in Large Language Models through Multi-Agent Debate," *arXiv.org*, May 30, 2023

[45] Y. Du, S. Li, A. Torralba, J. B. Tenenbaum, and I. Mordatch, "Improving Factuality and Reasoning in Language Models through Multiagent Debate," *arXiv.org*, May 23, 2023.

[46] Y. M. Wu et al., "An Empirical Study on Challenging Math Problem Solving with GPT-4," *arXiv* (Cornell University), Jun. 2023.

[47] Q. Wu et al., "AutoGen: Enabling Next-Gen LLM Applications via Multi-Agent Conversation," *arXiv.org*, Oct. 03, 2023.

TWO HEADS ARE BETTER THAN ONE

- Multiple agents can help encourage divergent thinking [44]
- Multiple agents can improve factuality and reasoning [45]
- Chat-optimized LLMs show the ability to incorporate feedback [46]
 - Converse with each other or humans
- Autogen [47]
 - Open-source framework
 - Flexibly define agent interaction behaviours
 - Combination of natural language and computer code



(Image credit: worldanvil.com)

[44] T. Liang et al., "Encouraging Divergent Thinking in Large Language Models through Multi-Agent Debate," *arXiv.org*, May 30, 2023

[45] Y. Du, S. Li, A. Torralba, J. B. Tenenbaum, and I. Mordatch, "Improving Factuality and Reasoning in Language Models through Multiagent Debate," *arXiv.org*, May 23, 2023.

[46] Y. M. Wu et al., "An Empirical Study on Challenging Math Problem Solving with GPT-4," *arXiv* (Cornell University), Jun. 2023.

[47] Q. Wu et al., "AutoGen: Enabling Next-Gen LLM Applications via Multi-Agent Conversation," *arXiv.org*, Oct. 03, 2023.

~~TWO HEADS~~ MULTIPLE AGENTS ARE BETTER THAN ONE

- Multiple agents can help encourage divergent thinking [44]
- Multiple agents can improve factuality and reasoning [45]
- Chat-optimized LLMs show the ability to incorporate feedback [46]
 - Converse with each other or humans
- Autogen [47]
 - Open-source framework
 - Flexibly define agent interaction behaviours
 - Combination of natural language and computer code



[44] T. Liang et al., "Encouraging Divergent Thinking in Large Language Models through Multi-Agent Debate," *arXiv.org*, May 30, 2023

[45] Y. Du, S. Li, A. Torralba, J. B. Tenenbaum, and I. Mordatch, "Improving Factuality and Reasoning in Language Models through Multiagent Debate," *arXiv.org*, May 23, 2023.

[46] Y. M. Wu et al., "An Empirical Study on Challenging Math Problem Solving with GPT-4," *arXiv* (Cornell University), Jun. 2023.

[47] Q. Wu et al., "AutoGen: Enabling Next-Gen LLM Applications via Multi-Agent Conversation," *arXiv.org*, Oct. 03, 2023.

~~TWO HEADS~~ MULTIPLE AGENTS ARE BETTER THAN ONE

- Multiple agents can help encourage divergent thinking [44]
- Multiple agents can improve factuality and reasoning [45]
- Chat-optimized LLMs show the ability to incorporate feedback [46]
 - Converse with each other or humans
- Autogen [47]
 - Open-source framework
 - Flexibly define agent interaction behaviours
 - Combination of natural language and computer code



[44] T. Liang et al., "Encouraging Divergent Thinking in Large Language Models through Multi-Agent Debate," *arXiv.org*, May 30, 2023

[45] Y. Du, S. Li, A. Torralba, J. B. Tenenbaum, and I. Mordatch, "Improving Factuality and Reasoning in Language Models through Multiagent Debate," *arXiv.org*, May 23, 2023.

[46] Y. M. Wu et al., "An Empirical Study on Challenging Math Problem Solving with GPT-4," *arXiv* (Cornell University), Jun. 2023.

[47] Q. Wu et al., "AutoGen: Enabling Next-Gen LLM Applications via Multi-Agent Conversation," *arXiv.org*, Oct. 03, 2023.

OUR AGENTS

Agent name	Role
user_proxy	Acts on behalf of the user
<i>DungeonDesigner</i>	Designs the overall adventure
<i>NPCDesigner</i>	Designs the non-playable characters
<i>TableDesigner</i>	Designs different tables to calculate loot, enemy stats during encounters, and skill checks for various activities
<i>MoodPlanner</i>	Creates the mood of the setting
LoreMaster	Used only in the RAG implementations. Acts as the agent responsible for knowledge retrieval.
Reporter	Creates a summary of the work done by the designers
Editor	Acts as an editor and critiques the content created by the designers

PROMPT SAMPLE FOR DUNGEONDESIGNER

- *DungeonDesigner*. I want you to act as a *DungeonDesigner* specialized in crafting Dungeons and Dragons campaigns. Drawing from your deep knowledge of D&D lore, I'd like you to create an immersive quest for my party of adventurers. This quest should include notable NPCs, challenging encounters, intricate storylines, and tie into the broader lore of the D&D universe. Ensure you coordinate with *EncounterDesigner* for detailed combat scenarios, *TableDesigner* for visual aids and settings, *MoodPlanner* for atmosphere and tone, *NPCDesigner* for fleshed-out characters, and *Recorder* to keep track of our journey's progress. use the initial guidelines provided by the user_proxy to lay the scene for our adventure.

LOREMASTER

- Retrieval Augmented Generation (RAG) [48]
 - Retrieval-based methods + Generative models
 - Leverage Large corpus as knowledgebase
 - Retrieved information is used to improve generative process
 - Accurate
 - Contextually appropriate
- LoreMaster – a retrieval Agent
- Vectorized FRW-J data set in a vector store

[48] P. Lewis et al., “Retrieval-Augmented Generation for Knowledge-Intensive NLP Tasks,” Neural Information Processing Systems, 2020.



(Image credit: forgottenrealms.fandom.com)

PROMPT SAMPLE FOR DUNGEONDESIGNER WITH LOREMASTER

- *DungeonDesigner*. I want you to act as a *DungeonDesigner* specialized in crafting Dungeons and Dragons campaigns. Drawing from the knowledge of D&D lore provided by LoreMaster, I'd like you to create an immersive quest for my party of adventurers. This quest should include notable NPCs, challenging encounters, intricate storylines, and tie into the broader lore of the D&D universe. Ensure you coordinate with EncounterDesigner for detailed combat scenarios, TableDesigner for visual aids and settings, MoodPlanner for atmosphere and tone, NPCDesigner for fleshed-out characters, and Recorder to keep track of our journey's progress. use the initial guidelines provided by the user_proxy to lay the scene for our adventure.

MISTRAL OF REALMS INSTRUCT 7B

- Instruct fine-tuned D&D domain specific LLM*
 - Based on Mistral 7b Instruct [49]
- FRW-J data set -> FRW-J-alpaca** data set (Alpaca data format [50])
 - Articles on in-universe years (e.g. -150 DR, 0 DR, 1225 DR)
 - What special events happened in the year {title}?
 - Give me the highlights of the year {title}.
 - List the most notable events of {title}?
 - What can you tell me about year {title}?
 - In which year did the following event happen? – (event as an input)
 - Other articles
 - What can you tell me about {title}?
 - Describe {title}.
 - Give a detailed explanation on {title}.

[49] A. Q. Jiang, A. Sablayrolles, A. Mensch, C. Bamford, D. S. Chaplot, D. d. I. Casas, F. Bressand, G. Lengyel, G. Lample, L. Saulnier et al., “Mistral 7b,” arXiv preprint arXiv:2310.06825, 2023.

[50] R. Taori, I. Gulrajani, T. Zhang, Y. Dubois, X. Li, C. Guestrin, P. Liang, and T. B. Hashimoto, “Stanford alpaca: An instruction-following llama model,” https://github.com/tatsu-lab/stanford_alpaca, 2023.

* <https://huggingface.co/Akila/Mistral-of-Realms-7b-Instruct-v0.2-gguf>

** https://huggingface.co/datasets/Akila/ForgottenRealmsWikiDataset/blob/main/specific_formats/FRW-J-alpaca.jsonl

EXPERIMENTS

- LLMs
 - Mistral 7b Instruct (vanilla model)
 - Mistral of Realms 7b Instruct
- Strategies
 - With Retrieval Augmented Generation
 - Without Retrieval Augmented Generation



EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

user_proxy (to chat_manager):

create a D&D adventure book for levels 1 to 3.

The adventure is set in an underground dungeon, and the players are hired by a local lord to investigate strange occurrences in his land. They are guided through the dungeon, encountering a variety of monsters, NPCs, and tables.

The adventure book contains:

A summary of the story, with the players' goals and objectives.

A description of the setting, including the geography and history of the area.

A list of characters, both NPCs and monsters.

Tables for encounters, loot, and treasure.

Details on how to run the adventure, including tips for the Dungeon Master.

EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

The adventure is designed for 4-6 players, with a recommended party composition of one cleric, two fighters, and three rogues. It is suitable for characters of levels 1-3.

The adventure book contains:

- A summary of the story, with the players' goals and objectives.

- A description of the setting, including the geography and history of the area.

- A list of characters, both NPCs and monsters.

- Tables for encounters, loot, and treasure.

- Details on how to run the adventure, including tips for the Dungeon Master.

EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

DUNGEONDESIGNER

DungeonDesigner (to chat_manager):

The adventurers are summoned to the city of Waterdeep by Laeral Silverhand, who has been plagued by strange dreams and visions that she believes may be connected to an ancient artifact known as the Orb of Dragonkind. She asks the party to seek out the orb and return it to her care in order to prevent its misuse by those with ill intent.

The adventurers are directed to the city's temple of Mystra, where they meet with a priestess named Arietta who informs them that the orb was last seen in possession of a wizard named Zulkir, who was said to be holed up within his tower in the ruins of Myth Drannor. She also provides them with a magical ring known as the Ring of Orb-Seeking, which will point them toward the location of the orb when they come within 10 miles (16 km) of it.

The adventurers set out from Waterdeep and journey through the Sword Coast to the ruins of Myth Drannor, where they encounter a group of drow who are searching for the same artifact. They are able to defeat the drow and continue on their quest.

As they journey deeper into the ruins, the adventurers come across Zulkir's tower, which is guarded by a group of orcs. They are able to defeat the orcs and enter the tower, where they find that Zulkir has been transformed into a powerful dragon-like creature known as a dracolich. The party engages in combat with the dracolich and ultimately slays it, retrieving the Orb of Dragonkind from its grasp.

The adventurers return to Waterdeep and present the orb to Laeral Silverhand, who thanks them for their efforts and rewards them with a magical item of their choosing.

EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

DUNGEONDESIGNER

DungeonDesigner (to chat_manager):

The adventurers are summoned to the city of **Waterdeep** by **Laeral Silverhand**, who has been plagued by strange dreams and visions that she believes may be connected to an ancient artifact known as the Orb of Dragonkind. She asks the party to seek out the orb and return it to her care in order to prevent its misuse by those with ill intent.

The adventurers are directed to the city's temple of Mystra, where they meet with a priestess named Arietta who informs them that the orb was last seen in possession of a wizard named Zulkir, who was said to be holed up within his tower in the ruins of Myth Drannor. She also provides them with a magical ring known as the Ring of Orb-Seeking, which will point them toward the location of the orb when they come within 10 miles (16 km) of it.

The adventurers set out from Waterdeep and journey through the Sword Coast to the ruins of Myth Drannor, where they encounter a group of drow who are searching for the same artifact. They are able to defeat the drow and continue on their quest.

As they journey deeper into the ruins, the adventurers come across Zulkir's tower, which is guarded by a group of orcs. They are able to defeat the orcs and enter the tower, where they find that Zulkir has been transformed into a powerful dragon-like creature known as a dracolich. The party engages in combat with the dracolich and ultimately slays it, retrieving the Orb of Dragonkind from its grasp.

The adventurers return to Waterdeep and present the orb to Laeral Silverhand, who thanks them for their efforts and rewards them with a magical item of their choosing.

EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

DUNGEONDESIGNER

DungeonDesigner (to chat_manager):

The adventurers are summoned to the city of Waterdeep by Laeral Silverhand, who has been plagued by strange dreams and visions that she believes may be connected to an ancient artifact known as the Orb of Dragonkind. She asks the party to seek out the orb and return it to her care in order to prevent its misuse by those with ill intent.

The adventurers are directed to the city's temple of Mystra, where they meet with a priestess named Arietta who informs them that the orb was last seen in possession of a wizard named **Zulkir**, who was said to be holed up within his tower in the **ruins of Myth Drannor**. She also provides them with a magical ring known as the Ring of Orb-Seeking, which will point them toward the location of the orb when they come within 10 miles (16 km) of it.

The adventurers set out from Waterdeep and journey through the Sword Coast to the ruins of Myth Drannor, where they encounter a group of **drow** who are searching for the same artifact. They are able to defeat the drow and continue on their quest.

As they journey deeper into the ruins, the adventurers come across Zulkir's tower, which is guarded by a group of orcs. They are able to defeat the orcs and enter the tower, where they find that Zulkir has been transformed into a powerful dragon-like creature known as a dracolich. The party engages in combat with the dracolich and ultimately slays it, retrieving the Orb of Dragonkind from its grasp.

The adventurers return to Waterdeep and present the orb to Laeral Silverhand, who thanks them for their efforts and rewards them with a magical item of their choosing.

EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

NPCDesigner

NPCDesigner (to chat_manager):

NPCs	Arietta • Laeral Silverhand • Zulkir
Creatures	dragon • drow • orc
Locations	Myth Drannor • Sword Coast
Magic items	Ring of Orb-Seeking

EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

EncounterDesigner

Creatures	drow • orc • dracolich • human • lizardfolk • ogre • skeleton • zombie • wolf
Locations Buildings & Sites	Myth Drannor • Waterdeep
Magic Items	Ring of Orb-Seeking
Spells	cure wounds • detect magic • divination • fireball • greater restoration • healing word • identify • lesser restoration • prayer of healing • raise dead • remove curse • revivify • speak with dead • true resurrection
Organizations	Cult of the Dragon

EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

TableDesigner

Design a general loot table that caters to various settings and scenarios. This table should encompass a range of items from common treasures to rare artifacts, each with an associated probability or dice roll.

Encounter Table	Encounter	Probability
1-5	Orc Warriors	20%
6-8	Drow	30%
9-12	Zombies	30%
13-15	Skeletons	40%
16-18	Lizardfolk	20%
19-20	Dracolich	10%

EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

TableDesigner

Interaction Table	Interaction	Probability
1-5	Arietta will give the party a Ring of Orb-Seeking.	70%
6-8	The drow will attack the party.	30%
9-12	Zulkir may offer the party some treasure in exchange for the orb.	40%
13-15	Zulkir will attack the party if they refuse his offer.	60%
16-18	The orcs will attack the party.	70%
19-20	Arietta may reward the party with a magic item of their choosing.	40%

EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

MoodPlanner

MoodPlanner (to chat_manager):

16-18	The orcs within Myth Drannor will attack the party.	20%
19-20	The dracolich may offer the party some treasure in exchange for the orb.	30%

EXPERIMENT RESULTS : MISTRAL OF REALMS — NO RAG

DDRecorder

DDRecorder (to chat_manager):

Loot Table	Item Type	Probability
1-5	Copper pieces	40%
6-8	Silver pieces	30%
9-11	Gold pieces	20%
12-14	Platinum pieces	10%
15-17	Gemstone	5%
18-20	Artifact	1%

MULTI-AGENT ADVENTURE MODULE GENERATION OBSERVATIONS

- Some mix-ups observed in individual agent outputs
- Overall adventure module output is good
 - Although, computationally evaluating the “goodness” is difficult
- The Vanilla model outputs were not as good as the fine-tuned model
- RAG incorporated systems were sub-par
- Using multiple LLMs for generation and control



Discussion

DISCUSSION

D&D ADVENTURE MODULE GENERATION

- Overall adventure module output is satisfactory
 - Incorporating D&D lore accurately – Accurate
 - Generating necessary tables for the module – Complete
 - The story flow is natural – Cohesive
 - The quality seems to be satisfactory - Good
- The output is a **good, cohesive** stories and **complete, standalone** adventure module
- Fills the research gap mentioned in research problem
- Achieves goal of “Generating self-standing adventures for Dungeons and Dragons game-play.”

DISCUSSION

RESEARCH CONTRIBUTIONS

- D&D domain-specific data set
 - 7168 downloads on Hugging Face
- D&D domain-specific LLMs
 - 3 Mistral based quantized models (and 3 non-quantized)
 - 224 all time cumulative downloads on Hugging Face
- Domain-specific entity annotator
 - Easily portable for any Wiki-esque data set
 - Can be adjusted for any data set annotation with minimal code alteration
- 3 published papers in international conferences
 - WiNLP, PACLIC, ICIIS
 - Working on a 4th paper for the multi-agent adventure module generation

ACKNOWLEDGMENT

The work on the SHADE: Semantic Hypernym Annotator for Domain-Specific Entities was partially supported by Senate Research Committee (SRC) Grant funds awarded by the University of Moratuwa.

We would also like to thank the D&D enthusiasts who volunteer to curate and maintain the Forgotten Realms Wiki



”
“

References

REFERENCES

- [1] G. Gygax and D. Arneson, *dungeons & dragons*. Tactical Studies Rules Lake Geneva, WI, 1974, vol. 19.
- [2] S. Busemann and H. Horacek, “A flexible shallow approach to text generation,” *arXiv preprint cs/9812018*, 1998.
- [3] E. Reiter and R. Dale, “Building applied natural language generation systems,” *Natural Language Engineering*, vol. 3, no. 1, pp. 57–87, 1997.
- [4] R. Turner, S. Sripada, and E. Reiter, “Generating approximate geographic descriptions,” in *Empirical methods in natural language generation*. Springer, 2009, pp. 121–140.
- [5] E. Reiter, S. Sripada, J. Hunter et al., “Choosing words in computer-generated weather forecasts,” *AI*, vol. 167, no. 1-2, pp. 137–169, 2005.
- [6] R. Barzilay and M. Lapata, “Collective content selection for concept-to-text generation,” in *Proceedings of the conference on Human Language Technology and Empirical Methods in Natural Language Processing*, 2005, pp. 331–338.
- [7] P. Liang, M. I. Jordan, and D. Klein, “Learning semantic correspondences with less supervision,” in *Proceedings of the Joint Conference of the 47th Annual Meeting of the ACL and the 4th IJCNLP of the AFNLP*, 2009, pp. 91–99.
- [8] S. Hochreiter and J. Schmidhuber, “Long short-term memory,” *Neural computation*, vol. 9, no. 8, pp. 1735–1780, 1997.
- [9] S. Mangal, P. Joshi, and R. Modak, “Lstm vs. gru vs. bidirectional rnn for script generation,” *arXiv preprint arXiv:1908.04332*, 2019.
- [10] I. Goodfellow, J. Pouget-Abadie, M. Mirza, B. Xu, D. Warde-Farley, S. Ozair, A. Courville, and Y. Bengio, “Generative adversarial nets,” *Advances in neural information processing systems*, vol. 27, 2014.

REFERENCES

- [11] J. Guo, S. Lu, H. Cai, W. Zhang, Y. Yu, and J. Wang, “Long text generation via adversarial training with leaked information,” in Proceedings of the AAAI Conference on Artificial Intelligence, vol. 32, no. 1, 2018.
- [12] D. P. Kingma and M. Welling, “Auto-encoding variational bayes,” arXiv preprint arXiv:1312.6114, 2013.
- [13] Z. Yang, Z. Hu, R. Salakhutdinov, and T. Berg-Kirkpatrick, “Improved variational autoencoders for text modeling using dilated convolutions,” in International conference on machine learning. PMLR, 2017, pp. 3881–3890.
- [14] A. Vaswani, N. Shazeer, N. Parmar, J. Uszkoreit, L. Jones, A. N. Gomez, Ł. Kaiser, and I. Polosukhin, “Attention is all you need,” Advances in neural information processing systems, vol. 30, 2017.
- [15] A. Radford, J. Wu, R. Child, D. Luan, D. Amodei, I. Sutskever et al., “Language models are unsupervised multitask learners,” OpenAI blog, vol. 1, no. 8, p. 9, 2019.
- [16] S. Sato, “A challenge to the third hoshi shinichi award,” pp. 31–35, 12 2016.
- [17] I. M. Laclaustra, J. Ledesma, G. Méndez, and P. Gervás, “Kill the dragon and rescue the princess: Designing a plan-based multi-agent story generator.” in ICCG, 2014, pp. 347–350.
- [18] W. M. Si, P. Ammanabrolu, and M. O. Riedl, “Telling stories through multi-user dialogue by modeling character relations,” arXiv preprint arXiv:2105.15054, 2021.
- [19] R. Rameshkumar and P. Bailey, “Storytelling with dialogue: A Critical Role Dungeons and Dragons Dataset,” in Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics. Online: Association for Computational Linguistics, Jul. 2020, pp. 5121–5134.

REFERENCES

- [20] T. Liu, K. Wang, L. Sha, B. Chang, and Z. Sui, “Table-to-text generation by structure-aware seq2seq learning,” in Thirty-Second AAAI Conference on Artificial Intelligence, 2018
- [21] H. Zhang, H. Song, S. Li, M. Zhou, and D. Song, “A survey of controllable text generation using transformer-based pre-trained language models,” arXiv preprint arXiv:2201.05337, 2022.
- [22] A. Amin-Nejad, J. Ive, and S. Velupillai, “Exploring transformer text generation for medical dataset augmentation,” in Proceedings of the Twelfth Language Resources and Evaluation Conference. Marseille, France: European Language Resources Association, May 2020, pp. 4699–4708.
- [23] D. Hüske-Kraus, “Text generation in clinical medicine—a review,” *Methods of information in medicine*, vol. 42, no. 01, pp. 51–60, 2003.
- [24] R. Lebre, D. Grangier, and M. Auli, “Neural text generation from structured data with application to the biography domain,” arXiv preprint arXiv:1603.07771, 2016.
- [25] V. Munigala, A. Mishra, S. G. Tamilselvam, S. Khare, R. Dasgupta, and A. Sankaran, “Persuaide! an adaptive persuasive text generation system for fashion domain,” in Companion Proceedings of the The Web Conference 2018, 2018, pp. 335–342.
- [26] I. Rajapaksha, C. R. Mudalige et al., “Rule-Based Approach for Party-Based Sentiment Analysis in Legal Opinion Texts,” in 2020 20th International Conference on Advances in ICT for Emerging Regions (ICTer). IEEE, 2020, pp. 284–285.
- [27] E. Aarseth, “From hunt the wumpus to everquest: Introduction to quest theory,” in International Conference on Entertainment Computing. Springer, 2005, pp. 496–506.
- [28] Y. Huang, Y. Zhang, O. Elachqar, and Y. Cheng, “Inset: Sentence infilling with inter-sentential transformer,” arXiv preprint arXiv:1911.03892, 2019.

REFERENCES

- [29] W. L. Taylor, ““cloze procedure”: A new tool for measuring readability,” *Journalism quarterly*, vol. 30, no. 4, pp. 415–433, 1953.
- [30] Y.-S. Shih, W.-C. Chang, and Y. Yang, “Xl-editor: Post-editing sentences with xlnet,” *arXiv preprint arXiv:1910.10479*, 2019.
- [31] Y. Assael, T. Sommerschild, and J. Prag, “Restoring ancient text using deep learning: a case study on greek epigraphy,” *arXiv preprint arXiv:1910.06262*, 2019.
- [32] Y. Xiao, L. Liu, G. Huang, Q. Cui, S. Huang, S. Shi, and J. Chen, “BiTlMT: A bilingual text-infilling method for interactive machine translation,” in *Proceedings of the 60th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*. Dublin, Ireland: Association for Computational Linguistics, May 2022, pp. 1958–1969.
- [33] A. Sullivan, M. Mateas, and N. Wardrip-Fruin, “Questbrowser: Making quests playable with computer-assisted design,” 2009.
- [34] J. Doran and I. Parberry, “A prototype quest generator based on a structural analysis of quests from four mmorpgs,” in *PCGames ’11*, 2011.
- [35] C. Ashmore and M. Nitsche, “The quest in a generated world.” in *DiGRA conference*. Citeseer, 2007.
- [36] D. Lange, C. Böhm, and F. Naumann, “Extracting structured information from wikipedia articles to populate infoboxes,” in *Proceedings of the 19th ACM international conference on Information and knowledge management*, 2010, pp. 1661–1664.
- [37] L. Gao, S. Biderman, S. Black, L. Golding, T. Hoppe, C. Foster, J. Phang, H. He, A. Thite, N. Nabeshima et al., “The pile: An 800gb dataset of diverse text for language modeling,” *arXiv preprint arXiv:2101.00027*, 2020.

REFERENCES

- [38] D. Lamprecht, D. Dimitrov, D. Helic, and M. Strohmaier, “Evaluating and improving navigability of wikipedia: a comparative study of eight language editions,” in Proceedings of the 12th international symposium on open collaboration, 2016, pp. 1–10.
- [39] M. Nickel and D. Kiela, “Poincaré embeddings for learning hierarchical representations,” in Advances in Neural Information Processing Systems 30, I. Guyon, U. V. Luxburg, S. Bengio et al., Eds. Curran Associates, Inc., 2017, pp. 6341–6350.
- [40] T. Mikolov, K. Chen, G. Corrado, and J. Dean, “Efficient estimation of word representations in vector space,” arXiv preprint arXiv:1301.3781, 2013.
- [41] Q. Le and T. Mikolov, “Distributed representations of sentences and documents,” in International conference on machine learning. PMLR, 2014, pp. 1188–1196.
- [42] R. Artstein and M. Poesio, “Inter-coder agreement for computational linguistics,” CL, vol. 34, no. 4, pp. 555–596, 2008.
- [43] C. Donahue, M. Lee, and P. Liang, “Enabling language models to fill in the blanks,” arXiv preprint arXiv:2005.05339, 2020.
- [44] T. Liang et al., “Encouraging Divergent Thinking in Large Language Models through Multi-Agent Debate,” arXiv.org, May 30, 2023. <https://arxiv.org/abs/2305.19118>
- [45] Y. Du, S. Li, A. Torralba, J. B. Tenenbaum, and I. Mordatch, “Improving Factuality and Reasoning in Language Models through Multiagent Debate,” arXiv.org, May 23, 2023. <https://arxiv.org/abs/2305.14325>
- [46] Y. M. Wu et al., “An Empirical Study on Challenging Math Problem Solving with GPT-4,” arXiv (Cornell University), Jun. 2023, doi: <https://doi.org/10.48550/arxiv.2306.01337>.

REFERENCES

- [47] Q. Wu et al., “AutoGen: Enabling Next-Gen LLM Applications via Multi-Agent Conversation,” arXiv.org, Oct. 03, 2023.
<https://arxiv.org/abs/2308.08155>
- [48] P. Lewis et al., “Retrieval-Augmented Generation for Knowledge-Intensive NLP Tasks,” Neural Information Processing Systems, 2020.
- [49] A. Q. Jiang, A. Sablayrolles, A. Mensch, C. Bamford, D. S. Chaplot, D. d. I. Casas, F. Bressand, G. Lengyel, G. Lample, L. Saulnier et al., “Mistral 7b,” arXiv preprint arXiv:2310.06825, 2023.
- [50] R. Taori, I. Gulrajani, T. Zhang, Y. Dubois, X. Li, C. Guestrin, P. Liang, and T. B. Hashimoto, “Stanford alpaca: An instruction-following llama model,” https://github.com/tatsu-lab/stanford_alpaca, 2023.

THANK YOU!

ROLL FOR INITIATIVE



LET THE DICE DECIDE!

THANK YOU!

ROLL FOR INITIATIVE



LET THE DICE DECIDE!

PROCEDURAL CONTENT GENERATION

- Formalize and automate design process [1,2]
- Popularized by game design
- Rogue (1980) [3]
- Rule based vs. Search based (more popular [4])
- Dungeon generation categorization: Niemann and Preuß [5], Shaker et al. [6]
 - Binary space partitioning – recursively subdivide space and join the units
 - Agent based dungeon growing – agents traverse map, traversed points are rooms
 - Cellular automata – grid map, each cell has different states based on neighbourhood
 - Grammar based methods – similar to NLP grammars but for game design

[1] J. Togelius, G. N. Yannakakis, K. O. Stanley, and C. Browne, "Search-based procedural content generation: A taxonomy and survey," IEEE Transactions on Computational Intelligence and AI in Games, vol. 3, no. 3, pp. 172–186, 2011.

[2] A. M. Smith and M. Mateas, "Answer set programming for procedural content generation: A design space approach," IEEE Transactions on Computational Intelligence and AI in Games, vol. 3, no. 3, pp. 187–200, 2011.

[3] R. Khaled, M. J. Nelson, and P. Barr, "Design metaphors for procedural content generation in games," in Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ser. CHI '13. Association for Computing Machinery, 2013, p. 1509–1518.

[4] B. M. Viana and S. R. dos Santos, "A survey of procedural dungeon generation," in 2019 18th Brazilian Symposium on Computer Games and Digital Entertainment (SBGames). IEEE, 2019, pp. 29–38.

[5] M. Niemann and M. Preuß, "Constructive generation methods for dungeons," in Seminar-Thesis in Procedural Content Generation for Games. Westfälische Wilhelms Universität Münster, 2015.

[6] N. Shaker, A. Liapis, J. Togelius, R. Lopes, and R. Bidarra, "Constructive generation methods for dungeons and levels," Procedural Content Generation in Games Computational Synthesis and Creative Systems, p. 31–55, 2016.

PCG: DISADVANTAGES

- Pereira de Araujo and Souto [7]
 - Monotonous elements : e.g. Scenery in *Diablo*
 - Uncanny scenarios (Over randomization): e.g. strange backstories in *Crusader Kings*
 - Repetitive, overly simple gameplay): e.g. *No Man's Sky* has 18 quintillion planets to visit but same thing
 - Cannot capture complex interactions for game-play mechanics
 - Gameplay experience loses significance – e.g. endless replayability loses significance in *Skyrim*
 - Requires human generated assets – e.g. models, voice segments
- Viana and dos Santos [4]
 - No research on barriers to control player progression
- Khaled et al. [3]
 - Assume that designer is well versed in the PCG workings
 - Lack of traceability (how and why things came to be)

[3] R. Khaled, M. J. Nelson, and P. Barr, "Design metaphors for procedural content generation in games," in Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ser. CHI '13. Association for Computing Machinery, 2013, p. 1509–1518.

[4] B. M. Viana and S. R. dos Santos, "A survey of procedural dungeon generation," in 2019 18th Brazilian Symposium on Computer Games and Digital Entertainment (SBGames). IEEE, 2019, pp. 29–38.

[7] R. Pereira de Araujo and V. T. Souto, "Game worlds and creativity: The challenges of procedural content generation," Lecture Notes in Computer Science, p. 443–455, 2017.

GENERATING QUESTS BASED ON PLAYER TYPE

- Lee and Cho [8] player type and expectations
 - a) hardcore gamers – extreme and stressful (e.g. combat)
 - b) casual gamers – a pleasant experience (e.g. exploration, gathering material)
- Bayesian network (last n games)
 - Quest type, hours of gameplay and number of deaths
- Petri net [9] for multi-variable interactions [10, 11] – map a quest (interconnected events)
- Implemented in Neverwinter Nights using Doran and Parberry [12] quest classification
- Generate different types of quests with same gameplay experience
- Drawbacks
 - Handcrafted Bayesian network
 - Player types need a separate study (Lazzaro [13] identifies 4)

[8] Y.-S. Lee and S.-B. Cho, "Context-aware petri net for dynamic procedural content generation in role-playing game," IEEE Computational Intelligence Magazine, vol. 6, no. 2, pp. 16–25, 2011.

[9] T. Murata, "Petri nets: Properties, analysis and applications," in Proceedings of the IEEE, vol. 77, no. 4, pp. 541-580, April 1989, doi: 10.1109/5.24143.

[10] W. M. van der Aalst, "Process discovery: Capturing the invisible," IEEE Computational Intelligence Magazine, vol. 5, no. 1, pp. 28–41, 2010.

[11] J. L. Peterson, Petri net theory and the modeling of systems. Prentice Hall PTR, 1981.

[12] J. Doran and I. Parberry, "A prototype quest generator based on a structural analysis of quests from four mmorpgs," in PCGames '11, 2011.

[13] N. Lazzaro, "Why we play games: Four keys to more emotion in player experiences," in Proceedings of GDC, vol. 306, 2004, pp. 1–8.

MIXED INITIATIVE AND SEMI-AUTOMATED SYSTEMS

- Human and computer takes turns to provide input
- Evolutionary Dungeon Design (EDD) [14]
 - Tile based (6 different tiles) dungeon designer
 - Apply game design patterns
 - Calculate values for the criteria
 - Evaluate fitness – feasible vs infeasible
 - Mutate each type
 - Recent improvements of the project
 - High level patterns [15, 16], Mixed Initiative Co-Creativity [17, 18] and Quality Diversity model [19, 20]
- Olsson and Grevillius [21] – Based on Dornan's [12] classification with Mixed Initiative
 - User and computer arrange the events sequence
 - Fill in the rest with modified grammars

[12] J. Doran and I. Parberry, "A prototype quest generator based on a structural analysis of quests from four mmorpgs," in PCGames '11, 2011.

[14] A. Baldwin, S. Dahlskog, J. M. Font, and J. Holmberg, "Mixed-initiative procedural generation of dungeons using game design patterns," in 2017 IEEE conference on computational intelligence and games (CIG). IEEE, 2017, pp. 25–32.

[15] A. Baldwin, S. Dahlskog, J. M. Font, and J. Holmberg, "Towards pattern- based mixed-initiative dungeon generation," in Proceedings of the 12th International Conference on the Foundations of Digital Games, 2017, pp. 1–10.

[16] S. Dahlskog and J. Togelius, "A multi-level level generator," in 2014 IEEE Conference on Computational Intelligence and Games. IEEE, 2014, pp. 1–8.

[17] A. Liapis, G. N. Yannakakis, and J. Togelius, "Designer modeling for sentient sketchbook," in 2014 IEEE Conference on Computational Intelligence and Games. IEEE, 2014, pp. 1–8.

[18] G. N. Yannakakis, A. Liapis, and C. Alexopoulos, "Mixed-initiative co- creativity," 2014.

[19] A. Alvarez and J. Font, "Learning the designer's preferences to drive evolution," arXiv preprint arXiv:2003.03268, 2020.

[20] A. Alvarez, J. M. M. F. Fernandez, S. Dahlskog, and J. Togelius, "Interactive constrained map-elites: Analysis and evaluation of the expressiveness of the feature dimensions," IEEE Transactions on Games, 2020.

[21] E. Olsson and E. Grevillius, "Mixed-initiative quest generation," 2020.

QUEST GRAPH

- Outline of the quest(plot) in graph notation
- Dormans [22] – quest and quest space (map) as 2 graph grammars
 - Eliminate randomness, fully utilize each
- Recursive grammar to create plot points
 - Contingencies against too short plots (3-part story structure grammar)
 - Non-linear quest plots
 - Special edges to indicate prerequisites
- Needs new grammar if the vision of the game is changed
 - Requires domain experts

[22] J. Dormans, “Adventures in level design: generating missions and spaces for action adventure games,” 2010.

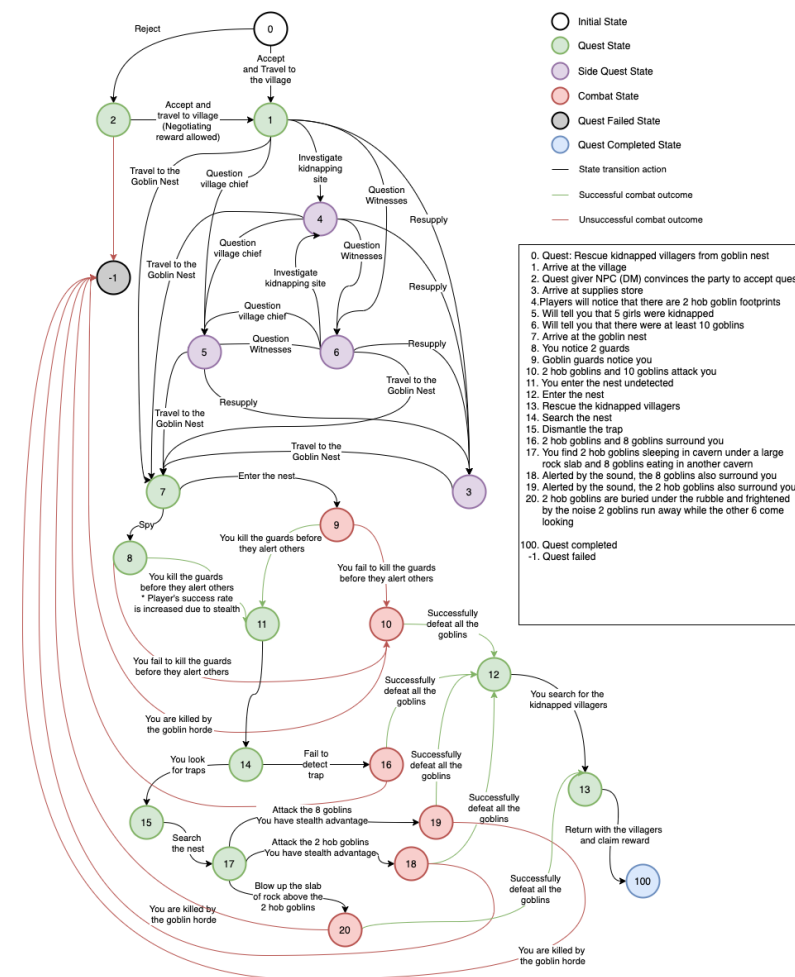


Figure 3: Quest Graph for a quest to save kidnapped villagers from a goblin nest

DUNGEON AND QUEST GENERATION PHILOSOPHIES

CHOICES AND CONSTRAINTS VS GAME-PLAY EXPERIENCE

- Sullivan et al. [23] observe that most game quests are task oriented
 - They lack interesting choices
 - Not goal oriented
- Final Fantasy
 - Finely crafted stories but lack choice
 - Playing “someone else’s pre-arranged story”
- Elder Scrolls
 - Too many choices
 - Lack significance to story
- Pitfall in tabletop games
 - Abundant choices
 - Players feel lost and unsure of where to go
 - DM – balance with constraints

[23] A. Sullivan, M. Mateas, and N. Wardrip-Fruin, “Questbrowser: Making quests playable with computer-assisted design,” 2009.

DUNGEON AND QUEST GENERATION PHILOSOPHIES

MEANINGFUL QUEST ENGAGEMENT

- Doran and Parberry [12]
 - Quest offered by NPC → Narrative is better/ more organic
 - 750 quests, 4 MMORPGs – only 9 categories (NPC motivations)
 - Proposes special grammar
- Ashmore and Nitsche [24]
 - Key-lock genre
 - World map grows as player progresses
 - Map is influenced by player past behaviour
 - Terrain to control player progression
- D&D quests balance NPC offered quests vs Key-lock and other mechanics

[12] J. Doran and I. Parberry, “A prototype quest generator based on a structural analysis of quests from four mmorpgs,” in PCGames ’11, 2011.

[24] C. Ashmore and M. Nitsche, “The quest in a generated world.” in DiGRA conference. Citeseer, 2007

DUNGEON AND QUEST GENERATION PHILOSOPHIES

NON-LINEAR STORIES

- “A plot often contains a process of plans being created, thwarted, readjusted and dropped repeatedly” – Brenner [25]
- Multiple paths to complete a quest.
 - Some paths may be dead ends
 - Infinite endings
- Soares de Lima et al. [26]
 - Hierarchical task decomposition
 - Models quest as a steps to follow
 - Complexity (multiple sub quests, goal states) makes it goal oriented and choice driven

[25] M. Brenner, “Creating dynamic story plots with continual multiagent plan- ning,” in Twenty-Fourth AAAI Conference on Artificial Intelligence, 2010.

[26] E. Soares de Lima, B. Feijó, and A. L. Furtado, “Hierarchical generation of dynamic and nondeterministic quests in games,” in Proceedings of the 11th Conference on Advances in Computer Entertainment Technology, 2014, pp. 1–10.

WIKIPEDIA DATA IN NLP

- Crowd sourced treasure troves of domain-specific knowledge [27]
- Rameshkumar and Bailey [28] – CRD3 dataset.
 - Critical role web series
 - Fandom Wikia

[27] A. Ferrari, B. Donati, and S. Gnesi, “Detecting domain-specific ambiguities: an nlp approach based on wikipedia crawling and word embeddings,” in 2017 IEEE 25th International Requirements Engineering Conference Workshops (REW). IEEE, 2017, pp. 393–399.

[28] R. Rameshkumar and P. Bailey, “Storytelling with dialogue: A Critical Role Dungeons and Dragons Dataset,” in Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics. Online: Association for Computational Linguistics, Jul. 2020, pp. 5121–5134. [Online]. Available: <https://aclanthology.org/2020.acl-main.459>.

LARGE LANGUAGE MODELS

- Large Language model (LLM) [29]
 - Machine learning model
 - Predict next word of a sentence
- Trained on vast amounts of data
- Contains billions of parameters
- Usecases: translation, summarization, and as conversational agents.

[29]

LLM BASED MULTI-AGENT CONVERSATION PLATFORMS

- Multiple agents can help encourage divergent thinking [30]
- Multiple agents can improve factuality and reasoning [31]
- Multiple agents can provide validation [32]
- Chat- optimized LLMs show the ability to incorporate feedback (converse with each other or humans)
- Autogen [33]
 - Open-source framework
 - Flexibly define agent interaction behaviours
 - Combination of natural language and computer code

[30] Tian Liang, Zhiwei He, Wenxiang Jiao, Xing Wang, Yan Wang, Rui Wang, Yujiu Yang, Zhaopeng Tu, and Shuming Shi. Encouraging divergent thinking in large language models through multi- agent debate, 2023.

[31] Yilun Du, Shuang Li, Antonio Torralba, Joshua B Tenenbaum, and Igor Mordatch. Improv- ing factuality and reasoning in language models through multiagent debate. arXiv preprint arXiv:2305.14325, 2023.

[32] Yiran Wu, Feiran Jia, Shaokun Zhang, Qingyun Wu, Hangyu Li, Erkang Zhu, Yue Wang, Yin Tat Lee, Richard Peng, and Chi Wang. An empirical study on challenging math problem solving with gpt-4. *arXiv preprint arXiv:2306.01337*, 2023.

[33] 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.

DATA ANNOTATION

- Crowdsourcing annotations [34][35]
 - Efficiency and scalability
 - 4 non-expert annotations per item \approx 1 expert level annotation
- Inter-annotator agreement (IAA) [36][37]
 - Consistency of annotations produced by different annotators
 - Annotator expertise
 - Annotation guidelines
 - Annotation complexity

[34] R. Snow, B. O'Connor, D. Jurafsky, and A. Ng, "Cheap and fast - but is it good? evaluating non-expert annotations for natural language tasks," in Proceedings of the 2008 Conference on Empirical Methods in Natural Language Processing. Honolulu, Hawaii: Association for Computational Linguistics, Oct. 2008, pp. 254–263. [Online].

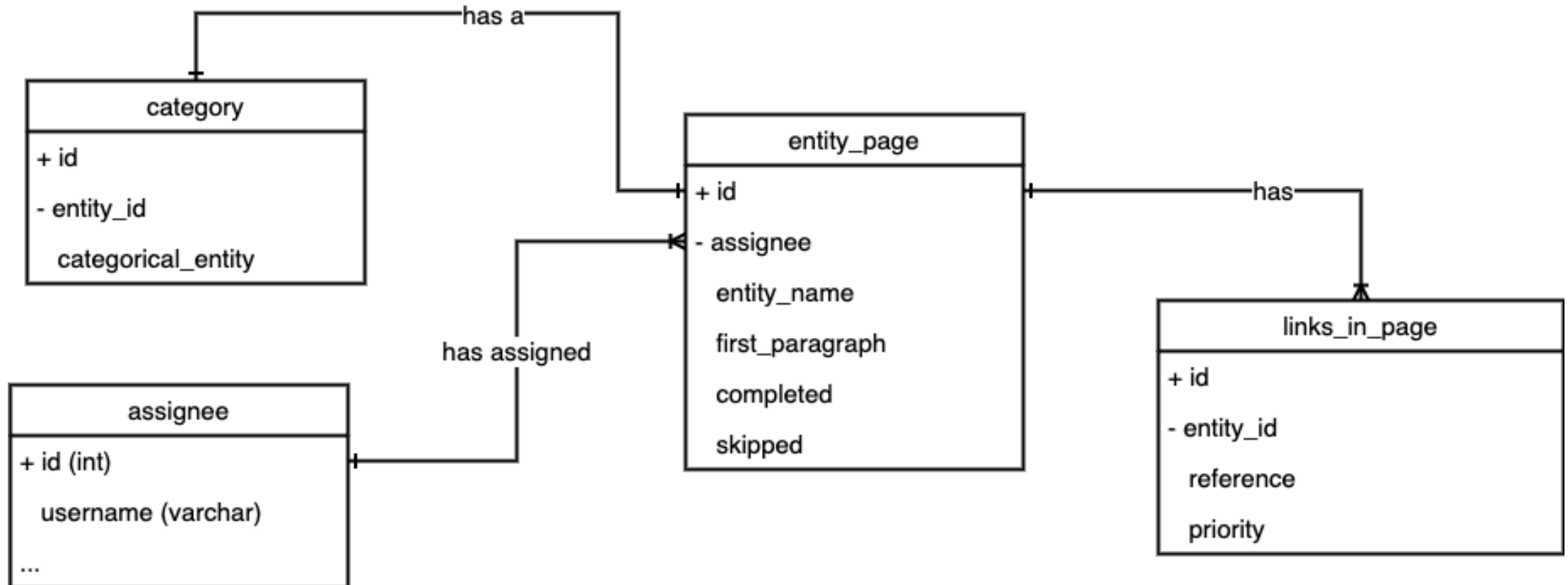
[35] A. Dumitrache, L. Aroyo, and C. Welty, "Achieving expert-level annotation quality with crowdtruth," in Proc. of BDM2I Workshop, ISWC, 2015.

[36] R. Artstein and M. Poesio, "Inter-coder agreement for computational linguistics," Computational linguistics, vol. 34, no. 4, pp. 555–596, 2008

[37] E. Ouyang, Y. Li, L. Jin, Z. Li, and X. Zhang, "Exploring n-gram character presentation in bidirectional rnn-crf for chinese clinical named entity recognition," in CEUR workshop proceedings, vol. 1976, 2017, pp. 37–42.

ANNOTATOR APP

ER DIAGRAM



OUR AGENTS

Agent name	Role	Prompt
user_proxy	Acts on behalf of the user	Reply TERMINATE if the task has been solved at full satisfaction. Otherwise, reply CONTINUE, or the reason why the task is not solved yet.
<i>DungeonDesigner</i>	Designs the overall adventure	<i>DungeonDesigner</i> . I want you to act as a <i>DungeonDesigner</i> specialized in crafting Dungeons and Dragons campaigns. Drawing from your deep knowledge of D&D lore, I'd like you to create an immersive quest for my party of adventurers. This quest should include notable NPCs, challenging encounters, intricate storylines, and tie into the broader lore of the D&D universe. Ensure you coordinate with <i>EncounterDesigner</i> for detailed combat scenarios, <i>TableDesigner</i> for visual aids and settings, <i>MoodPlanner</i> for atmosphere and tone, <i>NPCDesigner</i> for fleshed-out characters, and <i>Recorder</i> to keep track of our journey's progress. Use the initial guidelines provided by the user_proxy to lay the scene for our adventure.
<i>NPCDesigner</i>	Designs the NPCs	<i>NPCDesigner</i> . I want you to take on the role of <i>NPCDesigner</i> , creating compelling and believable NPCs to enrich our current D&D campaign. Drawing from the scene set by the <i>DungeonDesigner</i> , your task is to craft characters that not only add depth to the narrative but also serve as critical plot points or intriguing side quests. Feel free to expand on the <i>DungeonDesigner</i> 's setting, ensuring that these NPCs fit seamlessly into the world. Provide their names, backstories, and how they intersect with the current plot.
<i>TableDesigner</i>	Designs different tables to calculate loot, enemy stats during encounters, and skill checks for various activities	<i>TableDesigner</i> . I'd like you to assume the position of <i>TableDesigner</i> for our D&D campaign. Given the overarching story and specific encounters crafted by the <i>DungeonDesigner</i> , <i>EncounterDesigner</i> , and <i>NPCDesigner</i> : Design a general loot table that caters to various settings and scenarios. This table should encompass a range of items from common treasures to rare artifacts, each with an associated probability or dice roll. Construct an encounter table that outlines potential adversaries our party may come across, considering different environments and situations. Each entry should be tied to a specific dice range. Formulate an interaction table, taking into account the NPCs and the possible reactions based on various interaction checks (e.g. persuasion, intimidation, deception). For each table, provide a numerical range (like 1-20 for a d20 roll), a brief descriptor of the item, adversary, or interaction outcome, and any pertinent stats or mechanics.

OUR AGENTS

<i>MoodPlanner</i>	Creates the mood of the setting	<i>MoodPlanner</i> . You specialize in identifying the current mood of the story and suggesting images for that place. You read through the adventure and identify where images can be inserted for the best impact. you give a description of the image suitable to be inserted to that area.
LoreMaster	Used only in the RAG implementations. Acts as the agent responsible for knowledge retrieval.	You are LoreMaster, a helpful knowledge keeper of Dungeons & Dragons D&D lore. You draw your knowledge from the vast 'frw' collection and provide this knowledge to the <i>DungeonDesigner</i> , <i>NPCDesigner</i> , <i>EncounterDesigner</i> , and especially <i>TableDesigner</i> to create their content based on D&D lore.
Reporter	Creates a summary of the work done by the designers	Reporter. You look through conversations held by <i>DungeonDesigner</i> , <i>NPCDesigner</i> , <i>EncounterDesigner</i> , <i>TableDesigner</i> and <i>MoodPlanner</i> and summarize what has been done.
Editor	Acts as an editor and critiques the content created by the designers	Editor. I'd like you to assume the role of Editor for our campaign. As I provide the summary and content generated by the Reporter related to <i>DungeonDesigner</i> , <i>NPCDesigner</i> , <i>EncounterDesigner</i> , <i>TableDesigner</i> , and <i>MoodPlanner</i> , your task is to: Review the content for clarity and coherence. Ensure that the narrative is engaging and the details are well-explained. Check for any inconsistencies or contradictions within the content. If found, suggest improvements or ask for clarification. Evaluate the tone and atmosphere described by <i>MoodPlanner</i> . Make sure it aligns with the overall theme and mood intended for the campaign. For each aspect—be it narrative, NPC details, encounter designs, tables, or mood—provide feedback and constructive criticism, ensuring the campaign's success and immersion. Once you've reviewed the content, provide a concise summary of your feedback, indicating areas of excellence and areas needing further refinement or development.
DDRecorder	Writes python code to save the information generated by <i>DungeonDesigner</i> into a file	DDRecorder. You write the a python code to save what the <i>DungeonDesigner</i> says in adventure.txt to the disk.
NPCRecorder	Writes python code to save the information generated by <i>NPCDesigner</i> into a file	NPCRecorder. You write the a python code to save what the <i>NPCDesigner</i> says in npc.csv to the disk in the format npc, description table.

OUR AGENTS

EncounterRecorder	Writes python code to save the information generated by <i>EncounterDesigner</i> into a file	EncounterRecorder. You write the a python code to save what the <i>EncounterDesigner</i> says in encounter.csv to the disk in the format chapter, encounter table.
TableRecorder	Writes python code to save the information generated by <i>TableDesigner</i> into a file	TableRecorder. You write the a python code to save what the <i>TableDesigner</i> says as table_<table name>.csv to the disk.
MoodRecorder	Writes python code to save the information generated by <i>MoodPlanner</i> into a file	MoodRecorder. You write the a python code to save what the <i>MoodPlanner</i> says as image.csv to the disk in the format image, description table.
ExecutorDM	ExecutorDM. Executes the code written by DDRRecorder	Execute the code written by the DDRRecorderr and report the result.
ExecutorNPC	Executes the code written by NPCRecorder	ExecutorNPC. Execute the code written by the NPCRecorder and report the result.
ExecutorEncounter	Executes the code written by EncounterRecorder	ExecutorEncounter. Execute the code written by the EncounterRecorder and report the result.
ExecutorTable	Executes the code written by TableRecorder	ExecutorTable. Execute the code written by the TableRecorder and report the result.
ExecutorMood	Executes the code written by MoodRecorder	ExecutorMood. Execute the code written by the MoodRecorder and report the result.