



Northeastern
University



Computational Tools for Table-Top Role-Playing Games: A Scoping Review

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Cooper

The background is a light beige parchment-like surface with a dark, irregular border. In the top left corner, there are four small black bird silhouettes in flight. In the top right corner, there is a white silhouette of a mountain peak. In the bottom right corner, there is a single small black bird silhouette.

Abstract

- TTRPGs are unique form of gameplay that lend themselves to be enhanced with computational tools
- We performed a systematic scoping review of academic literature of computer tools for TTRPGs
- The 46 papers included in this reviewed varied in terms of artifacts, computation methods, and evaluation
- We also identified several limitations in presented papers and opportunities for future works

A stylized fantasy landscape illustration in the background. It features a dark silhouette of a castle with multiple towers and spires on a hill. A large dragon is shown in flight, its wings spread wide. Several birds are scattered across the sky. In the distance, there are white, mountain-like shapes against a light beige background.

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The background is a stylized fantasy landscape. It features two large black dragons with spread wings flying in the sky. There are several smaller birds. In the bottom right corner, there is a silhouette of a large, multi-towered castle or cathedral. The bottom left corner shows dark green, jagged shapes representing trees or mountains. The sky is a light beige color with some white clouds.

01

What are TTRPGs?

(Table-top Role-playing Games)

Table-Top Role-Playing Games

Defining characteristics

1. Game Manager (GM)
2. Role-Playing
3. Homebrewing

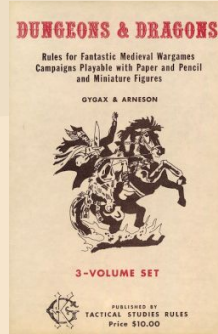
Common Features

1. Extended game-play
2. Navigating social interactions
3. Combat
4. Puzzle Solving



Dungeons and Dragons

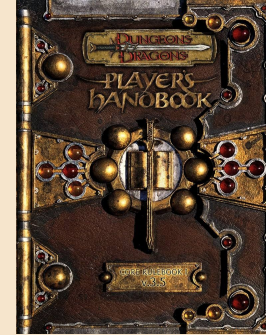
First Edition



1974

https://en.wikipedia.org/wiki/Dungeons_and_Dragons_1974

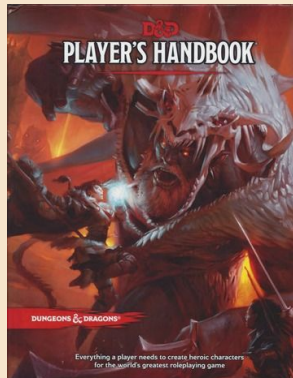
3.5 e



2003

<https://www.amazon.com/Players-Handbook-Version-Dungeon-Dragons/dp/0786941928>

5 e



2014

<https://archive.org/details/dn-d-5e-players-handbook-bn-w-ocr-1>

2024



2024

<https://www.amazon.com/Dungeons-Dragons-Players-Handbook-Rulebook/dp/0786969512>

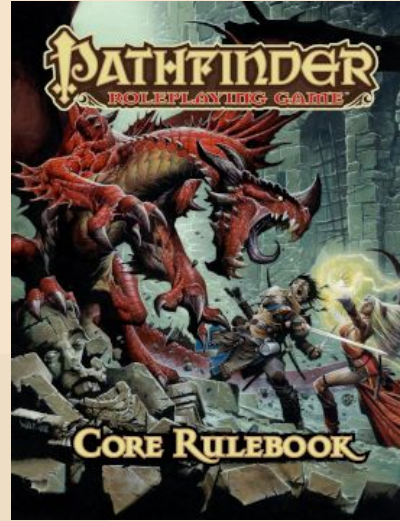
Other Systems



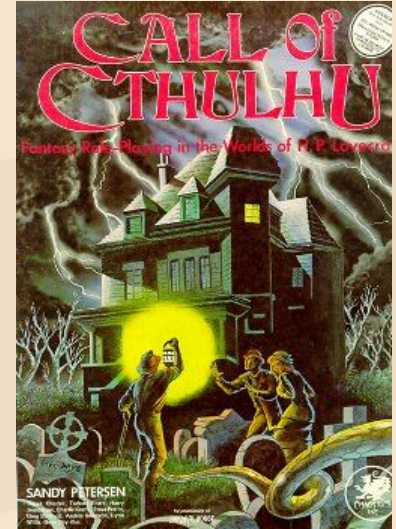
<https://en.wikipedia.org/wiki/Shadowrun>



https://en.wikipedia.org/wiki/Starfinder_Roleplaying_Game



https://en.wikipedia.org/wiki/Pathfinder_Roleplaying_Game



https://en.wikipedia.org/wiki/Call_of_Cthulhu_role-playing_game

Commercially Available Tools



<https://dndbeyond.com>



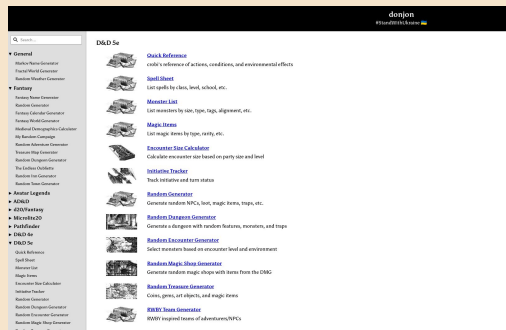
<https://roll20.net>



<https://foundryvtt.com/>



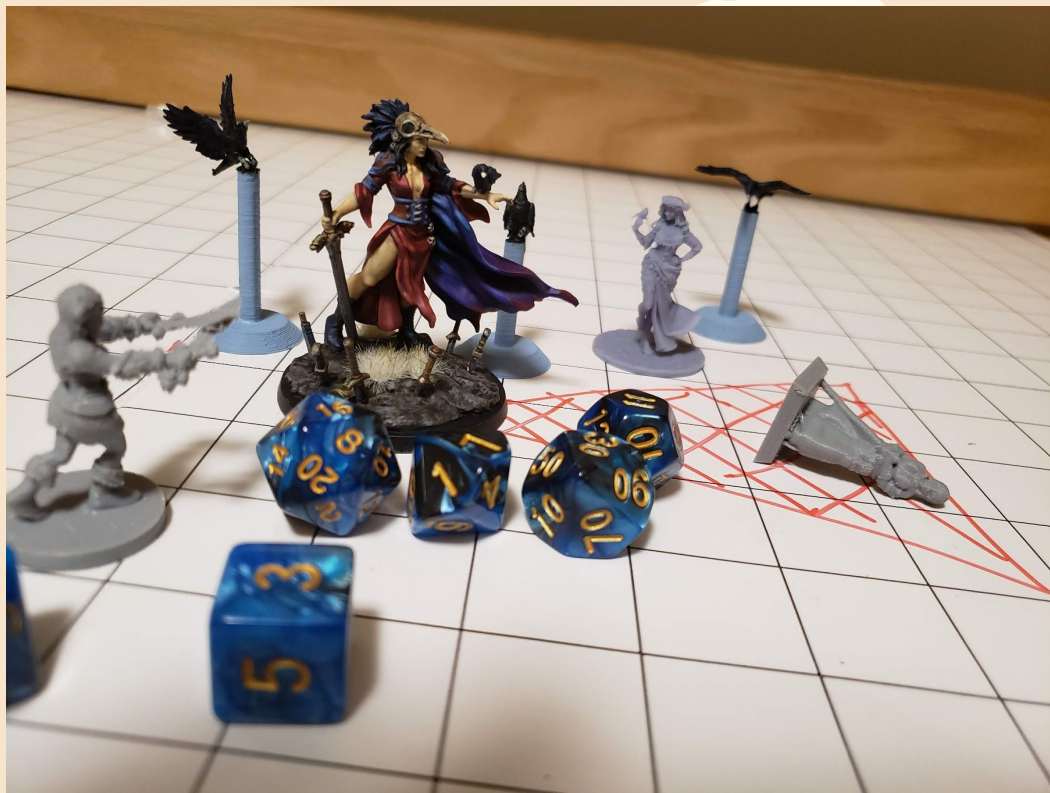
<https://avrae.io>



<https://donjon.bin.sh/>

Challenges for TTRPGs

1. Rule Complexity
2. Player Generated Content
3. Online/Hybrid Games





Research Questions

RQ1

What do academic computation support tools for Table-Top Role-Playing Games look like in terms of computational techniques, study design, types of assistance, outcomes, and limitations?

RQ2

What areas in this domain remain unexplored?

02 Search Methodology





Eligibility criteria

1. Must directly mention applications to TTRPGs
 - a. generally
 - b. to a TTRPG system (e.g. D&D).
2. Must have a computational interface that is used either:
 - a. Offline: in preparation for the session
 - b. Online: during the campaign
3. Must be published in an academic venue.
 - a. Workshop papers included
 - b. Theses were excluded.
4. We must be able to retrieve the full text in English.

Database Search

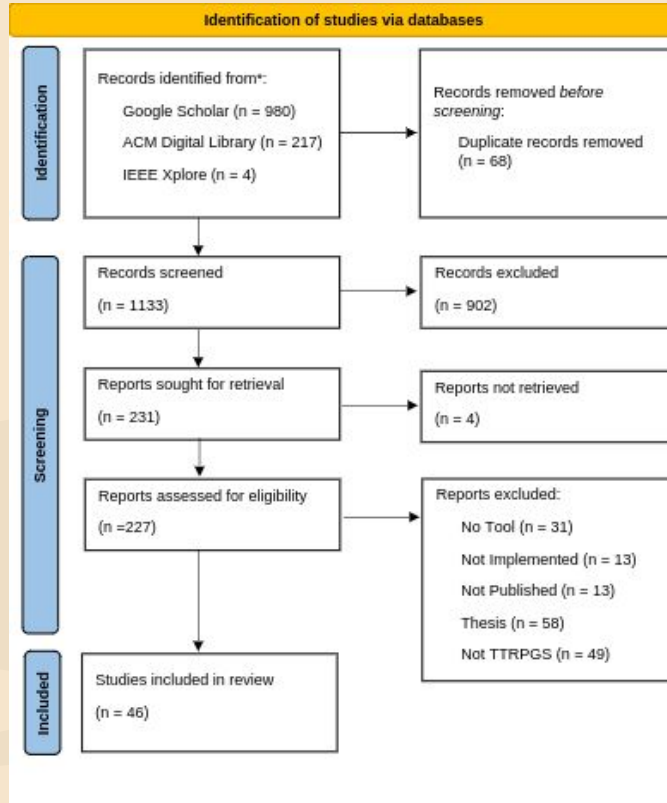
Databases:

- ACM Digital Library
- IEEE Xplore
- Google Scholar

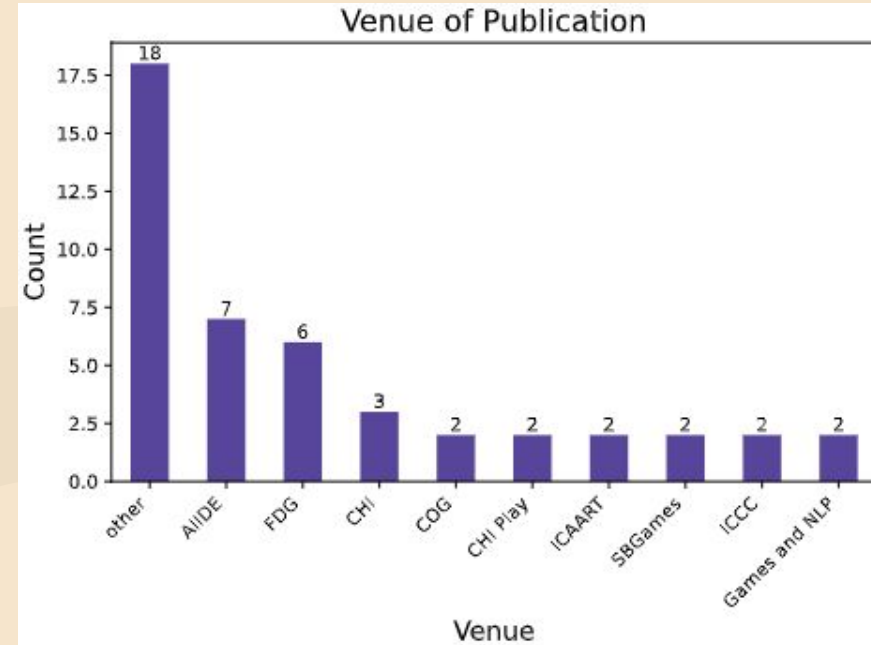
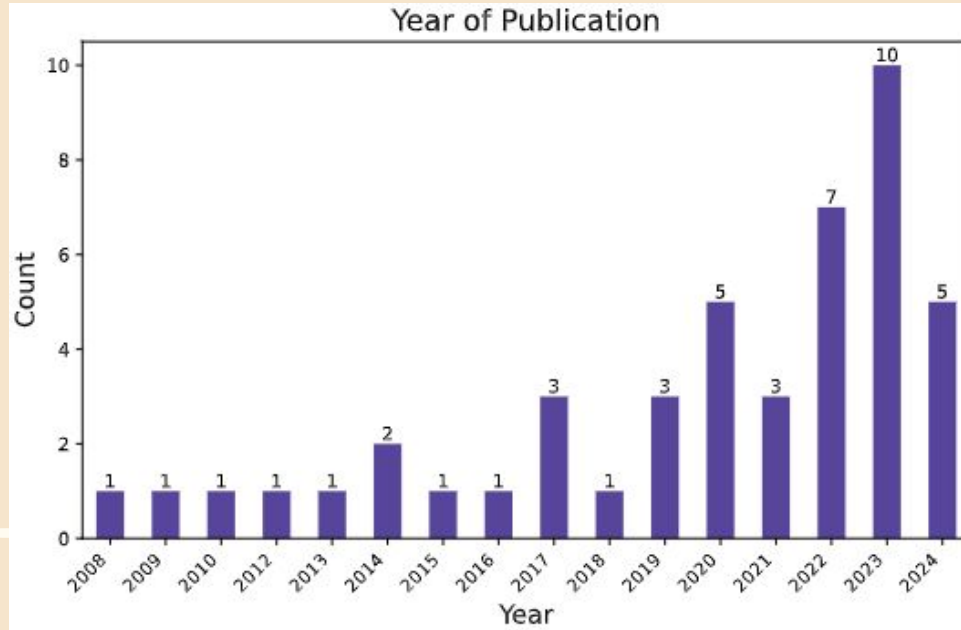
Query

Computational	Tools	TTRPGs
procedural automatic computational	tool generation assistant	tabletop role-play table top role play table-top role-play tabletop roleplay TTRPG TTRPGS TRPG TRPGS Dungeons and Dragons Dungeons & Dragons

Papers Found



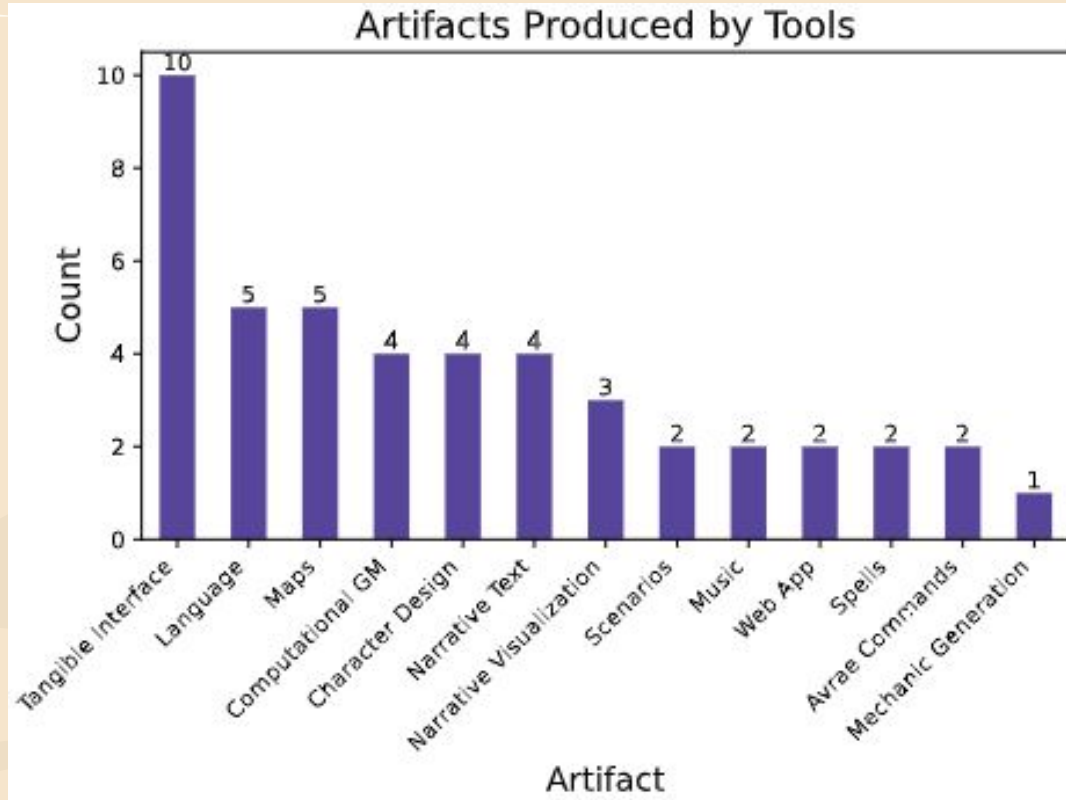
Metadata



03 Artifact Examples



Artifacts

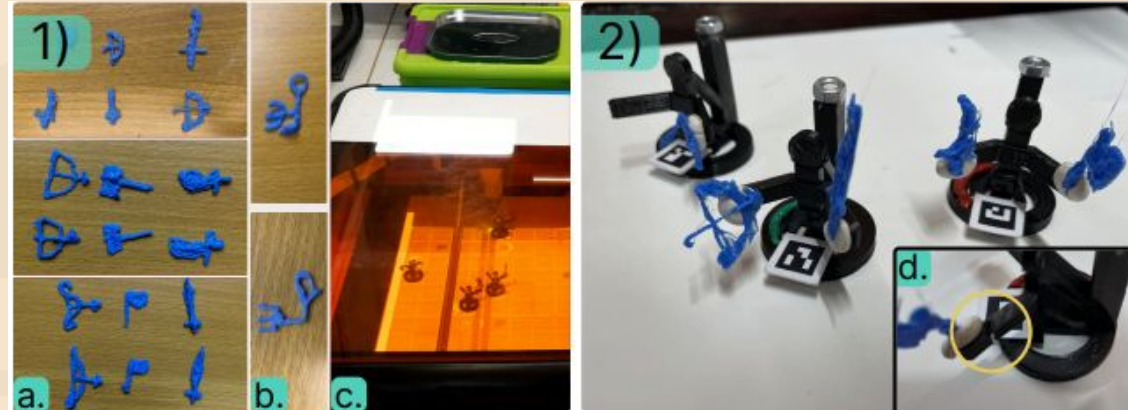


Tangible Interfaces

Tisch Digital Tools Supporting Board Games.
2012. <https://doi.org/10.1145/2282338.2282376>

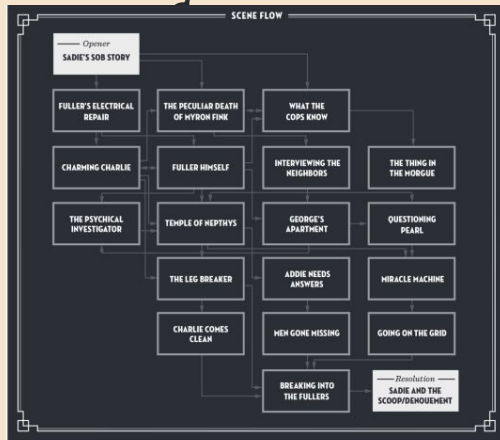


Dungeon-Maker: Embedding Tangible
Creation and Destruction in Hybrid Board
Games through Personal Fabrication
Technology. 2024.
<https://doi.org/10.1145/3613904.3642243>



Narrative

Shoelace: A Storytelling Assistant for GUMSHOE
One-2-One. 2023. <https://doi.org/10.1145/3582437.3582475>



Suggestions

How did you meet George?

- We met at the New York Public Library. He was reading books about the human brain and the spirit world, and things like that. We decided to get to know each other better and started going out shortly after. He's an amazing person and that's why I fell in love so quickly.

Respond as

Go!

Reset

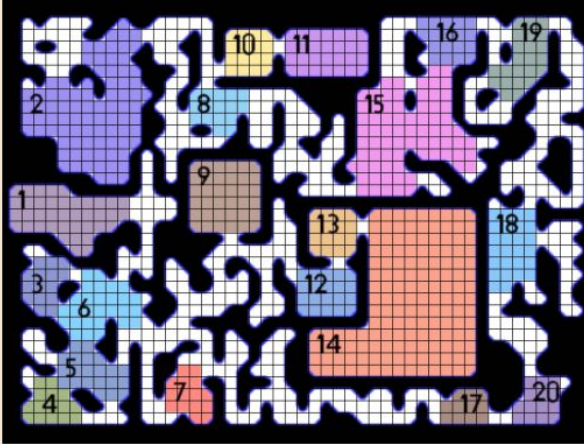
In response to specific questions, Sadie responds with the following information:

- ☐ Viv's encountered types who try to get their loved ones a trial in the press before it ever goes to court. Most of the time, they know the guy did it. This girl seems utterly convinced of her fiancé's innocence.
- ☐ The police rarely care about getting the right guy when both victim and suspect come from the lower strata. If this case looks open and shut to them, they'll arrest George as soon as they find him and call it a day.
- ☐ She met George at the New York Public Library. She loves George because she found him entirely different from your ordinary Joe. He read books about the human brain and the spirit world and all kinds of things. He thought a lot. George would have gone to college, only his family couldn't afford it.

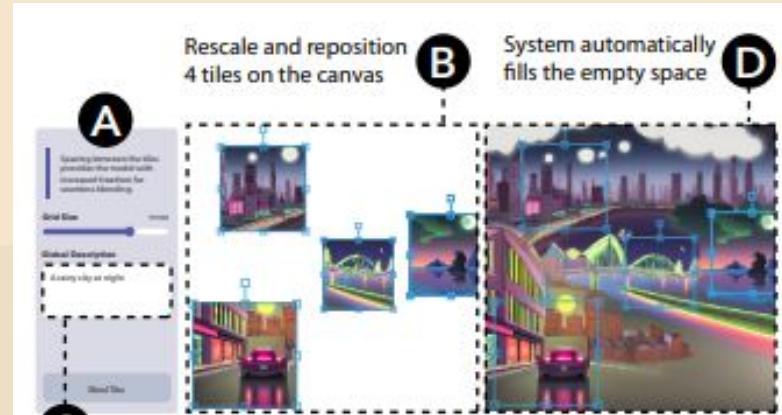
Towards Computational Support with Language Models for TTRPG Game Masters.
2023. <https://doi.org/10.1145/3582437.3587202>

Maps and Dungeons

Automatic generation of fantasy role-playing modules. 2014
<https://doi.org/10.1109/CIG.2014.6932867>



World-Smith: Iterative and Expressive Prompting for World Building with a Generative AI.
2023. <https://doi.org/10.1145/3586183.3606772>



Domain Specific Language

Imaginarium: A Tool for Casual Constraint-Based PCG. 2019

Imaginarium

Tigger is a male, long-haired, small, manx, age 18
Thomas is a male, short-haired, big, black Maine coon, age 4
Lilly is a female, long-haired, small, white Persian, age 7
Angel is a female, short-haired, small, staid, grey tabby, age 12
Roxy is a female, short-haired, big, haughty, tabby, age 13

> |

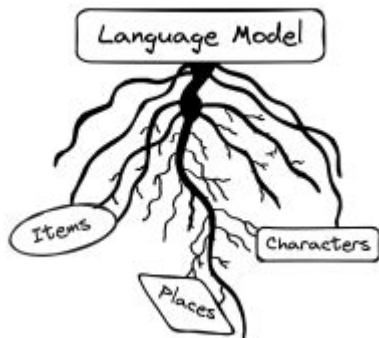
Nouns
cat (cats), must be male or female, must be long-haired or short-haired, can be big or small, can be cuddly or haughty, can be staid or crazy, must be black, white, grey, or ginger, has properties age and name, is always a person
Persian (Persians) is a kind of cat, is always long-haired
tabby (tabbies) is a kind of cat
Siamese (Siameses) is a kind of cat, is always grey and short-haired
manx (manxs) is a kind of cat
Chartreux (Chartreux) is a kind of cat, is always grey
Maine coon (Maine coons) is a kind of cat, is always large

Verbs
cats can love cats
cats can hate cats

Statistics
Rules: 100.00% 0.00% 0.00%
Satisfiable: 100.00% (1.00%)
CPU: 0.00s 0.00s 0.00s 0.00s 0.00s 0.00s
Memory: 0.00 0.00 0.00 0.00 0.00 0.00
Time: 0.00 0.00 0.00 0.00 0.00 0.00
Number of rules: 10 0.00% 0.00% 0.00% 0.00% 0.00%
Number of rules used: 0 0.00% 0.00% 0.00% 0.00% 0.00%

The graph shows nodes for Tigger, Thomas, Lilly, Angel, and Roxy, connected by edges representing constraints. The edges are labeled with terms like 'age', 'name', 'color', 'size', 'haughtiness', 'cuddliness', 'staidness', 'long-haired', 'short-haired', 'big', 'small', 'male', 'female', 'black', 'white', 'grey', 'ginger', 'manx', 'tabby', 'Siamese', 'Chartreux', 'Maine coon'.

Computational GM



PAYADOR: A Minimalist Approach to Grounding Language Models on Structured Data for Interactive Storytelling and Role-playing Games. 2024.

☞ You check your inventory.

You quickly check your inventory, making sure your pistol is loaded and easily accessible. Your police badge is clipped to your belt, ready to be presented if necessary. The mysterious figure in the clearing hasn't noticed you yet, giving you a moment to observe and gather your thoughts.

☞ You take the bazooka from your inventory to shoot the figure.

As you reach for the bazooka in your inventory, you realize that it's not there. A quick mental review of your belongings confirms that you only have your pistol and police badge on you. Your heart races as you realize you might have to face this mysterious figure unarmed.

☞ You take your bazooka from the right pocket of your bag.

Upon further investigation, you find that your bazooka is indeed in your bag, specifically in the right pocket. You quickly and quietly equip it, ensuring that it's

Character Design

RPG Creature Design: Cross-System Analysis and Conversion. 2023.
<https://doi.org/10.1145/3631085.3631332>



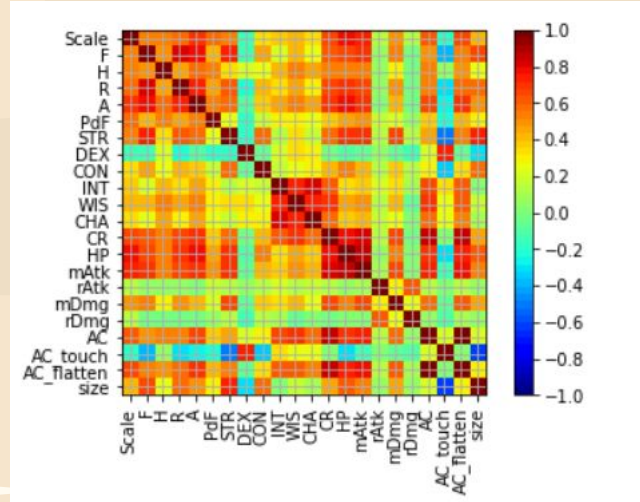
A Multi-Stage Approach to Image Consistency in Zero-Shot Character Art Generation for the D&D Domain. 2024. <https://doi.org/10.5220/0012317600003636>



- HP = 350
- MP = 190
- Strength = 23
- Magic = 19
- Endurance = 14
- Speed = 19
- Luck = 10



- HP = 230
- MP = 135
- Strength = 15
- Magic = 16
- Endurance = 10
- Speed = 12
- Luck = 11




The Calculation of Player's and Non-Player Character's Game-play Attribute Growth in Role-Playing Game with K-NN and Naive Bayes. 2020. <https://doi.org/10.1109/CENIM51130>.

The background is a stylized illustration in a flat, minimalist style. It features a light beige sky with soft, wavy horizontal bands of slightly darker beige. Two large, black dragon silhouettes are in flight, one on the left and one on the right. Several small, black bird silhouettes are scattered across the sky. In the bottom right corner, there is a black silhouette of a castle with multiple towers and spires. The bottom left corner shows dark green, jagged silhouettes of trees or hills.

04

Discussion

The background is a stylized landscape. The sky is a light beige color with a large, bright white circle representing the sun or moon in the upper right. Several black silhouettes of birds are scattered across the sky. A large, dark silhouette of a dragon is flying in the center of the sky. The ground is a dark brown color with a silhouette of a dragon in the center. The overall style is minimalist and artistic.

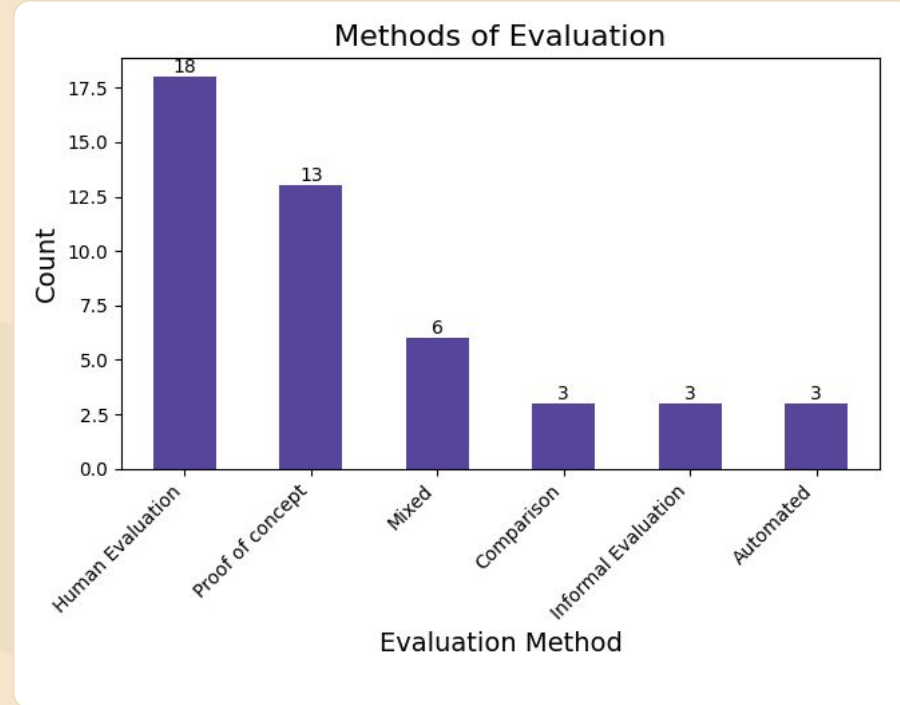
4.1

Major Trends

RQ1: What do academic computation support tools for Table-Top Role-Playing Games look like in terms of computational techniques, study design, types of assistance, outcomes, and limitations?

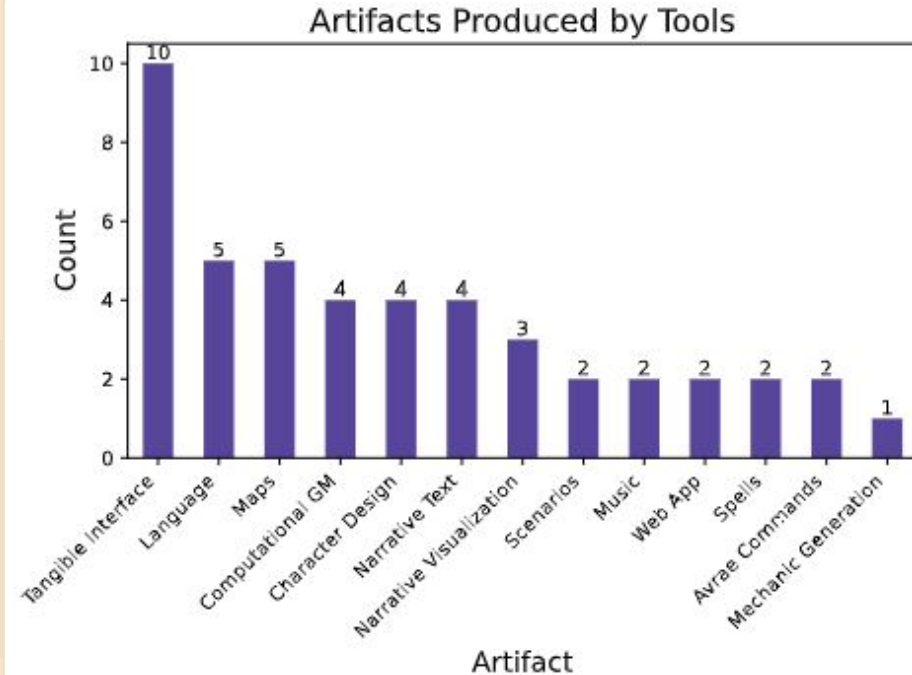
Human Evaluation

- Over half of papers used some type of human evaluation
- These varied between qualitative, quantitative, and mixed
- 5 papers used participatory design techniques



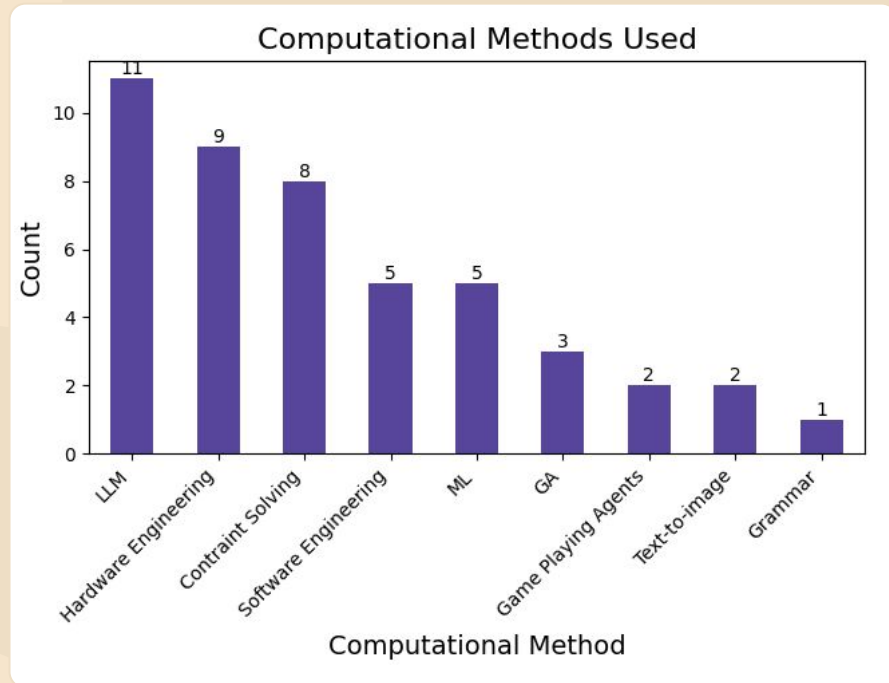
Focus on Tangibility

- The most common artifacts were tangible interfaces
- Physical embodiment is valuable
- Can be augmented with digital devices



Variety of AI techniques

- While LLMs were the most common, “traditional AI” is still represented
- These techniques are found even in the most modern papers (2023)



The background is a stylized landscape with a light beige sky. In the upper left, a group of birds flies towards the right. In the center, a large dragon with spread wings flies towards the left. To the right, a large white sun is visible with several birds flying around it. The bottom of the image features dark, silhouetted hills and a dense forest of trees on the right side.

4.2 Opportunities for Future work

What areas in this domain remain
unexplored?

Ease of use vs controllability

☞ You check your inventory.

You quickly check your inventory, making sure your pistol is loaded and easily accessible. Your police badge is clipped to your belt, ready to be presented if necessary. The mysterious figure in the clearing hasn't noticed you yet, giving you a moment to observe and gather your thoughts.

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action fight(>Fighter,<Fightee):

“Fighter and Fightee come to blows”

location: (Fighter, Fightee);

tags: scandalous,violent, angry);

++++**visibility**;

result:

Fighter and Fightee

dislike **each other**,

Fighter and Fightee

do not like **each other**.



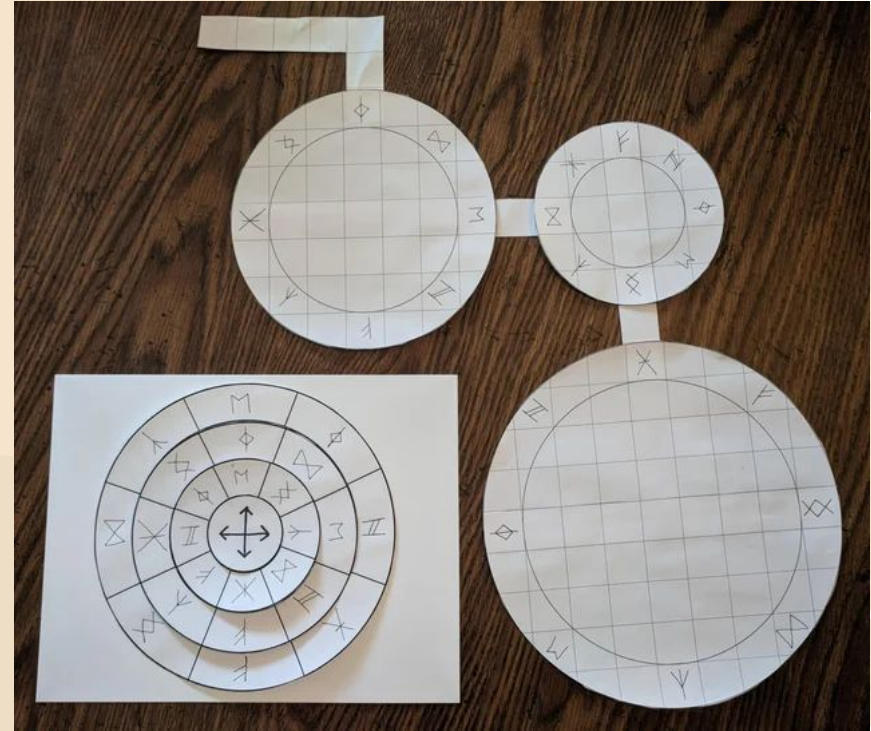
Realistic Evaluation

- Sessions last months but evaluation lasted under an hour
- Parties were not previously established
- Little focus on the entire process: brainstorming - running a session

Combat and Puzzles



<https://forgottenrealms.fandom.com/wiki/Mimic>



https://www.reddit.com/r/DnD/comments/8hy0hj/the_southeastern_alcove_a_homemade_puzzle_dungeon/

Thanks

Data:

<https://osf.io/5fgku/>

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