Introduction and Domain Background
An interactive and collaborative game where a narrator, aka Dungeon Master (DM), sets challenges for the players to overcome by role-playing as the characters they created.
Characters (players)

Character Attributes
- Abilities
- Armor Class (AC)
- Health Points (HP)
- Passive Perception (PP)
- Experience Points (Exp)

Character Abilities
- Strength
- Wisdom
- Intelligence
- Dexterity
- Constitution
- Charisma

But a party typically has around 5 players!

www.dndbeyond.com/classes/monk
Characters
(non-players)

Relationships
NPCs contribute to making the created world feel more alive, the players can interact with them and develop positive or negative relationships which impact interactions.
Monsters

Monster Attributes

- Challenge Rating (CR)
- Environment
- Type
- Size
- Alignment
- Abilities

Monster Environment

- Arctic
- Coastal
- Desert
- Forest
- Hill
- Swamp

- Grassland
- Mountain
- Underdark
- Underwater
- Urban

There are thousands of monsters!

Roll the dice!
Motivation


Methods and Implementation
Methodology

Pre-Design Interviews
Conducted ~30 min interviews with 9 domain experts (DMs)

Technology

Dice Tracker, Party Tracker, Relationship Tracker
Vega Lite + Observable

Monster Shopper
Customized of https://github.com/amnh-sciviz
AI: Python/Keras/PCA/TSNE
Vis: D3.js, OpenseaDragon
03

Results
Before the game

During the game
The Monster Shopper
Animated Objects

Falling Stones

Bols of Simpering

| Dragons |
|---|---|
| 20 | 15 |
# The Forgotten City

**# of Characters:** 4  
**Average Party Level:** 5

## Monsters

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Size</th>
<th>CR</th>
<th>Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;The Demogorgon&quot;</td>
<td>Giant</td>
<td>Large</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Aarakocra</td>
<td>Humanoid</td>
<td>Medium</td>
<td>1/4</td>
<td></td>
</tr>
<tr>
<td>Aarakocra Simulacrum</td>
<td>Humanoid</td>
<td>Medium</td>
<td>1/8</td>
<td></td>
</tr>
<tr>
<td>Aarakocra Spelljammer</td>
<td>Humanoid</td>
<td>Medium</td>
<td>6</td>
<td></td>
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<tr>
<td>Aartuk Elder</td>
<td>Plant</td>
<td>Large</td>
<td>3</td>
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<tr>
<td>Aartuk Starhorror</td>
<td>Plant</td>
<td>Medium</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Aartuk Weeding</td>
<td>Plant</td>
<td>Medium</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Abhorrent Overlord</td>
<td>Fiend</td>
<td>Large</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Abjurer</td>
<td>Humanoid</td>
<td>Medium</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

**Source:**  
- Innermost Mists (rebuild)
- Monster Manual
- Storm King's Thunder
- Spelljammer Adventures in Space
- Spelljammer Adventures in Space
- Mythic Odysseys of Theros
- NDK's Guide to Monsters

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[https://www.dndbeyond.com/encounter-builder](https://www.dndbeyond.com/encounter-builder)
The Monster Shopper

Visuals driven

Data driven
Ankheg

[Ankheg]

Large monstrosity, unaligned

Armor Class 14 (natural armor), 11 while prone
Hit Points 39 (6d10 + 6)
Speed 30 ft., burrow 10 ft.

STR 17 (+3)  DEX 11 (+0)  CON 13 (+1)  INT 13 (+1)  WIS 13 (+1)  CHA 6 (+2)

Senses darkvision 60 ft., tremorsense 60 ft., passive Perception 11
Languages —
Challenge 2 (450 XP)

Actions

Blind Weapon Attack: +5 to hit, reach 5 ft., one target. Hit: 18 (2d6 + 3) slashing damage plus 3 (1d8) acid damage. If

https://dnd-monsters-atlas.netlify.app/
The Party Tracker
Demo

https://.observablehq.com/d/f6c2e85a64d1bcf9#pack
The Character Relationship Tracker
Demo

https://observablehq.com/d/323f4e30d80b3671
The Dice Tracker
Demo

https://observablehq.com/d/08c9f9de6cb8579c
04

Discussion
Limitations and Critiques

- Low complexity ceiling of Vega-Lite
- Lack of direct input capabilities in Observable
- Filter options and algorithm tuning for Monster Shopper
- Too many modules
Future Work

01 User test
- Usability and utility testing with domain experts

02 Integration
- With online RPG tools such as Roll20

03 Dashboard Building
- Combining all modules into one dashboard for easy access

04 Scaling for Flexibility
- More customization options of the modules.

We plan to release our tools!
Thanks

Questions?

CREDITS: This presentation template was created by Slidesgo, including icons by Flaticon, infographics & images by Freepik
The Monster Shopper Layout Algorithm

Monster images
~1000x1000 dimensions

Feature extraction with an image classification model (VGG16) pre-trained on ImageNet
To dim. = 4096

Dimensionality Reduction (PCA)
To dim. = 250

Grid to a giant matrix image with tiles

2D scattered points mapped into a 2D grid

tSNE
To dim. = 2