Crowdsourcing Mixed-Initiative Level Design
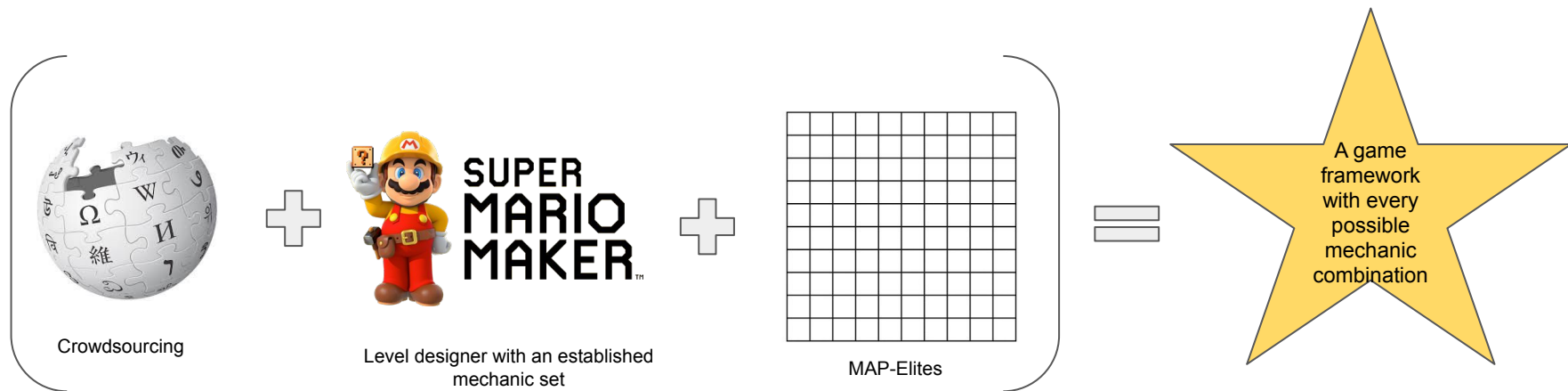
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CoG 2020

Concept

Crowdsourcing

Level designer with an established mechanic set

MAP-Elites

A game framework with every possible mechanic combination

Background - Mixed Initiative Level Design

facilitates AI and human interaction through the use of suggestions and algorithmic structuring for level design

- Sentient Sketchbook (Liapis, 2011)
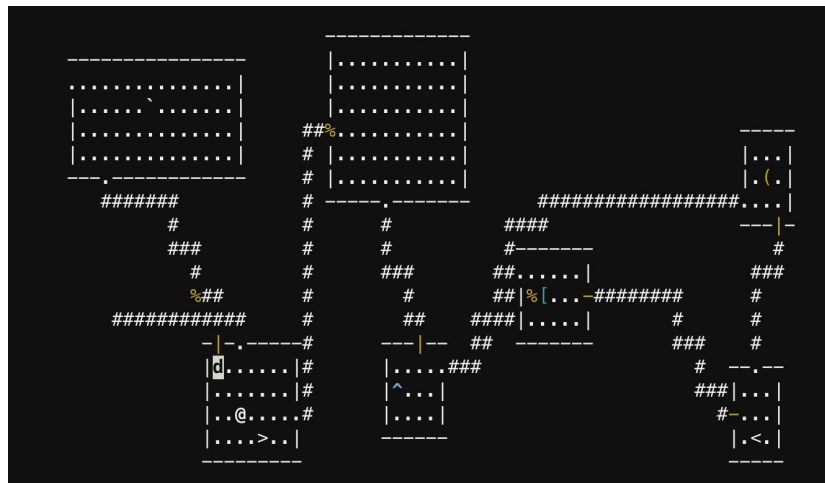- Tanagra (Smith, 2010)
- Ropossum (Shaker, 2013)

http://julian.togelius.com/Liapis2013Sentient.pdf

Background - Procedural Content Generation

create unique content and experiences without hard-coding details

- ● Minecraft (2009)
- ● Rogue (1980) and Rogue-like games

Screenshot from a level in NetHack - a classic Rogue-like game

Background - Map-Elites

quality diversity algorithm with the ability to diversify, organize, and optimize content
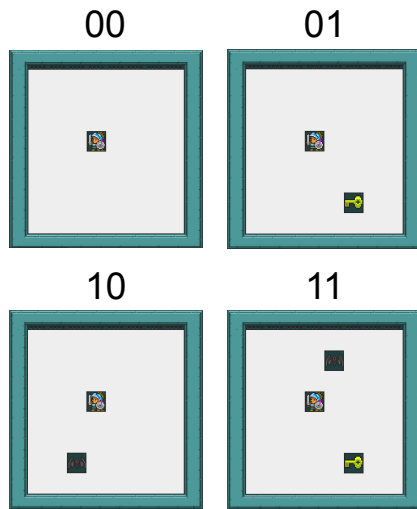
- Bullet Hell Generation (Khalifa, 2018)
- Dungeon Design (Alvarez, 2019)
- Mech-Elites (Charity, 2020)

Map-Elites Levels

00   01

Behavior Mechanics

{
    grab key,
    kill enemy
}

Mutating and Evaluating

10   11

Baba is You (the clone)

A deterministic, small-scale, dynamic, and simple Sokoban-like puzzle game with tile-based level editing and mutation
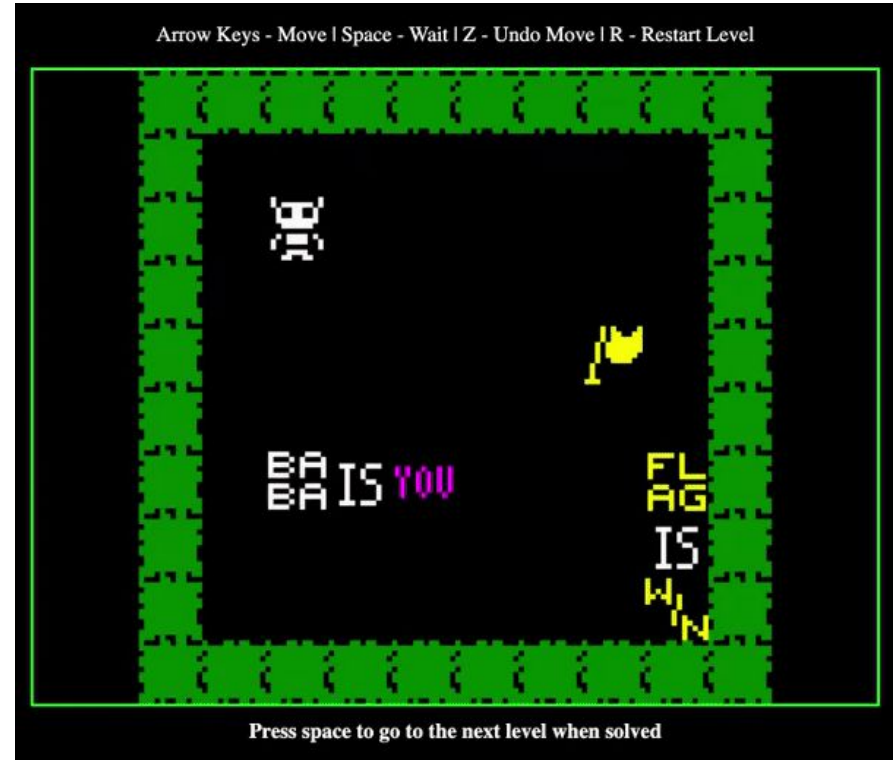

Hempuli, 2005

Baba is Y'all - Crowdsourced Baba is You

1. **Game Module**

2. **Editor Module**

3. **Generator Module**

4. **Map Module**

1. Game Module

The core game framework where the user can test game levels by solving it themselves or by using an AI solver.
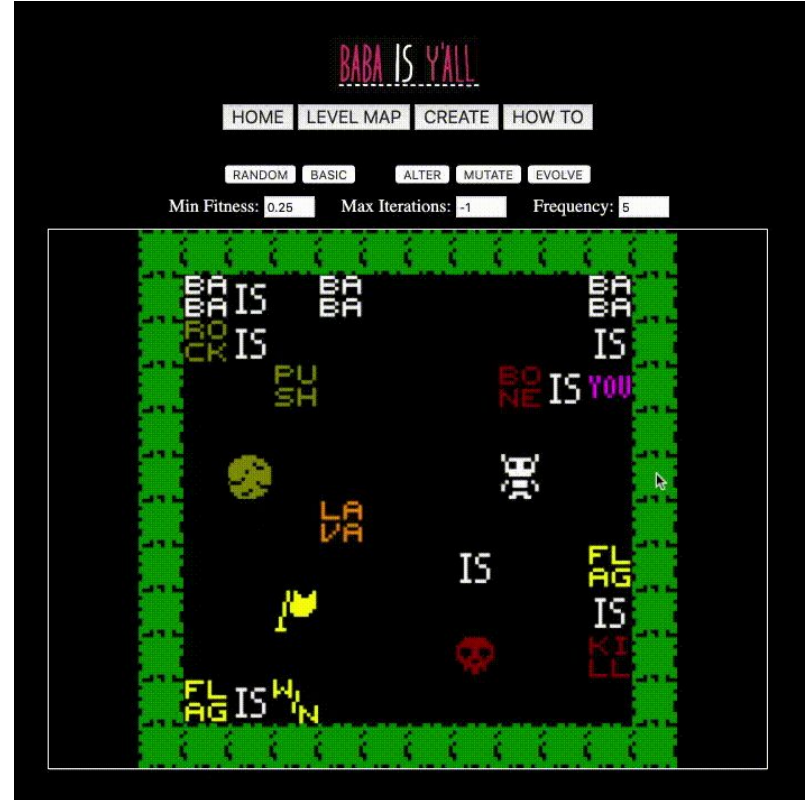
2. Editor Module

The level editor where the user can design Baba is You levels and submit it to our map module.

3. Generator Module

Provides the user with access to an evolutionary algorithm that can help them generate or modify levels through mutation.
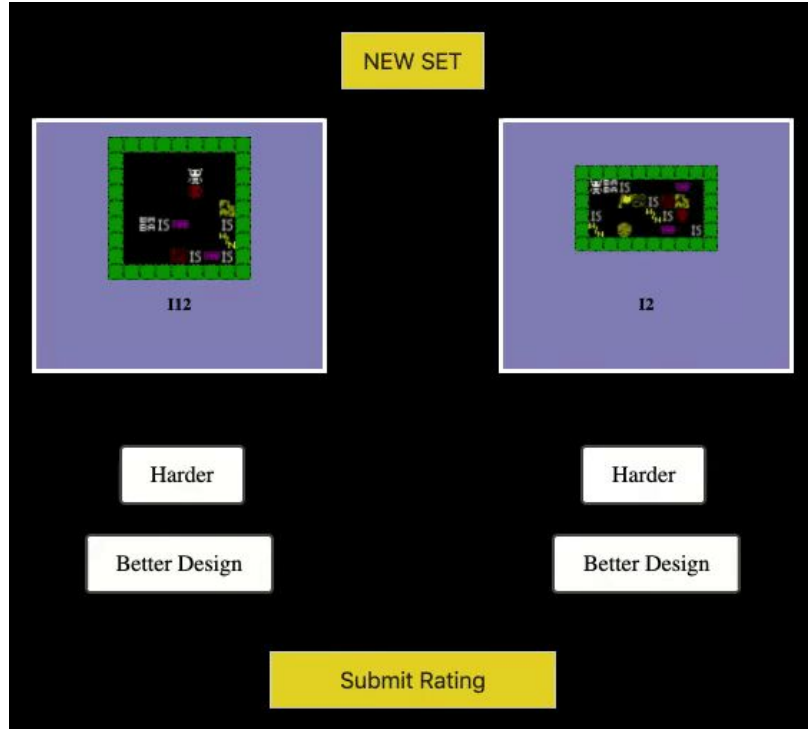
4. Map Module

Responsible for maintaining the different game levels and suggests new levels to play or make.
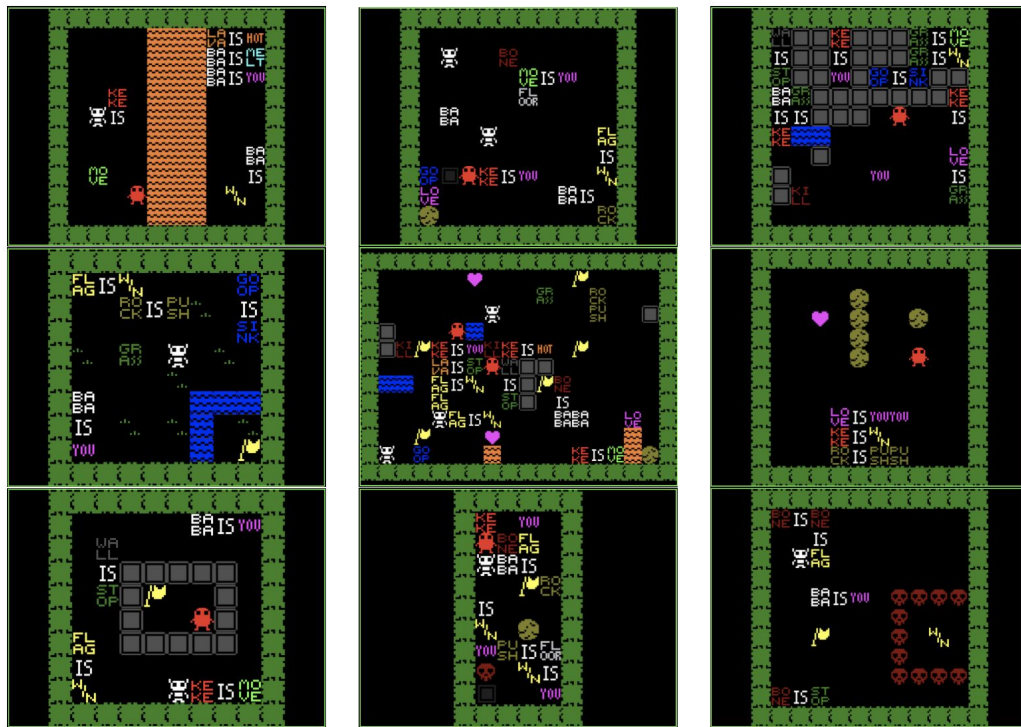
4.1 Rating Module

A rating for a single level is determined by comparison to another level based on two qualities: hardness and design.
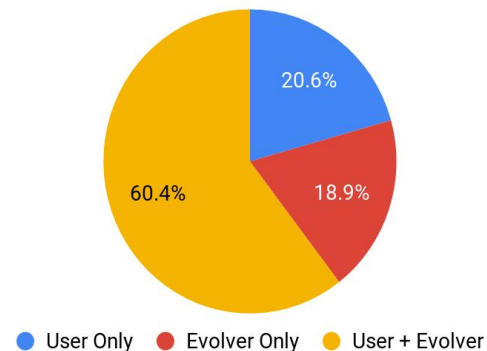
Preliminary Online Study

User-only

Evolver-only

User+Evolver

Baba is Y'all Levels Made

User Only — 20.6%
Evolver Only — 18.9%
User + Evolver — 60.4%

Future Work

- Personal user interaction
  - Save and share levels
- Collaboration on levels
  - Multiple users for one level
  - Multiple algorithms for one level
  - Multiple users and algorithms
- More user studies
  - *Alpha Stage*: Internal designer UI tests
  - *Beta Stage*: Formal user study for level creation
  - *Official Release v2:* Anonymous online data collection
- Expansion to other well-known games
  - Zelda

BABA IS Y'ALL

LINKS

Baba is Y'all (Experiment)

http://game.engineering.nyu.edu/babaisyall/

Baba is You (Original Game)
https://hempuli.com/baba/

Paper
https://arxiv.org/abs/2003.14294

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https://game.engineering.nyu.edu/