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Predicting Personas Using Mechanic Frequencies and Game State Traces

Game Mechanic:

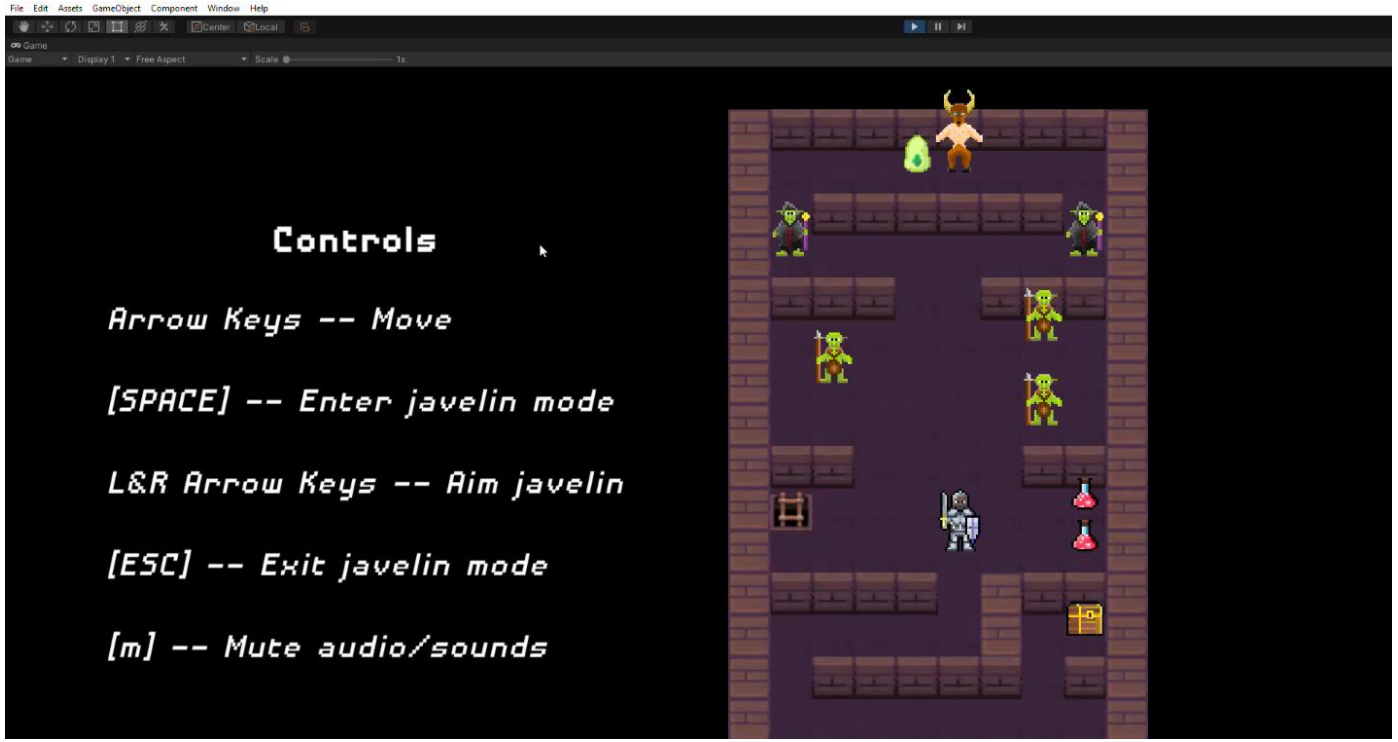
Any event in the game that involves game entities and changes the game's state.

Mechanic Frequency

“The number of times a mechanic is used within a single session/level”

Minidungeons 2

- 2D, Rogue-like Dungeon Crawler
- Win: Go to the exit
- Lose: 0 HP



Blob

Goblin

Sorcerer

Ogre

Minitaur

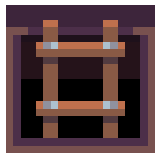
Treasure

Potion

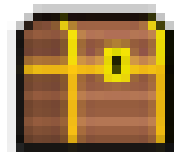
Game Elements

Playstyles in Minidungeons 2

Runner



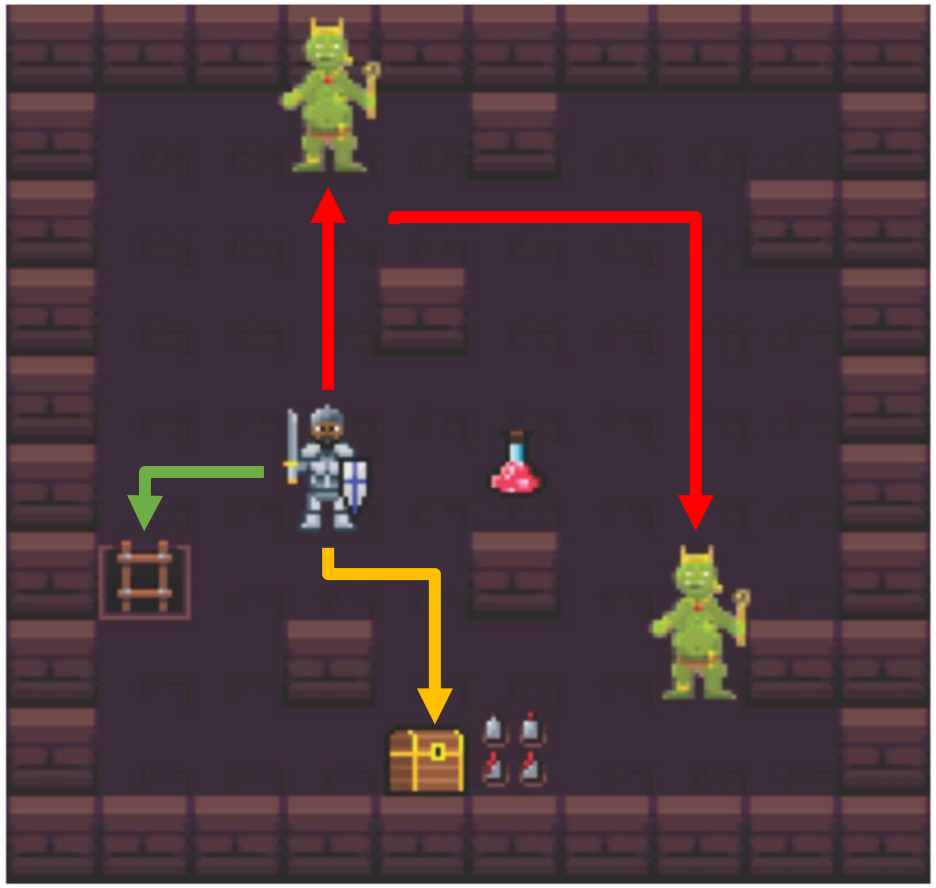
Treasure Collector



Monster Killer

Playstyle in Minidungeons 2

- Runner
- Treasure Collector
- Monster Killer



Procedural Personas

- Agents that can mimic playstyle behaviors
- Best-first search algorithms with utility rewards

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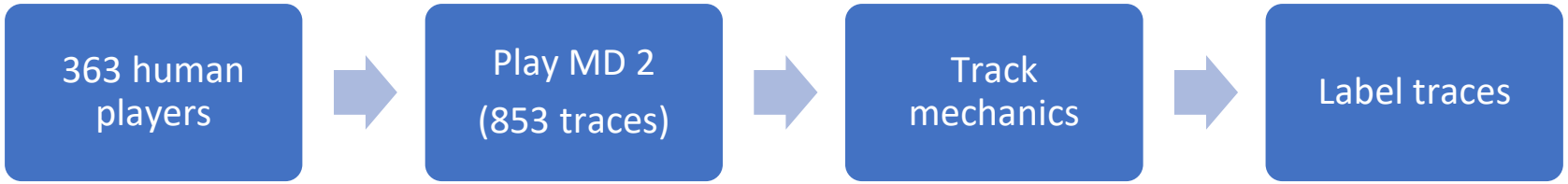
Dataset of MD2 Players



	Count
No Label	136
R	243
TC	92
MK	3
R/TC	108
R/MK	69
TC/MK	34
R/TC/MK	173

Labeling with Action-Agreement Ratios (AAR)

- Using procedural personas
- Measure % of similarity
- Cumulate % over every move

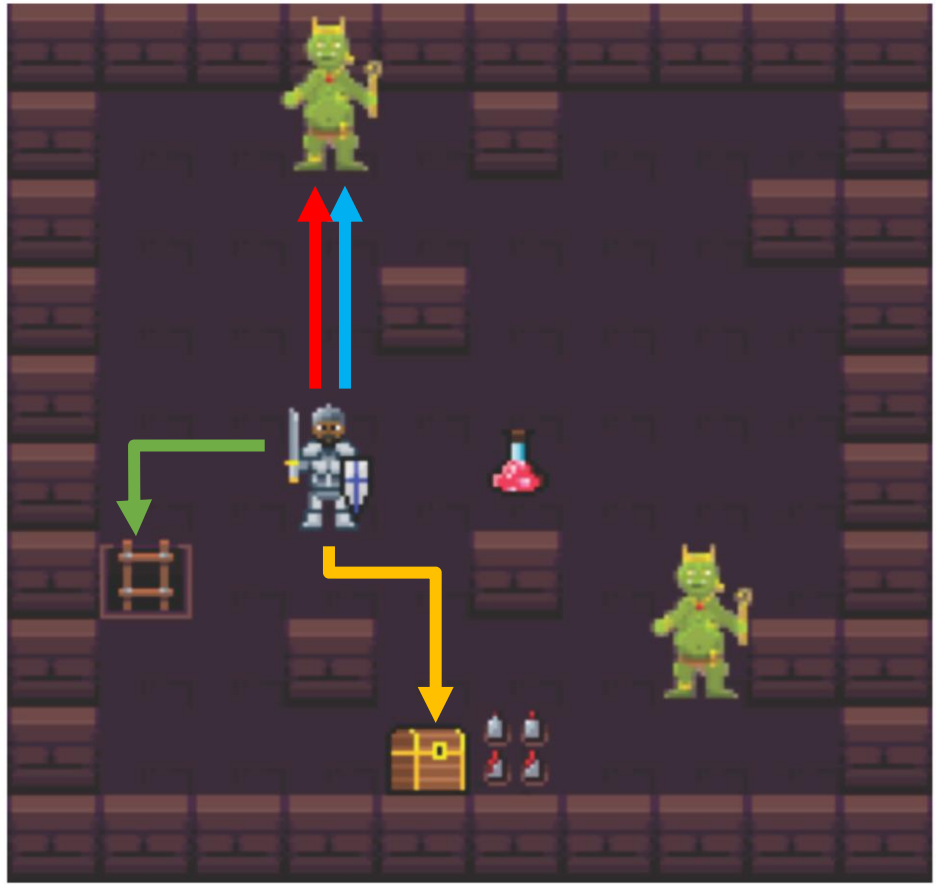
AAR Labeling Example

Persona	Agreement %
Runner	0%
Treasure Collector	0%
Monster Killer	0%

Actual Player
Runner
Treasure Collector
Monster Killer

AAR Labeling Example

Persona	Agreement %
Runner	0%
Treasure Collector	0%
Monster Killer	100%



Actual Player
Runner
Treasure Collector
Monster Killer

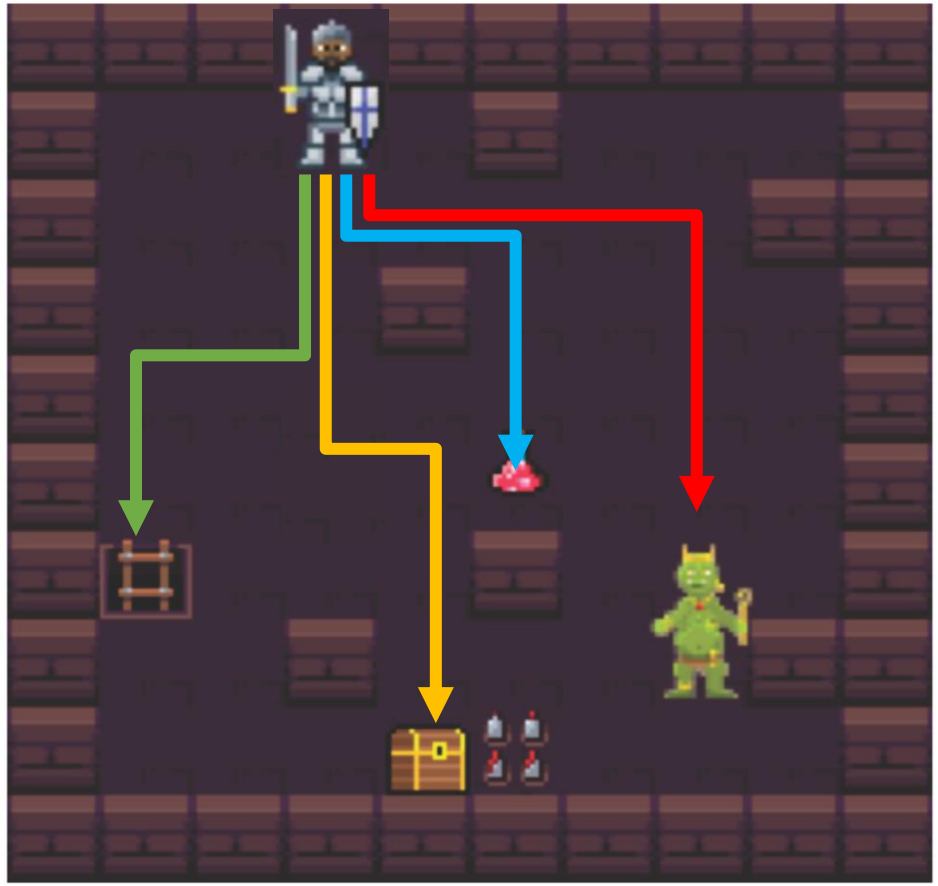
AAR Labeling Example

Persona	Agreement %
Runner	0%
Treasure Collector	0%
Monster Killer	100%

Actual Player
Runner
Treasure Collector
Monster Killer

AAR Labeling Example

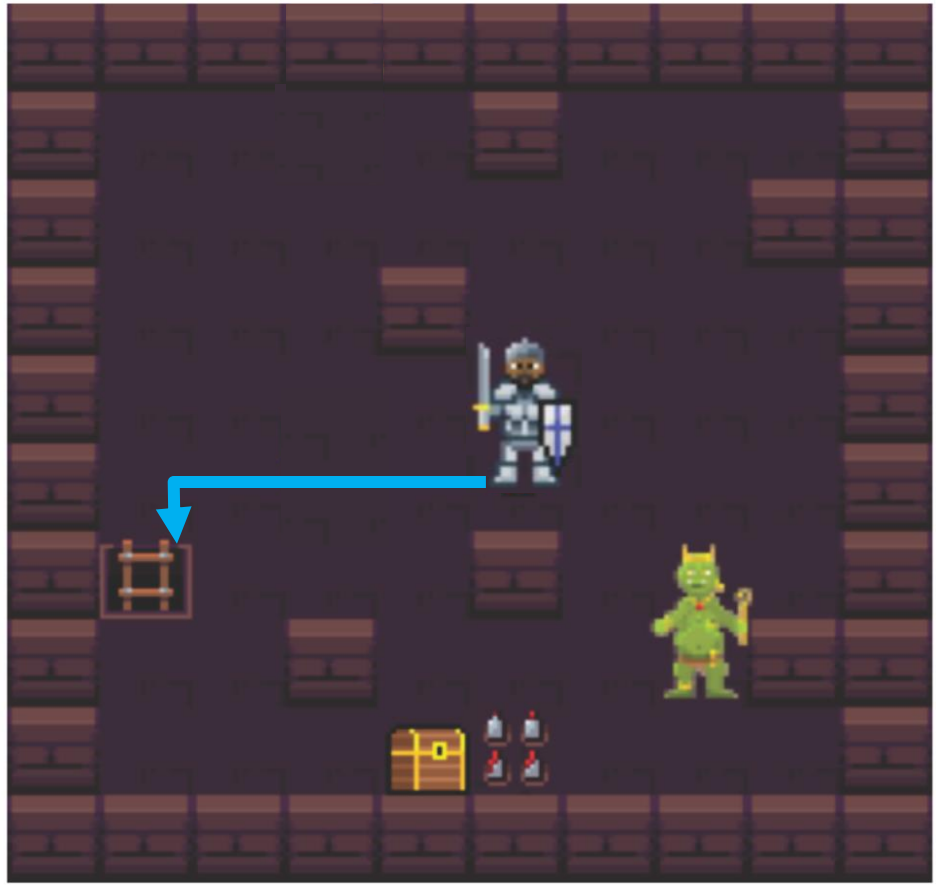
Persona	Agreement %
Runner	5%
Treasure Collector	5%
Monster Killer	75%



Actual Player
Runner
Treasure Collector
Monster Killer

AAR Labeling Example

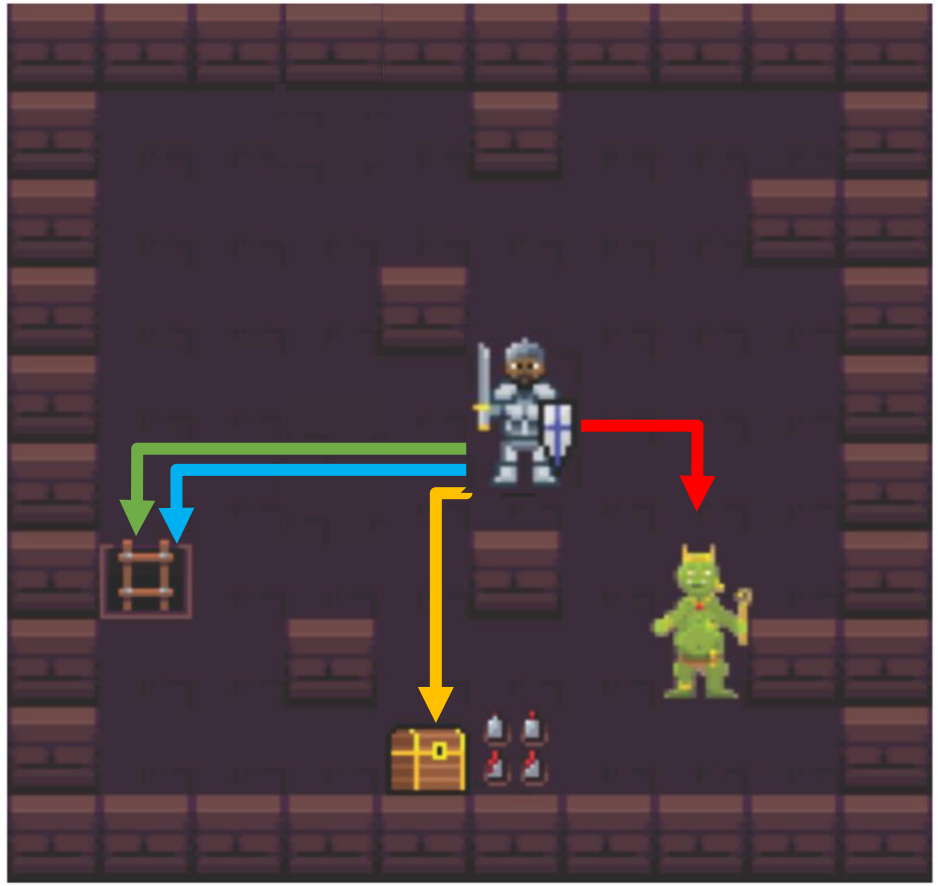
Persona	Agreement %
Runner	5%
Treasure Collector	5%
Monster Killer	75%



Actual Player
Runner
Treasure Collector
Monster Killer

AAR Labeling Example

Persona	Agreement %
Runner	40%
Treasure Collector	10%
Monster Killer	65%



Actual Player
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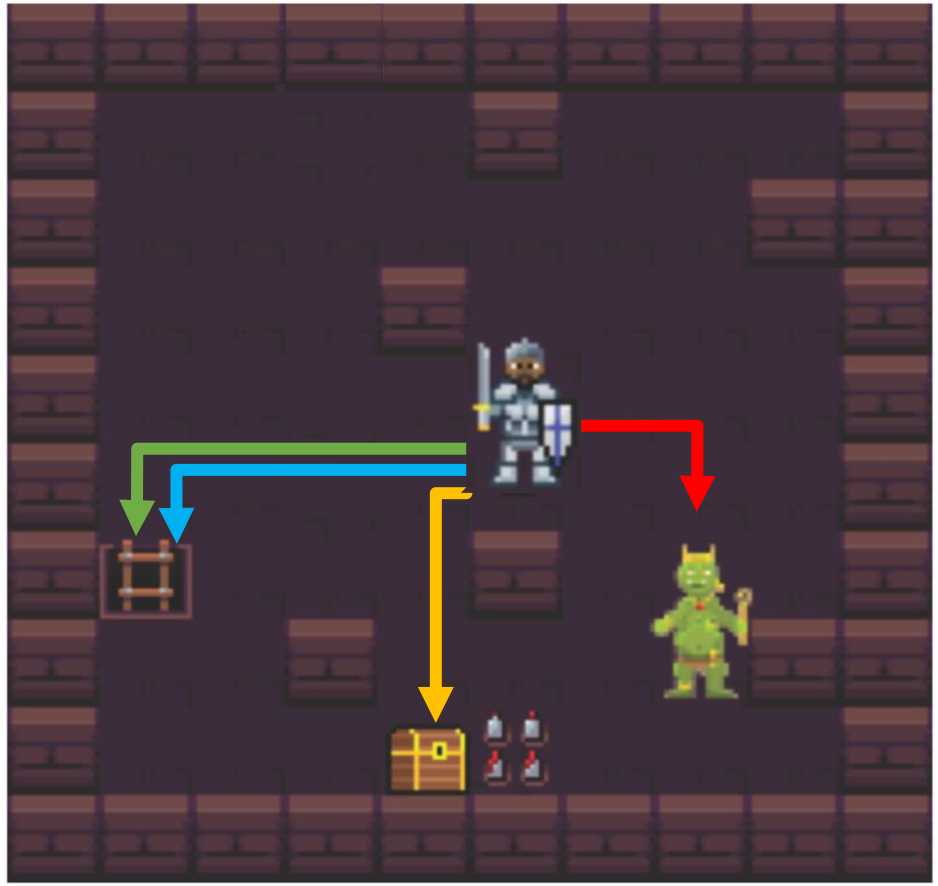


Actual Player
Runner
Treasure Collector
Monster Killer

Labels: Monster Killer

Training on the User Study (SVM)

EnemyKill	TakeTurn	UsePortal	CollectTreasure	CollectPotion	JavelinThrow	Label
4	45	2	3	0	3	MK
1	24	2	0	1	0	R
6	40	0	1	3	5	MK

	Count
No Label	136
R	243
TC	92
MK	3
R/TC	108
R/MK	69
TC/MK	34
R/TC/MK	173

SVM

Training on the User Study (LSTM)

	Count
No Label	136
R	243
TC	92
MK	3
R/TC	108
R/MK	69
TC/MK	34
R/TC/MK	173

LSTM

Model	Training	Validation	Testing
LSTM	0.837 ± 0.03	0.784 ± 0.067	**0.726 ± 0.029**
SVM	0.777	0.694	**0.700**

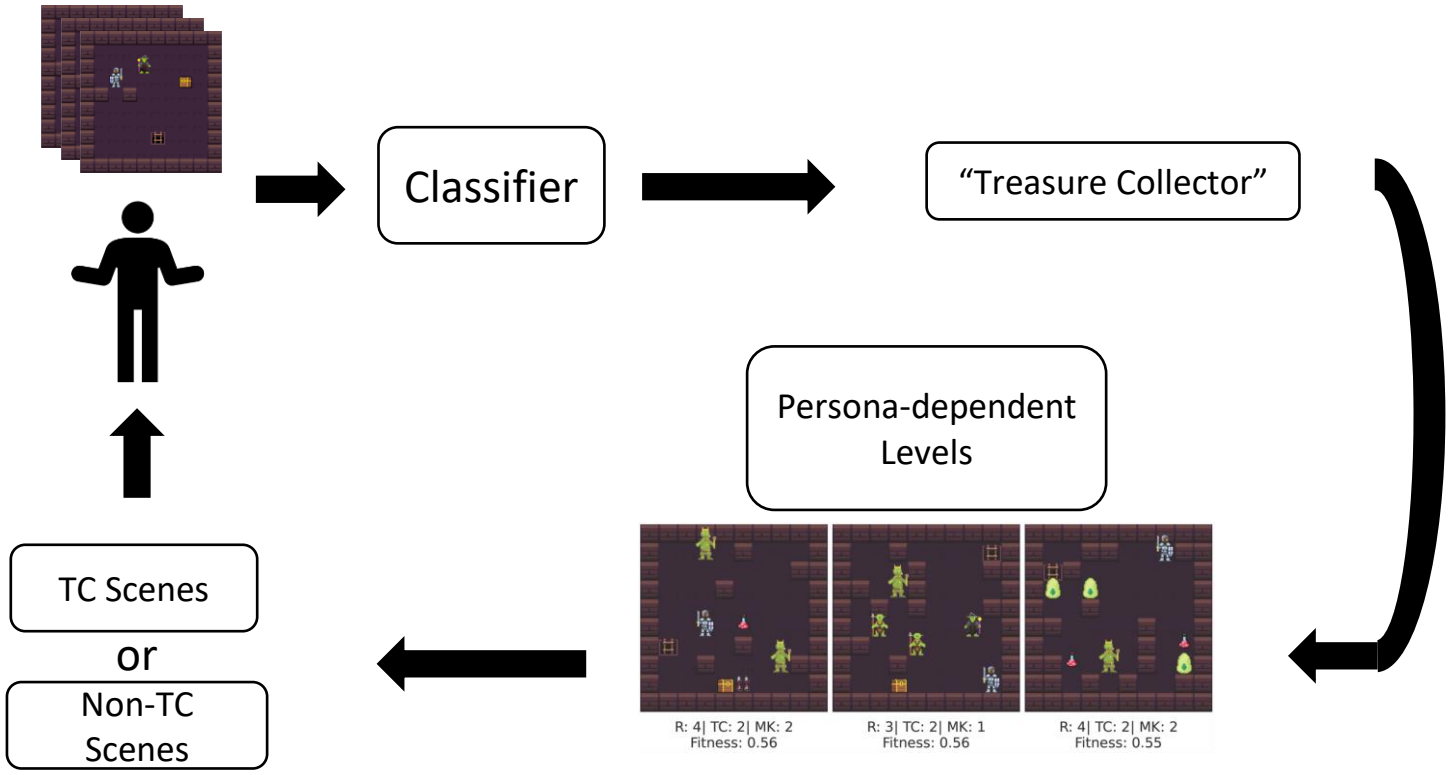
Classification Pipeline

- LSTM – sequential game states
- SVM – mechanic frequency vectors

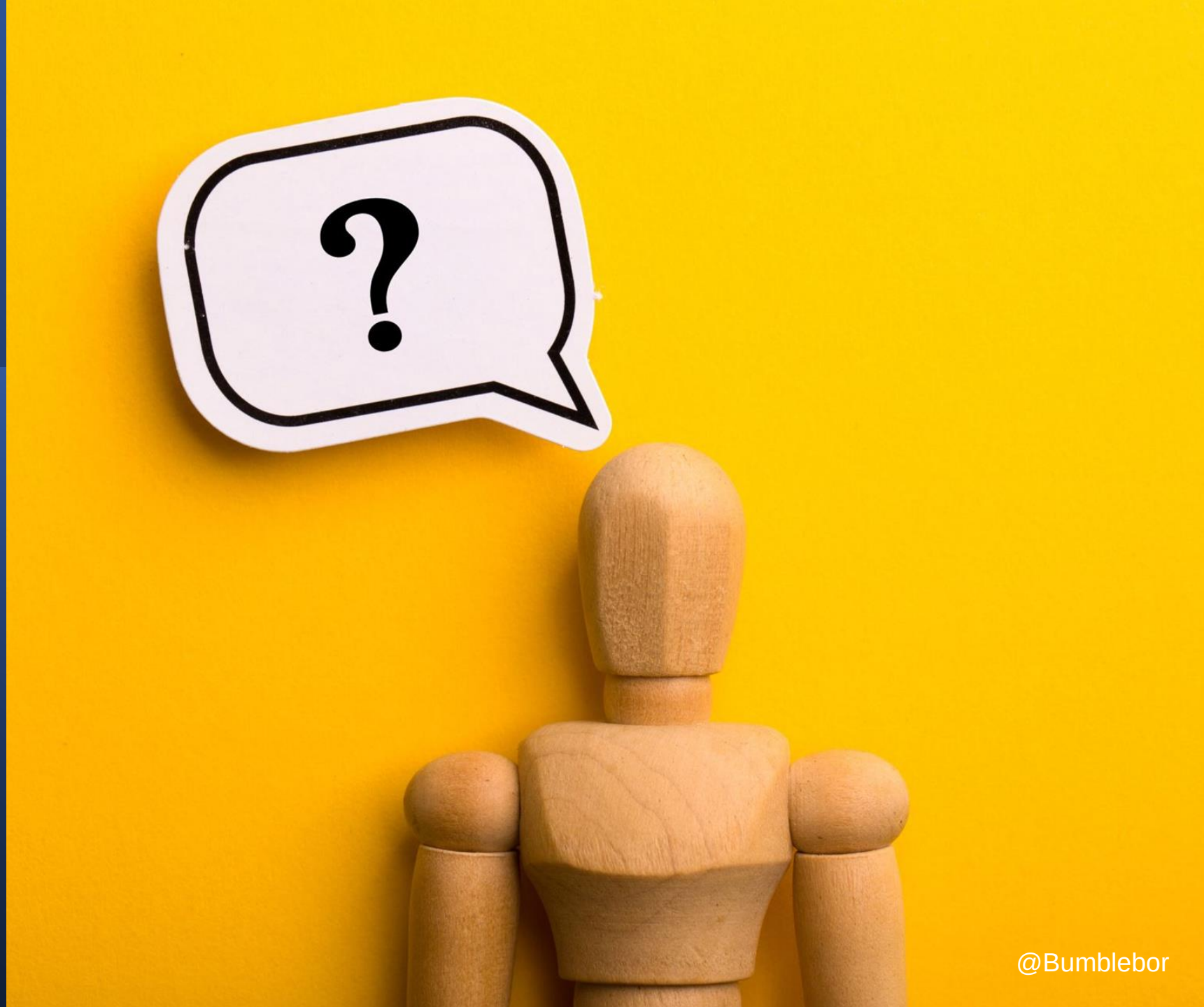
Candy Crush!

- 13 million daily players
- @ 30 seconds a trace
  - ~541.6k traces an hour
  - 4,513 every 30 seconds
- Labeling takes time!
- Game states > Int vectors

A Persona-dependent Pipeline



Questions?



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