IMPROVISATIONAL COMPUTATIONAL STORYTELLING IN OPEN WORLDS

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IMPROVISATIONAL
WHAT THE HECK DID WE JUST SEE?

- The American version of the show Whose Line Is it Anyway? Season 3, Episode 8

Sure, but...

- They’re building a story.
- They’re reinterpreting the surgery theme by adding a spy and a Film Noir feel.
- They’re building up and playing off of our and each others’ expectations.
- But also, they’re making (occasionally humorous) responses that break our expectations.
I GIVE UP. HOW DO THEY DO IT?

Simple, right?

HUMANS CAN DO IT. SO WHY CAN’T COMPUTERS?

- It takes a lot of expertise.
- Computational systems tend to be experts in a single area.
- The response needs to be quick (real-time).
OPEN WORLDS
OUR DEFINITION OF AN “OPEN WORLD”

All possible thoughts a human can think of and express through language
OKAY, SO IT’S HARD.

BUT AT LEAST WE’RE NOT STARTING FROM SCRATCH...?
COMPUTATIONAL STORYTELLING
INTERACTIVE NARRATIVE

+ Computational
+ Storytelling
- Improvisational
- Open World

West of House
You are standing in an open field west of a white house, with a boarded front door. There is a small mailbox here.

1977

+ Computational
+ Storytelling
+ Improvisational
- Open World
NOW LET’S MAKE IT AN OPEN WORLD!

I USED TO BE AN ADVENTURER LIKE YOU
UNTIL I TOOK AN ARROW TO THE KNEE
IMPROVISATIONAL STORYTELLING

Interactive Narrative  +  Improv Theater
“Interactive Script”
WHAT DID WE GET OURSELVES INTO?
WE HAVE A PLAN.
HOW DO WE HANDLE HUMANS?

1. We have to assume that the user has a set of scripts, like improv actors.

2. Depending on what the human does, the agent chooses the appropriate actions based off of 3 strategies:
   - Constituent
   - Consistent
   - Exceptional
THE SETUP
HOW IT SHOULD END
CONSTITUENT (SAME)
CONSISTENT
EXCEPTIONAL
GRAPH-BASED REPRESENTATION
OUR GENERAL FRAMEWORK

- History
- World Knowledge
- Scripts
- Representation
- User Turn
- Agent Response

Constituent
Consistent
Exceptional
Sally sends for help

The sheriff arrests John

John arrives at the bank

John pulls out his gun

Sally gives John the money

John shoots Sally

John escapes

“Sally throws John the bag of coins.”

“John gets back on his horse, Virginia.”

*Not a real plot graph.*
“Sally runs into the bank.”

“John locks the bank.”
“Sally shoots John before he can escape.”

“John calls for an ambulance.”
“The ambulance arrives just in time for John to survive.”
GRAPH-BASED REPRESENTATION

Pros
- Clear story flow
- Can have multiple scripts
- Can be acquired from just a few special stories

Cons
- Crowdsourced separately for each genre
- Script might not be ideal (matching user, boring, etc.)
- Awkward transitioning between scripts
- Reliant on sentential NLP
NEURAL NET REPRESENTATION
OUR FRAMEWORK (REVISITED)

User Turn

Representation

Decision-Maker

Agent Response

Sample

Exceptional

Constituent

Consistent

NEURAL NET

OUR FRAMEWORK (REVISITED)

Scripts

History

World Knowledge

User Turn

Decision-Maker

Agent Response

Sample

Exceptional

Constituent

Consistent

NEURAL NET
NEURAL NET REPRESENTATION

Pros

- Self-learning internal “memory”
- Transitions easily between genres
- Can use any stories

Cons

- Need a lot of stories
- Don’t know what goal/objective function to optimize for (surprisal, consistency, etc.)
- Hard to see why an agent makes certain decisions
WHY ARE WE DOING THIS?

- It’s fun!
- Serious games for training (forensics, strategists)
- Problem-based inquiry educational games (open-ended problem-solving)
- Integration into conversational agents to appear more human
- A glimpse into cognitive processes of human improv
This is not a solved problem. Are we covering all possible scenarios for how a story can unfold?

What kind of data should we be training on? Can it scale?

What does it mean for a story to be considered “good” or “entertaining”?

How “creative” can we be before things get weird?
Thank you!

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Icons taken from flaticon.com and adapted for this presentation.
“Whose Line” video cut from https://youtu.be/XmnZ9HZHjw