Understanding the Technological and Experiential Requirements of Improvisational Storytelling Agents

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Why is storytelling important?

Most natural way of communicating

What if computers could tell stories?

They could...

- Help us plan
- Teach us
- Train us for hypothetical scenarios
- Do anything else that requires long-term context and commonsense information!
Automated Story Generation
Teaching computers to tell stories
Main Takeaway (tl;dr)

There are currently two ways of doing story generation

And I am creating a combined model by taking the best from both
Causal Storytelling Systems

Pharmacist asks for prescription → Customer produces prescription → Pharmacist checks prescription → Pharmacist delivers drugs
Examples

**Universe (1984):**

>> LIZ tells NEIL she doesn’t love him
working on goal – (WORRY-ABOUT NEIL) – using plan BE-CONCERNED
Possible candidates – MARLENA JULIE DOUG ROMAN DON CHRIS KAYLA
Using Marlena for WORRIER
>> MARLENA is worried about NEIL

**Talespin (1992):**

One day,
JOE WAS THIRSTY.
JOE WANTED NOT TO BE THIRSTY.
JOE WANTED TO BE NEAR THE WATER.
The Dream

Story Prompt
(First Sentence)

Story Generator

Rest of the Story
(about anything)
Neural Storytellers

a TON of stories

Neural Network

A story??
A Standard Neural Network’s Output

r2d2 carrying some drinks on a tray strapped to his back passes yoda who uses his force powers to hog the drinks

Expected:
obi wan and anakin are drinking happily when chewbacca takes a polaroid picture of anakin and obi wan

Generated:
can this block gives him the advantage to personally run around with a large stick of cheese
Comparison

CAUSAL SYSTEMS

+ Coherent stories
- Limited domain

NEURAL NETWORK SYSTEMS

+ Unique stories
- Coherence is terrible
This brings me to my thesis statement...
Why don’t we have both?
In other words...

A jointly neural and causal model will create more novel coherent open-domain stories than solely probabilistic (neural) or causal models.
Outline

- Extracting events from sentences
- Leading it toward plot points

Improving neural networks for storytelling

Joint Model
Why is this so weird?

r2d2 carrying some drinks on a tray strapped to his back passes yoda who uses his force powers to hog the drinks can this block gives him the advantage to personally run around with a large stick of cheese

Problem: Sentences like this only appear once in the dataset

Solution: Fixing sparsity by separating semantics (meaning) from syntax (grammar)
Event Representations

Use linguistic knowledge to bootstrap the neural network
From sentence, extract event representation
(subject, verb, direct object, modifier)

Original sentence: yoda uses the force to take apart the platform
Event: yoda, use, force, Ø
Generalized Event: <PERSON>0, fit, power, Ø

John unwittingly unleashes an insidious pox.

John unleash pox Ø

<Eventify>

<PERSON>0, disassemble, contagious_disease, Ø

John unleash pox Ø

<event_n>

Event-to-

Event

<event_n+1>

male, spatial_configuration, Ø, adopt
How do you read that?
John unwittingly unleashes an insidious pox.
Why are the sentences generalized?

CAT STORIES

Generalized Event-to-Event

carnivore, eat, animal_tissue, Ø

The dog ate the bone.
John unwittingly unleashes an insidious pox.

John unleash pox Ø

<PERSON>0, disassemble, contagious_disease, Ø
John unleash pox Ø

<PERSON>0 = John
contagious_disease = pox

male, spatial_configuration, Ø, adopt

He crumples and is about to be husk.

generalized_sentence_{n+1} male crumples and is about to be sheath
Global Coherence

Meet
Plot Point 1

Admire
Mid Point

Plot
Point 2

Unrequited

Marry
Resolution

Discovery

Understanding

Image source: https://blog.reedsy.com/plot-point/
Outline

• Extracting events from sentences
• Leading it toward plot points

Improving neural networks for storytelling
Improved Neural Network

Event-to-Event

Output heads toward goal?

Closer distance = Higher reward
But are the stories actually any good?
Human-Participant Questionnaire

1. This story exhibits CORRECT GRAMMAR.
2. This story's events occur in a PLAUSIBLE ORDER.
3. This story's sentences MAKE SENSE given sentences before and after them.
4. This story AVOIDS REPETITION.
5. This story uses INTERESTING LANGUAGE.
6. This story is of HIGH QUALITY.
7. This story is ENJOYABLE.
8. This story REMINDS ME OF A SOAP OPERA.
9. This story FOLLOWS A SINGLE PLOT.
Average Score per Model

* p < .05
** p < .01
So far...

We have a neural network that is more accurate (because of events) and is now goal driven.
But the stories still aren’t causally coherent...
Example (Goal: hate/admire)

Our sister died.
Greggory executed during the visit.
Greggory adopted the girl.
The girl looked like her mom.
She was appalled.
Penelope detested the jungle gym.
Outline

Improving neural networks for storytelling

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Joint Model
Back to **Causal Chains**

1. Pharmacist asks for prescription
2. Customer produces prescription
3. Pharmacist checks prescription
4. Pharmacist delivers drugs
Using VerbNet

Jen sent the book to Remy from Atlanta.

Agent: Jen
Theme: book
Destination: Remy
Initial_Location: Atlanta

Roles:
- Agent
- Theme
- Destination
- Initial_Location

Predicates:
- has_location(e1, book, Atlanta)
- do(e2, Jen)
- cause(e2, e3)
- motion(e3, book)
- !has_location(e3, book, Atlanta)
- has_location(e4, book, Remy)
Using VerbNet

**Jen** sent the **book** to **Remy** from **Atlanta**.

**Causes**
- has_location(e1, book, Atlanta)
- do(e2, Jen)
- cause(e2, e3)
- motion(e3, book)
- !has_location(e3, book, Atlanta)
- has_location(e4, book, Remy)

**Effects**
- Atlanta: location
- book: concrete
- Jen: animate or organization
How does this fit into the joint system?
Eventify

\[ \text{event}_n \]

Event-to-Event

\[ \text{event}_{n+1} \]

Event-to-Sentence

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Conclusion

• Storytelling systems are important!
• Causal systems are too cumbersome to make but create stories that make sense
• Neural network systems can create stories about many topics but don’t always make sense
• I hypothesize that a hybrid system can create more novel coherent open-domain stories
Thank you!

Questions?

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