Cyber-detectives, Robot Mysteries

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In many games, you can do whatever you want...
Games with stories are different...
Plots are handwritten by designers.
Nothing has changed since 1990...

What's the problem with that Largo guy?
Nice apron. Are you some sort of chef?
How much wood could a woodchuck chuck if a woodchuck could chuck wood?
I'd just like to browse, thanks.
Complex plots are hard to write...
Computer-aided storytelling isn’t just fun and games...

Characters from USC project
*Army Excellence in Leadership*
Sharpen your math and reading skills by solving riddles!
Automated storytelling requires artificial intelligence

● What should happen in the story?
● What should the story make you feel?
Grimesby Roylott’s evil plan

If my daughters get married, I’ll lose money…
   I don’t want to lose money…

If my daughters die, they can’t get married…
   If a poisonous snake bites my daughters, they’ll die

If I put a snake in the ventilator, it will bite my daughters

THEREFORE: I should put a snake in the ventilator!

Is this actually a good plan?
Use predefined logical rules to plan for a goal…

What do you think of this approach?
Problem!

The Analytical Engine has no pretensions to originate anything. It can do whatever we know how to order it to perform.

-Ada Lovelace

Programming all the rules is almost like writing the story!

...The programmer decides in advance what will happen
Another approach...

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-Ada Lovelace

Learning machines:
Instead of trying to produce a programme to simulate the adult mind, why not rather try to produce one which simulates the child's?
-Alan Turing
Machines that learn...

- Lots of data
  - Tells us what the options are

- Probability
  - Combines evidence to make good choices
Newer projects learn rules from existing stories

Plan steps learned from 60 stories about robbing a bank

img: Li et al, from Georgia Tech
There was a detektav wuns named Cal, who was a very good detektav and very brave. Nuthin fritened him. Imajin his surprise one night when he herd an introoeder in his masters home.

He came russian into the riting office. There was an introoeder. He had cum in throo the windo. There was broken glas. That was what Cal, the brave detektav, had herd with his good hering.

He said, "Stop, introoeder."

The introoeder stopped and looked skared. Cal felt bad that the introoeder looked skared. Cal said, "Look what you have done. You have broken the windo."

"Yes," said the introoeder, looking very ashaymed. "I did not mean to break the windo."

-Isaac Asimov, “Cal”
The Intruder’s evil plan

I need money…
   There’s money in the house…
      If I were in the house, I could take the money…
         I can’t get in because of the window
      THEREFORE, I should break the window!

Is this a good plan?
Does it make an interesting story?
We need clues! We need suspense!

- Roylott plans to kill Helen and not get caught
- Mysterious hissing sounds, dummy bell-ropes...
- Solution makes sense (sort of) but still surprising
Measuring suspense?

Anger and fear in *Adventure of the Speckled Band*

tool by Robert Ang, Jon Oberlander, Viccy Adams (U of Edinburgh), Micha Elsner (OSU)
Sentiment analysis

Customer Reviews

amazon.com reviews for 2010 “Sherlock Holmes”

Good movie, lots of action and very good acting.

It is not pushed too far and, though sometimes improbable, is not more so than in some stories - and is certainly mild compared to most films.

I've watched it many times and hopefully the second Sherlock Holmes will be as good as this one.

Originally used for customer service
Sentiment word by word

- Ask “is this word [angry/sad...]?"
- Count average stars for reviews with word

star ratings in IMBD reviews containing various words from de Marneffe (OSU), Manning and Potts (Stanford)
“See that you keep yourself out of my grip,” he snarled, and hurling the twisted poker into the fireplace he strode out of the room.

“He seems a very **amiable** person,” said Holmes, laughing. **(positive emotion)**

I have no one to **turn to**—none, save only one, who cares for me, and he, poor **fellow**, can be of little **aid**. **(trust)**

I found myself in my old armchair in my own old room, and only wishing that I could have seen my old **friend** Watson in the other chair which he has so often **adorned**. **(happiness)**

I am naturally observant, as you may have remarked, Mr. Holmes, and I soon had a **pretty good** plan of the whole house in my head.

...versus: She is a very **pretty** girl and has attracted admirers who have occasionally hung about the place. That is the only drawback which we have found to her, but we believe her to be a thoroughly **good** girl in every way. **(positive emotion)**
From sentiment to music

Hannah Davis and Saif Mohammad’s evil plan?

Convert text to emotional graph
  Determine overall positive vs negative
    active emotions (anger and joy) vs inactive (sadness)
    level of emotion at beginning, middle or end?
    dominant emotions
  Map to major or minor key
    tempo
    number of notes in melody
    higher or lower notes
Create a musical score using JFugue composition software

http://www.musicfromtext.com/
Computer storytelling: still unsolved

Need both planning and sentiment…

But how?

Roylott wants to murder daughters...

Shoot them? (not very surprising)

Tickle them? (unlikely to work)

Some kind of vicious animal?

gigantic hound

giant rat of Sumatra

swamp adder
Clues shouldn’t be too obvious...

**Good:** The sight of the **safe**, the **saucer of milk**, and the **loop of whipcord** were enough to finally dispel any doubts which may have remained.

**Not good:** The sight of the **glass tank**, the **bucket of mice**, and the **snake tongs** were enough to finally dispel any doubts which may have remained.

**Don’t even try:** ‘Oh, my God! Helen! It was the **scarf**! The **scaly scarf**!’
Measuring “how obvious” with data

DANGERS
INDEXED BY THE NUMBER OF GOOGLE RESULTS FOR
“DIED IN A ____ ACCIDENT”

<table>
<thead>
<tr>
<th>TYPE OF ACCIDENT</th>
<th>GOOGLE RESULTS</th>
</tr>
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<tbody>
<tr>
<td>SKYDIVING</td>
<td>710</td>
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<tr>
<td>ELEVATOR</td>
<td>575</td>
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<tr>
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<td>7</td>
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<tr>
<td>BLOGGING</td>
<td>2</td>
</tr>
</tbody>
</table>

xkcd: Randall Munroe
But frequency is not enough

Some creative phrases are quite rare;
some creative phrases are common, but most really common phrases are boring.

Results from a paper by Kuznetzova, Chen and Choi (SUNY Stonybrook)

Data with creativity scores from survey on Amazon Mechanical Turk

Common
quiet teenager
constant longitude
watery juice
noble political
diet cooking
verbal interpretation
unwelcome situation

Creative
inglorious success
thorny existence
relaxed symmetry
sardonic destiny
dispassionate history
poetical enthusiasm
verbal beauty
What we’ve learned...

- A good mystery should *make sense*
  - Which takes *planning*
- It should be *exciting*
  - Which takes *sentiment analysis*
- It should be *creative*
  - We’re still not sure how to do this
- And then you need to put it all together...
Maybe someday soon, computers will be able to tell interesting stories!