Research in Intelligent Narrative Technologies and Interactive Stories
CMPS 10 Guest Lecture Lecture
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The Character Creator Project
Natural Language and Dialogue Systems Lab
Center for Games and Playable Media
Interactive narrative often involves dialogue with virtual characters.
Character Death (e.g., *Heavy Rain*)

Story continues regardless of lead character’s death... but... **what happens to future scenes?**
One way of reacting to character death: all future chapters featuring this character are removed.

Madison died?

If not, then go through this chapter.

Narrative Structure and Technique in Heavy Rain, Wei and Calvert, iDMAa (International Digital Media and Arts) Journal article, Sept. 1, 2011
What if we still want to experience the deleted scenes, but with remaining characters?

Need a dynamic procedural generation system for dramatic elements, such as:

- Different events that may have happened
- Different character relationships
- Different knowledge known by the characters

We are interested in the dialogue aspect, such as:

- Different dialogue in respond to character death
What will a dynamic system offer?

We’d have a way out of the **massive authoring effort** for dialogue of interactive stories

Currently: dialogue mostly handcrafted:

- **Heavy Rain** (2010): ~2000 pages
- **LA Noire** (2011): ~2200 pages of script, authoring since 2004
- **Star Wars: The Old Republic**: ~10x Star Wars: Knights of the Old Republic, ~40+ novels, >12 full-time writers, authoring since 2006
  - MMO game, continuous authoring...

Possible solution: **Expressive Natural Language Generation**
Natural Language Generation

• Dynamic language systems; generates utterances (sentences)

• Most NLG systems do not care much about characters, drama, and personality

• However, **Expressive Natural Language Generation** (ENLG), aims to automate generation of character’s linguistic behavior
  
  – This is the basis of our work, and we apply it to games
Our Long Term Goal

New tool: **Character Creator**

1. **Language generation engine** – character-relevant parameters to control syntactic and pragmatic aspects of generated utterances

2. **Character models** – how to combine parameters to express a particular character through dialogue

3. **Authoring tool** – how to exposes these functionalities to authors

We are currently focusing on creating character models (component 2 above) using film dialogue
Film Corpus  
(Collection of film scripts)

- 862 film scripts from IMSDb, as of May 19, 2010
- ~7,000 characters
- ~600,000 lines of dialogue
Corpus-Based Models from Film  
(Lin and Walker 2011)

Why film screenplays?

• Film dialogue is authored to **deliberately convey** the feelings, thoughts, and perceptions of the film character
  
  – Drama vs. action
  
  – Annie Hall vs. The Terminator

• Examine dialogue of **heroes, villains, wise men, jokers, etc.**
Scene from Annie Hall: Lobby of Sports Club

ALVY: Uh ... you-you wanna lift?
ANNIE: Turning and aiming her thumb over her shoulder
Oh, why-uh ... y-y-you gotta car?
ALVY: No, um ... I was gonna take a cab.
ANNIE: Laughing  Oh, no, I have a car.
ALVY: You have a car?
Annie smiles, hands folded in front of her
So ... Clears his throat. I don’t understand why ... if you have a
car, so then-then wh-why did you say “Do you have a car?” ... like you wanted a lift?
Scene from *The Terminator*: Cigar biker

**TERMINATOR:** I need your clothes, your boots, and your motorcycle.

**CIGAR BIKER:** You forgot to say please.

Terminator hurls Cigar, all 230 pounds of him, clear over the bar, through the serving window into the kitchen, where he lands on the big flat GRILL. We hear a SOUND like SIZZLING BACON as Cigar screams, flopping jerking. He rolls off in a smoking heap.
IMDB Ontology for Character Groupings

Gender

Genre*

Directors


* images from AMC’s www.filmsite.org
How does it work?

Experimental Method: 6 steps

1. Collect movie scripts from IMDB

2. Extract utterances for each character

3. Select leading roles (dialogue > 60 turns)

4. Generate features reflecting linguistic behaviors

- Jules' LIWC results
- Jules' Tag Question Ratio
- Jules' Overall Polarity
- Vincent's other features
5. Learn models of character

6. Generate new utterances using learned models to control parameters of our dialogue generator

- Jules’ in SpyFeet utterances
- Vincent in SpyFeet utterances
- Others in SpyFeet utterances

Story domain: SpyFeet utterances

PERSONAGE generator (ENLG engine)
Counting surface features from each character’s dialogue:

- Number of sentences, verbs, etc.
- Number of discrepancy words: *should*, *would*, *could*
- Number of positive emotion words: *love*, *nice*, *sweet*
- Number of negative emotion words: *hurt*, *ugly*, *nasty*
- Number of tentative words: *maybe*, *perhaps*, *guess*

Turn them into averages, ratios

Not a complete feature inventory

- Aspects of characters not being captured: jokes, idiom, etc.

However, we have enough features to discriminate between different types of characters, and to create learned models.
Learning Character Models (Step 5)

- Each character is represented by a list of feature values

<table>
<thead>
<tr>
<th>Char</th>
<th>Gen</th>
<th>Average Num of Sents</th>
<th>PosEmo ratio</th>
<th>NegEmo ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annie</td>
<td>F</td>
<td>3.33</td>
<td>0.0472</td>
<td>0.009</td>
</tr>
<tr>
<td>Alvy</td>
<td>M</td>
<td>2.66</td>
<td>0.0347</td>
<td>0.011</td>
</tr>
<tr>
<td>... etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

One way to learn character models is to calculate standard score for each feature for each character:

- How many standard deviations a feature value is above or below the mean

Higher standard score == feature values further away from mean == more significant
Learning Character Models (Step 5)

What did we learn about Annie from her significant features (features that made her stand out from the female population)?

- Uses many non-fluencies: *um, uh*
- Says yes, *yep* a lot, especially at beginning of her utterances
- Short sentences, but talks a lot
- Does not use long words
- Uses emphasis and hedging pragmatic markers: *really, sort of, I think*
Generates Utterances from Character Models (Step 6)

Example: Learned character model for Annie
Map character model to PERSONAGE parameters: weighted average of features

<table>
<thead>
<tr>
<th>PERSONAGE parameter</th>
<th>Description</th>
<th>Sample mapped features (from character model)</th>
<th>Annie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbosity</td>
<td>Control # of propositions in the utterances</td>
<td>Number of sentences per turn, words per sentence, word length, etc.</td>
<td>0.78</td>
</tr>
<tr>
<td>Content polarity</td>
<td>Control polarity of propositions expressed</td>
<td>…</td>
<td>0.77</td>
</tr>
<tr>
<td>Negation Insertion</td>
<td>Control expressed polarity as neutral or extreme</td>
<td>…</td>
<td>0.72</td>
</tr>
</tbody>
</table>

… etc.
Story domain (step 6)

**SpyFeet:** a playable prototype of RPG implemented on Android smart phone (Reed, et al. 2011)

The story:
- Dr. Cartmill is up to no good...
- 5 guardians of nature (animal spirits) know Cartmill’s plot

Your job:
Perform tasks to gain guardians of nature’s trust in order to uncover Dr. Cartmill’s plot

Yes, the 5 of us are the **guardians of nature**...

What would you do to find out?

And we **know** what Cartmill is up to...

Oooo... fresh blood...

May I have some cabbage?

Dr. Cartmill

Wolf

Otter

Tiger Beetle

Tortoise

Sparrow
Original and Generated Utterances

Annie (Annie Hall) original dialogue sample

• H’m?
That’s, uh ... that’s pretty serious stuff there. Yeah? Yeah?
U-huh.
• Hi. Hi, hi.
Well, bye.
Oh, yeah? So do you. Oh, God, whatta- whatta dumb thing to say, right?
I mean, you say it, “You play well,” and right away ... I have to say well. Oh, oh ... God, Annie. Well ... oh, well ... la-de-da, la-de-da, la-la

Annie’s Learned Character Model for our ENLG engine

Verbosity=0.78
Conten polarity =0.77
Polarization =0.72
Repetition polarity=0.79
Concessions =0.83
Concessions Polarity=0.26
Positive content first=1.00
First Person in Claim=0.6
Claim Polarity=0.57
... etc.

Generated dialogue (SpyFeet story domain)

• Come on, I don’t know, do you? People say Cartmill is strange while I don’t rush to um.. judgment.
• I don’t know. I think that you brought me cabbage, so I will tell something to you, alright?
• Yea, I’m not sure, would you be? Wolf wears a hard shell but he is really gentle.
• I see. I am not sure. Obviously, I respect Wolf. However, he isn’t my close friend, is he?

Learning Linguistic Features

Generation
How do users perceive generated utterances?

Perceptual Experiment

• Compare perceptions of personality
  – *Original utterances* from film scripts
  – *Generated utterances* from learned character models
• Story domain: SpyFeet
• 6 film characters (3 male, 3 female)
  – Alvy, Annie *(Annie Hall)*
  – Indy, Marion *(Indiana Jones – Raiders)*
  – Vincent, Mia *(Pulp Fiction)*
• 29 users (13 female, 16 male), ages 22 to 44

Web-based experiment
Perceptual Experiment
Original Utterances

Example: read 3 scenes of dialogue for Marion from Indiana Jones and the Raiders of the Lost Ark

Scene 1
The Bantu Wind is bathed in moonlight as it cuts across even seas.

Scene 2
Indy moves quickly through the felt hat. He peers through the 

Scene 3
Indy and Marion are briskly walking along one of Cairo's busy bazaar streets. Vendors with fine cloth, pottery, baskets, jewelry, etc line the street. Marion has the Monkey from Sallah's house on her shoulder.

INDY: Do you really need that monkey?
MARION: Not without that
INDY: It's lovely.
MARION: I'm surprised at you, Indy. Talking that way about our baby. He's got your looks, too.

INDY: Let's get out of here
MARION: Whole wardrobe in the
Perceptual Experiment
Generated Utterances

Example: Next read 6 sets of generated utterances to determine similarity of style to original utterances

* 29. Basically, I don't rush to judgment. On the other hand, people say Cartmill is strange, he is strange.
   Yeah, I can answer since you brought me that cabbage.
   Everybody knows that Wolf is gentle. However, he wears a hard shell, doesn't he?
   I think that Wolf isn't my close ally, alright? However, I respect him.
   Oh because Sparrow conveys excitement to my life, I am allies with her, okay?

* 30. How similar is the style of this dialogue to the MARION character?
   - Right, I don't rush to judgment, would you? People, however, say Cartmill is strange.
   - Actually, I will tell you something because you brought me cabbage, you see?
   - Oh I am not sure. Wolf is gentle. However, he wears a hard shell.
   - You might be interested in knowing that Wolf isn't my close friend, okay? I, on the other hand, respect him.
   - Actually, I am allies with Sparrow since she conveys excitement to my life, okay?

* 34. How similar is the style of this dialogue to the MARION character?

<table>
<thead>
<tr>
<th>Similarity</th>
<th>Not at all</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

NATURAL LANGUAGE AND DIALOGUE SYSTEMS LAB
BASKIN ENGINEERING
UC SANTA CRUZ
Character Model Utterances
Perceptual Experiment Results
(Walker et. al. ICIDS 2011)

What we found:

- **Alvy, Annie, Indy, and Vincent** are perceived as being similar to their intended characters
- But some confusion with **Marion**: more similar to Mia and Vincent
- And some confusion with **Mia**: more similar to Vincent

Why the confusion? Strong female roles similar to each other or to other male roles?
Summary

We showed we can:

• **Learn character models** from film dialogue

• Use models to **generate** character utterances **in a completely different domain**

• Produce **character-stylized** utterances to match a particular character or group of characters, which are in general **PERCEIVED** as being **more similar to the modeled character** than to random other characters.
Future Work

• Every step of our experimental method can be improved, for example:
  – Create additional relevant features to better represent characters
  – Gather additional film scripts
  – Better mapping from character model features to PERSONAGE parameters
• More detailed analysis of film corpus: model characters’ relationships to see how that affects their dialogue interaction
Someday… a fully functional dynamic procedural generation system