Deep Dungeons and Dragons: Learning Character-Action Interactions from Role Playing Game Transcripts

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Narrative Processing in NLP
Stories are a central part of everyday human experience
- since childhood
- cultural significance

Automated story understanding is a hard problem, but
- useful for communicating narrative
- generating coherent text in summarization/QA: current systems lack focus, goals and structure

Learning character-action interactions is a central task
Previously > frequency-based
- What are frequent character-action pairs?
This work > predictive ties
- Given a character’s attributes, what actions are likely?
- Given observed actions, what attributes might be attached to a character?

Prior work
- Learning types of characters
- Learning regular event sequences
- Classify characters based on their speech/actions
- Both characters and actions are described in complex NL texts

A corpus of RPG transcripts from online forums:
http://groups.inf.ed.ac.uk/cup/dd/!

Neural language models for learning interactions

Character/Action Descriptions from our Corpus
Character description
- Name: Ana Blackclaw
- Age: 27
- Gender: Female
- Appearance: Standing at a mighty 6'5, she is a giant among her fellow humans... Her face is marked by scars. ... Her body is muscular, as it would have to be to carry both her armor and the hammer. Preferred Weapon: Hammer. Preferred Armor: Heavy. Gift: Binoculars. Dark Sign: No.

Action description
- She stopped dead in her tracks as the hissing began, and grabbed the back of the girl's neck, pulling her back to steady herself. The giant remained silent as she did so, and then glanced over to the nearby skeletons. They would be upon them soon. Her grip tightened on the hammer as she glanced from side to side. It would not be a fun fight.

Complex natural language descriptions
- Express sophisticated character attributes and actions compared to coarse categories such as introvert/extrovert

The Corpus: Role Playing Game Transcripts
From online RPG Forums: roleplayerguild.com
An RPG transcript
- a set of character describing posts
- a sequence of action posts
1,544 RPGs
- 56,576 action posts
- 9,771 unique characters

Preprocessing descriptions
- Retain only parts related to character in focus
- Remove auxiliary information (other characters, location etc)
- Normalize character name

Character description
- Keep only sentences with character name or pronouns 'he', 'she'
- Sentences with personality words – 'ability', 'profile', 'talent' etc
- Replace character name with 'ENT'

Action description
- Keep only sentences which start with character name
- Replace character name with 'ENT'

Download our corpus at http://groups.inf.ed.ac.uk/cup/dd/!

Modeling character-action interaction
- Mikolov and Zweig, 2012 – Language models with side information
  - RNN Language model
  - Side information for token $x_i$ → feature embedding vector $e_i$
  - $e_i$ concatenated to input and output layers
  - $h_i = \text{LSTM} \left( h_{i-1}, e_i \right)$
  - $P(x_i | x_1 \ldots x_{i-1}) = \text{softmax} \left( \frac{W h_i + b}{h_i} \right)$

<table>
<thead>
<tr>
<th>Our language models</th>
<th>Action LM</th>
<th>Character LM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Token seq</td>
<td>entire story thread</td>
<td>a character’s description</td>
</tr>
<tr>
<td>+ Side info</td>
<td>char producing each token</td>
<td>all actions posts done by char</td>
</tr>
<tr>
<td>$e_i$ is jointly learned in the same model. Feedforward network with average pre-trained embeddings of side info (bag of words) as input.</td>
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</tbody>
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Future work
- Infer one modality from another
- Better models for generation

Results and Future work

Language model perplexities
<table>
<thead>
<tr>
<th></th>
<th>Train</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action LM</td>
<td>82.56</td>
<td>105.06</td>
</tr>
<tr>
<td>Action LM + side-char</td>
<td>57.38</td>
<td>96.91</td>
</tr>
</tbody>
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Character context
| Continuations of “ENT called...” |
| small, girl, cheerful | <eos> ENT called... her name <eos>
| bulky, male | <eos> ENT called... out to the group <eos>

Action context
| Continuations of “ENT is...” |
| walked, looked, stayed | <eos> ENT is... a very friendly person <eos>
| strike, slap | <eos> ENT is... a bad boy <eos>

References
2. Chambers and Jurafsky, “Unsupervised learning of narrative schemas and their participants”, ACL-UCNLP 2009