PINEAPPLE: Personifying INanimate Entities by Acquiring Parallel Personification data for Learning Enhanced generation
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(1) Background
Personification is the attribution of animate actions or characteristics to an entity that is inherently inanimate.
Task: Given a literal sentence, convert the sentence to one containing a personification
Personification generation is useful for:
- Dialogue systems
- AI-assisted creative writing
Challenges:
- Personifications have no fixed structure (unlike similes)
- Requires us to be able to successfully model animacy

(2) PersonifCorp Dataset
- 511 diverse personifications
- Gathered from various sources
  - *CL Prior Art (e.g. Deja Image Captions Dataset (Chen et al., 2015))
  - Kaggle/SemEval datasets
- Test set: Human-annotated list of (literal, personification) pairs

(3) Automatic Parallel Corpus Creation
This “de-personification” pipeline has 3 main steps, outlined below:
1. TOPIC-ATTRIBUTE Extraction
   - TOPIC = a noun phrase that acts as a logical subject
   - ATTRIBUTE = the distinctly animate action or characteristic that is being ascribed to the TOPIC
   - Dependency parse trees + iterative merging algorithm to determine the TOPICS and ATTRIBUTES of a given sentence.

<table>
<thead>
<tr>
<th>Attribute Type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noun</td>
<td>The planet earth is our mother.</td>
</tr>
<tr>
<td>Verb</td>
<td>My alarm clock yells at me to get out of bed every morning</td>
</tr>
<tr>
<td>Adjective</td>
<td>Justice is blind and, at times, deaf.</td>
</tr>
</tbody>
</table>

2. Candidate Generation
   - Filter out the animate TOPICS, and keep only the inanimate TOPICS
   - How to determine which TOPICS are inanimate? → Use COMET’s (Bosselut et al., 2019) ConceptNet relations (Speer et al., 2017) as a proxy for animacy.
     - Specifically, use the IsA(x, “person”) relation
   - Mask out the ATTRIBUTE and use BART to generate the top k=10 candidate replacements
     - E.g. “She did not realize that opportunity was knocking on her door” → “She did not realize that opportunity <mask>”

3. Candidate Selection
   - Given k=10 replacement candidates, design a ranking system to select the most appropriate candidate:
     - Animacy – use COMET’s CapableOf relation
     - Fluency – use BART’s generation scores
     - Meaning Preservation – use BERTScore(original, new)
   - Select candidate with highest composite score (defined above).

(4) Models
1. COMET – No training at all. Use COMET’s Isa, CapableOf relations to generate and rank candidate personifications replacements.
2. Baseline-BART – Similar to COMET except use BART to generate the candidate replacements.
3. PINEAPPLE-BART – Our proposed model; seq2seq training with personification+literal training pairs

(5) Results

<table>
<thead>
<tr>
<th>Models</th>
<th>BLEU Input</th>
<th>BERTScore Input</th>
<th>Output</th>
<th>Gold</th>
<th>Meaning Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMET</td>
<td>0.172</td>
<td>0.749</td>
<td>1.000</td>
<td>5.264</td>
<td>0.332</td>
</tr>
<tr>
<td>BL-BART</td>
<td>0.132</td>
<td>0.655</td>
<td>0.569</td>
<td>6.366</td>
<td>-2.028</td>
</tr>
<tr>
<td>PA-BART</td>
<td>0.153</td>
<td>0.748</td>
<td>0.636</td>
<td>5.460</td>
<td>0.679</td>
</tr>
</tbody>
</table>

(6) Sample Outputs

<table>
<thead>
<tr>
<th>Paired Sentences</th>
<th>Generated Output</th>
<th>Test Input (Literal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lightning bolts streaked across the sky.</td>
<td>The freshly sliced pineapple serenaded my taste buds.</td>
<td>Lightning danced across the sky. The sky wept tears of joy.</td>
</tr>
</tbody>
</table>

Dataset + code: https://github.com/sedrickkeh/PINEAPPLE