Creative Writing with a Machine in the Loop

Case Studies on Stories and Slogans

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Collaborative writing
Collaborative writing
Writing with a machine in the loop
Research contributions

- Explored 2 possible machine-in-the-loop creative writing systems
- Found most participants enjoyed writing with the systems and would use them again
- Identified areas to improve machine-in-the-loop systems (particularly in the suggestions)
What is a *machine-in-the-loop* creative writing system?
### Machine-in-the-loop characteristics

<table>
<thead>
<tr>
<th>Interaction characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initiation</strong></td>
<td>How to initiate the context-suggestion loop?</td>
</tr>
<tr>
<td><strong>Intrusiveness</strong></td>
<td>How intrusive are the suggestions?</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>How often do you repeat the loop before submitting the result?</td>
</tr>
</tbody>
</table>
Story writing with a machine in the loop

Add a sentence to the story:

Add Line to Story

Characters: 0

Click here to submit the finished story and answer evaluation questions: Submit Story

Story writing with a machine in the loop

Add a sentence to the story:

Phil woke up on the couch with a huge hangover.

Add Line to Story

Characters: 47

Click here to submit the finished story and answer evaluation questions:

Submit Story

Story writing with a machine in the loop

The prompt will appear below.
You can edit it as much as you like before adding it to the story.

Phil woke up on the couch with a huge hangover.

Now he looked at Anne.

Add Line to Story
Characters: 22

Click here to submit the finished story and answer evaluation questions: Submit Story

Initiation: Push
Story writing with a machine in the loop

The prompt will appear below. You can edit it as much as you like before adding it to the story.

- Phil woke up on the couch with a huge hangover.
- He looked out the window at Anne, the neighbor’s cat.

Add Line to Story
Characters: 53

Click here to submit the finished story and answer evaluation questions: Submit Story

Initiation: Push  Intrusiveness: High
Story writing with a machine in the loop

Add a sentence to the story:

Phil woke up on the couch with a huge hangover.

He looked out the window at Anne, the neighbor’s cat.

Add Line to Story
Characters: 0

Click here to submit the finished story and answer evaluation questions:

Initiation: Push      Intrusiveness: High      Structure: Additive
Slogan writing with a machine in the loop

**Initiation:** Pull

**Intrusiveness:** Low

**Structure:** Iterative
# Machine-in-the-loop characteristics

<table>
<thead>
<tr>
<th></th>
<th>Story Writing</th>
<th>Slogan Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initiation</strong></td>
<td>push</td>
<td>pull</td>
</tr>
<tr>
<td><strong>Intrusiveness</strong></td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>additive</td>
<td>iterative</td>
</tr>
</tbody>
</table>

[Diagram showing the process of machine-in-the-loop characteristics]
User study: writing with a machine in the loop
Experiment setup

- 1 hour session
  - Perform 3 tasks + evaluation surveys
  - Final survey
  - Open-ended interview

- 3rd party evaluations with Amazon Mechanical Turk

Is the final story:

- Creative?
- Coherent?
- Entertaining?
- Grammatical?

Not at all 1 2 3 4 5 6 7 Extremely
Participant satisfaction

Are you satisfied with your final story/slogan?

<table>
<thead>
<tr>
<th></th>
<th>Story</th>
<th>Slogan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solo</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>MIL</td>
<td>18</td>
<td>23</td>
</tr>
</tbody>
</table>
## Participant satisfaction

<table>
<thead>
<tr>
<th>Would you use this system again?</th>
<th>Stories</th>
<th>Slogans</th>
</tr>
</thead>
<tbody>
<tr>
<td>I'd use it exactly as it is now.</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>I'd use it if the <strong>suggestions</strong> were better.</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I'd use it if the writing <strong>set-up</strong> changed.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>I wouldn't use it.</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
How can we improve collaborative writing systems?
Yesterday I felt fine, and now you're telling me I'm at death's door?!

"We'll take care of Furble tomorrow," the doctor said.

"This is ridiculous," said Duke. "Yesterday I felt fine, and now you're telling me I'm at death's door?!

"Yeah," replied the doctor coolly, "we've found that anthropomorphizing tumors helps people in your position come to terms with their condition more easily."

Anyway, we feel that Furble will most likely be gone within a month," the doctor said.

Lance yells over the speakers "no sudden hammering"
"I would also recommend incorporating proper nouns introduced by the writer into the suggestions. I had three people, but then the suggestion brings in another name I never accounted for and it threw the whole thing off."

➔ Use character information to improve generation
Importance of keywords

❖ "Relax. Refresh. Enjoy."
❖ "Feed, snap, snack"
❖ "Snack it, save it, Cap it"
❖ "Open, eat, seal, repeat!"

Generate different types of suggestions

"[It] might be helpful in the creative process to suggest additional keywords too, like synonyms of words already typed. Words that rhyme might also be helpful in coming up with something creative and catchy!"

➔ Suggestion variety: keywords, rhyme, synonyms
Conclusion

❖ Machine-in-the-loop framework for creative writing systems
❖ User study investigating story and slogan writing with a machine in the loop
❖ Future modeling directions: add characters, suggestion variety
Thank you!

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Chenhao Tan  
Yangfeng Ji  
Noah A. Smith