Summary
- **CR-PO (Création Poétique Assistée par Ordinateur):** A system for interactive French poem generation, which combines neural language models (LMs) with explicit constraints that can be set by users on form, topic, emotion, and rhyming scheme.
- Challenges: LM on low-resource (genre and form); text tuning once the CR-PO (Création Poétique Assistée par Ordinateur):
- In stages: Form - Topic - Emotion - Rhyme (+ manual editing in each).

**Model, Data, and Implementation**
- Form and Rhyme: Input (40)+Emb (100)+2 BiLSTM (256)+Attention (612)+Softmax (89) with character-based TextGenRNN.
- Topic and Emotion: CamemBERT fine-tuned.
- 15 MB (10k poems) general dataset. For topic and emotion-specific datasets, each <1 MB manually labeled → Naive Bayes apply to general dataset.
- Implemented on small-form-factor PC with 32” touchscreen; stages logged in JSON for further analysis; final poem printed or uploaded.

**Evaluation**
- Digital Lyric exhibition
  - 100 poems in 13 days
- Workshop open to the public at HEIG-VD (Nov '21).
  - 42 poems from 25 visitors
- Average number of interactions per stage (>1 means some users started over).

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>AVG</th>
<th>STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Generation of 1st draft</td>
<td>1.62</td>
<td>1.10</td>
</tr>
<tr>
<td>Manual editing</td>
<td>0.31</td>
<td>0.47</td>
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<tr>
<td>2. Topic adjustment</td>
<td>1.05</td>
<td>1.23</td>
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<tr>
<td>Manual editing</td>
<td>0.36</td>
<td>0.48</td>
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<tr>
<td>3. Emotion adjustment</td>
<td>0.95</td>
<td>0.91</td>
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<tr>
<td>Manual editing</td>
<td>0.26</td>
<td>0.45</td>
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<tr>
<td>4. Rhyming scheme</td>
<td>1.26</td>
<td>1.67</td>
</tr>
<tr>
<td>Manual editing</td>
<td>0.38</td>
<td>0.49</td>
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</tbody>
</table>

Table 4: Average number of interactions with the CR-PO system, for each stage, at the 2021 Open Doors of HEIG-VD (25 visitors, 42 poems).

**Constrained Autoregressive Generation of Poems**

1. Setting the Poetic Form
- LM generates a poem based on 4 fixed possible forms chosen by the user (although any number of stanzas, lines, and lengths are possible).
- Sample from distribution + forbidden characters (punctuation, etc.)
- Temperature augments the highest probability values in the distribution.
- Cold start: 4 first lines generated not shown to the user.
- Length of Verses
  - Generate 85% of verse disallowing punctuation.
  - Loop through 15% with objective of ending with punctuation mark. If not, relax constraints.
  - Post-processing: whitespaces, uppercase, and dictionary checking for closest match (not common).

2 and 3. Adjusting to Topics and Emotions
- 5 topics and 3 emotions. User selects proportion in each stage with sliders.
  - Word Selection
    - Independence Quotients: a corpus-based measure of the correlation between words and topics (resp. emotions).
    - Select about 8% of the words (exclusive of stopwords) for replacement.
  - Word Replacement
    - Word-level CamemBERT fine-tuned to the topic/emotion.

4. Setting the Rhyming Scheme
- User chooses out of a fixed number of schemas (i.e. AABB).
- Select ending words to be changed, and get list of candidates (same POS) from rhyming dictionary (regex from phonetic dictionary - 150k words).
- General LM scores them, and selects highest.

**Example**
A poem made up of 3 concatenated sample outputs of our system (out of 6), each prompted internally with the underlined strings.

**Conclusions**
- French poem generator as combination of neural LM + rule-based constraints on form, topic, emotion, and rhyme.
- Autonomous system left without supervision in public exposition.
- Lack a high-level meaning (such as narratives) - still very difficult to solve w/o very large LMs.
- Plans for the future:
  - To be extended to English.
  - Improving individual stages such as rhyme.
  - Users able to introduce seed words.

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