Machine Learning Assisted Cantopop Lyric Composition

LYU2101

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01 Recap: Tone-based Lyrics Generation
Limitation of Cantopop Lyrics

- Cantonese is a tone language
- Cantopop Lyrics should follow Tone-melody Matching Mechanism
Melody contains the sequence of music notes with different pitch height.
- Matching the tone of lyrics to the melody of the song.
- The song is basically not understandable if the mechanism is not followed.
Tone-based Lyrics Generation:
Base Model

Input:
5 1 4 3 1 5 2
4 4 6 6 3 3 1 2 3 5 6 3
6 5 1 2 5 4
4 2 5 6 2 1 3 6

Output:
曙光融化心裡透
遥遥望外雪却不懂放下内疚
在你的口裡留
留到你在此刻照旧
Limitation of Base Model

- Samples are not related to each other
- Can't predict what content of lyrics would be generated given the tone input
Limitation of Base Model

Lack of Controllability
Controllable Models

Figure 2.2 Flow chart of controllable models

Base Model
(Tone-based Lyrics Generation)

Pre-Lyrics Control Model

Post-Lyrics Control Model
03
Pre-Lyrics Control Model
Pre-Lyrics Control Model

1. First embed two attributes into the tones input which are Keywords and title
2. Pass embedded input to the model
3. The model will generate lyrics that match the input tone while relate to the embed keywords and title

Figure 3.1 Flow of using Pre-Lyrics Control Model
Figure 3.2 Illustration of title extraction
Keyword Extraction

Figure 3.3 Illustration of keywords extraction
Labelling

Figure 3.4 Illustration of Tone-to-Lyrics Dataset Labelling
Third Stage: Pre-Lyrics Control Model

- **Lyrics Data**
  - title extraction
  - keyword extraction

- **Title**
  - merge

- **Keywords**
  - merge

- **Tone-to-Lyrics Data**
  - merge

- **Labelled Tone-to-Lyrics Data**
  - tone-to-tone

- **Pre-Lyrics Control Model**
  - merge

- **Base Model**

Figure 3.5 Flow chart of Pre-Lyrics Model phase
## Evaluation

<table>
<thead>
<tr>
<th>Metric</th>
<th>Base Model</th>
<th>Pre-Lyrics Control Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLEU</td>
<td>4.1</td>
<td>20.1</td>
</tr>
<tr>
<td>Perplexity</td>
<td>337.1880</td>
<td>177.8593</td>
</tr>
<tr>
<td>Tone Accuracy</td>
<td>0.9938</td>
<td>0.9868</td>
</tr>
</tbody>
</table>
## Evaluation

<table>
<thead>
<tr>
<th></th>
<th>Base Model</th>
<th>Pre-Lyrics Control Model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BERTScore</strong></td>
<td>0.4965</td>
<td>0.5523</td>
</tr>
<tr>
<td><strong>Pairwise BLEU</strong></td>
<td>24.9</td>
<td>55.6</td>
</tr>
</tbody>
</table>

- **Base Model**: (Same tone, same keywords)
- **Pre-Lyrics Control Model**: (Same tone, different keywords)
<table>
<thead>
<tr>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 3 6 5 1 1 2 2 1 5 1</td>
</tr>
<tr>
<td>5 1 1 1 3 3 5 1 1 1 3 3</td>
</tr>
<tr>
<td>2 1 1 5 1 2 2 2 1 3 1</td>
</tr>
<tr>
<td>2 1 2 5 5 6 3 6 1 3 5 6 3</td>
</tr>
</tbody>
</table>
懷妒忌我天崩找到黑與光
我的天空變假我的心不放假
可深知你身體找到黑變黑
幾多找到了我在接近黑暗裡落腳

Sample 2
離去讓我當初找到心裡邊
你的呼吸變假我不安的變化
可知乘了多想到找到心愛吧
彷彿找到了美麗試驗黑暗裡落泊

Sample 3
懷着熱吻終於找到心裡的
我不安的變假我不安的變化
這風霜雨崩找到可安試吧
這心底可會有日再度失去了預告

Sample 4
懷着熱會擔心找到心裡邊
已經天崩世界已經天崩變假
彷彿冰冷剛好找到新愛吧
找不到可以努力試驗一試努力愛
Sample 1
Title: 見或不見
Keywords: 世界 看見 不見 變退 人海 盛宴 發現 定要 對待 轉身
能見面哪一天等到新那天
我的心中 看見哪一天會再見
誰不知哪一位等到新轉身
誰的改寫我會在對岸先見你盛宴

Sample 2
Title: 歲月靜好
Keywords: 迷戀 有趣 配偶 興奮 最好 感恩 維護 愚笨 遺憾 不停
如昨日我今天感到興奮劑
被窩都不要 配偶不經不覺性
可惜今晚一起找到佳趣麼
感恩很好有我大個地方 配偶合襯

Sample 3
Title: 黃色大門
Keywords: 黃色 變煙 天花 花園 不由 喝著 梳化 樂園 可靠 天使
黃變讓我的天使打開晚裝
有天花梳化叫我花間梳化叫
紙花貓我都可使我小心靠家
小天使賞我美麗雪亮梳化我願跳

Sample 4
Title: 心動
Keywords: 消息 守護 知道 氣息 陪伴 看到 權利
沒見痕跡回頭
還記住那一天緊緊的你肩
我深深的看著你輕輕的笑著
這一刻我不懂這樣的氣息
這麼久到永遠沒見面的愛已逝去
04
Post-Lyrics Control Model
Post-Lyrics Control Model

1. First tones into partly finished lyrics
2. Pass embedded input to the model
3. The model will generate lyrics that match the input tone while relate to the partly finished lyrics

Figure 4.1 Flow of using Post-Lyrics Control Model
Masked Language Model (MLM)

Figure 4.2 Illustration of MLM
Tone Masking

Figure 4.3 Diagram comparing ordinary masking and tone masking
Tone Masking

Figure 4.4 Illustration of Tone Masking Data
Implementation

Figure 4.5 Flow chart of Post-Lyrics Model phase
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<th>Base Model</th>
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<td>39.3</td>
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<td>119.0876</td>
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<td>0.9945</td>
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</table>
## Evaluation

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<tr>
<th>BERTScore</th>
<th>Base Model</th>
<th>Post-Lyrics Control Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.4608</td>
<td>0.4927</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Base Model</th>
<th>Post-Lyrics Control Model (Same tone, same lyrics)</th>
<th>Post-Lyrics Control Model (Same tone, different lyrics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pairwise BLEU</td>
<td>30.5</td>
<td>61.8</td>
<td>1.1</td>
</tr>
</tbody>
</table>
Samples given same partly finished lyrics

**Input**

43651122151

你穿西裝獻奏 我穿婚紗獻唱

誰不知 那一起譜寫的愛歌

現今怎只有我 夜半在黑暗裡獨奏

**Sample 1**

投進是我的她這顆心已經

**Sample 2**

投降是我的初戀只得你知

**Sample 3**

投降是我今天只可知我心

**Sample 4**

投降贈你的分手怎麼會哭
Sample 1

Input:
43651122151
可能又似沒可能為了她只好
一等再等
因心中約誓
曾互送上不朽約誓
這相戀約誓
情路我和你圍困
我和你圍困要浪漫到底

Output:
常去在雨中她只想聽雨聲

Sample 2

Input:
43651122151
請跟我探討荒誕的遊戲
世界置之不理敢愛的身體
永不老死
別太乏味
當失意角色怎會有趣味
她跟你昨天一切請忘記

Output:
沉醉在你的身體怎麼會飛

Sample 3

Input:
43651122151
為了在這都市建家
為了下半生無牽掛
花光所有力拼嗎
得到的快樂
還在意嗎
想過夢與現況總有偏差
反正夢最後也總要歸家

Output:
從缺憾那天得到幾多滿足

Sample 4

Input:
43651122151
這天際叫我不禁地掛念無數夜晚
想起你當天說喜歡看星星的閃爍
奪目燦爛
這一剎你有否也在哪抬頭同看聚散
正當這掛念劃下句點
流星忽然從夜空降到目前
猶豫在暗示我相信就可相見

Output:
懷著耀眼的燭火這刻會開
Tone2Cantopop
web tool for public to generate lyrics
Lyrics Generation: Base Mode

- Input the tones converted from the melody

Figure 5.1 Input interface for base mode
Lyrics Generation: Pre-Lyrics Mode

- Input the tones converted from the melody
- Input the title and the keywords

Figure 5.2 Input interface for Pre-Lyrics mode
Lyrics Generation: Post-Lyrics Mode

- Having some partly finished lyrics
- Embed tone into the lyrics as input

Figure 5.3 Input interface for Post-Lyrics mode
Live Demonstration
Conclusion

- Tone-based lyrics generation (Base Model)
  - A tailor made approach for Cantopop lyrics generation.

- Pre-Lyrics Control Model
  - Increase controllability by adding title and keywords

- Post-Lyrics Control Model
  - Increase controllability by having partly finished lyrics

- Tone2Cantopop
  - A Web tool open to public
THANKS