

The background features a complex network of thin grey lines connecting various points, forming a web-like structure. Scattered throughout are numerous triangles of different sizes and orientations, some solid and some outlined. The overall aesthetic is modern and technical, suggesting a theme related to machine learning or data science.

# **Machine Learning Assisted Cantopop Lyric Composition**

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**LYU2101**

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# 01

## **Recap: Tone-based Lyrics Generation**

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# Limitation of Cantopop Lyrics

- Cantonese is a tone language
  - Cantopop Lyrics should follow Tone-melody Matching Mechanism
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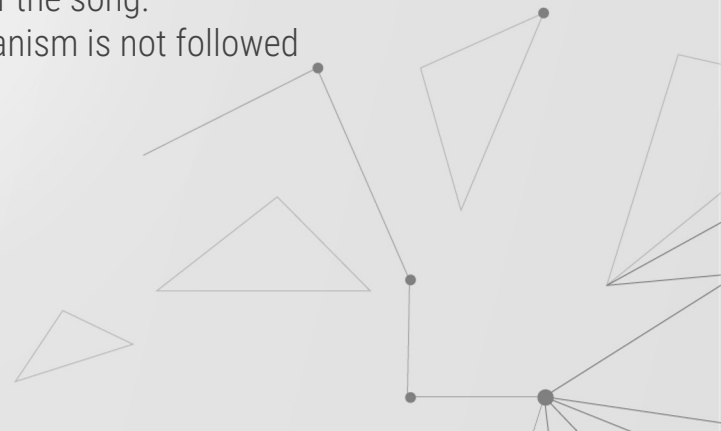


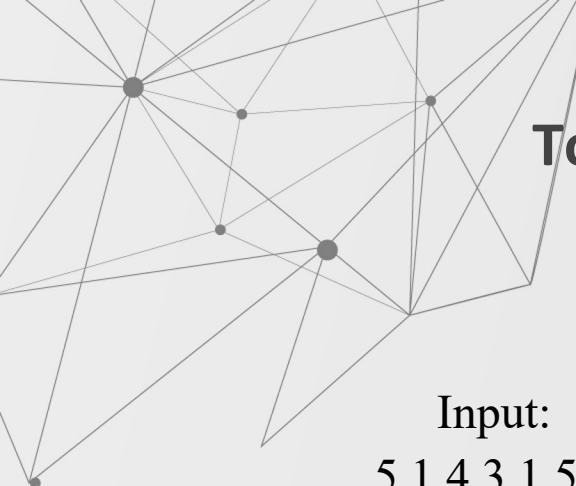


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# Tone-melody Matching Mechanism in Cantopop

- 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
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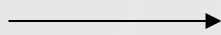




## Tone-based Lyrics Generation: Base Model

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  
遙遙望外雪卻不懂放下內疚  
在你的口裡留  
留到你在此刻照舊



# 02

## Enhancement of Base Model

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## Limitation of Base Model

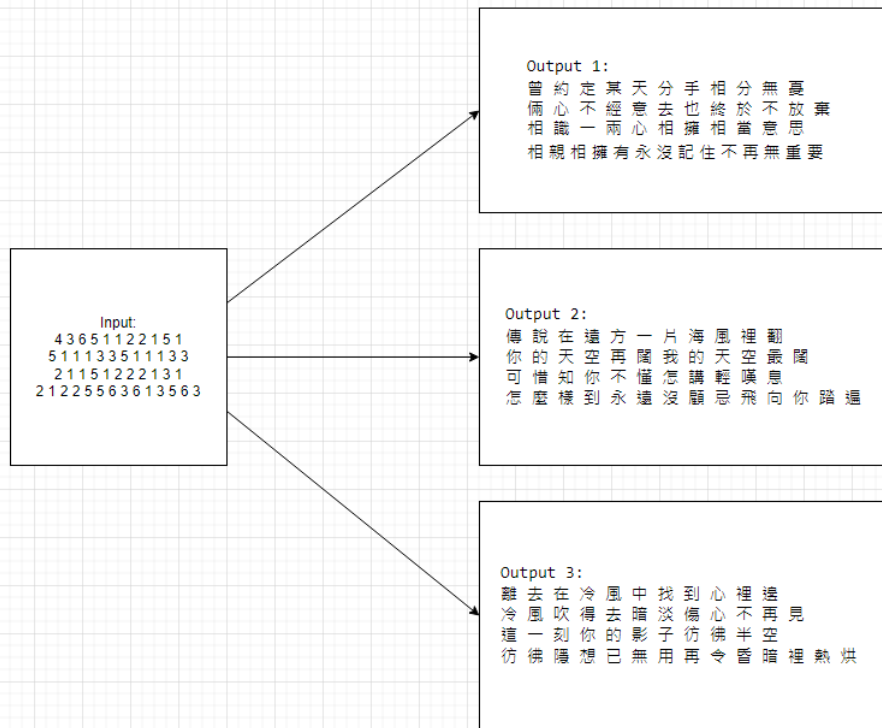


Figure 2.1 Output of the base model

- 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

Output 1

曾約  
倆心  
相

相分無裏  
終於不放  
相當意思

Output

離去在  
冷風吹  
這一刻  
彷彿隱

到心裡邊  
傷心不再  
彷彿半空  
用再令昏暗裡熱烘



# Controllable Models

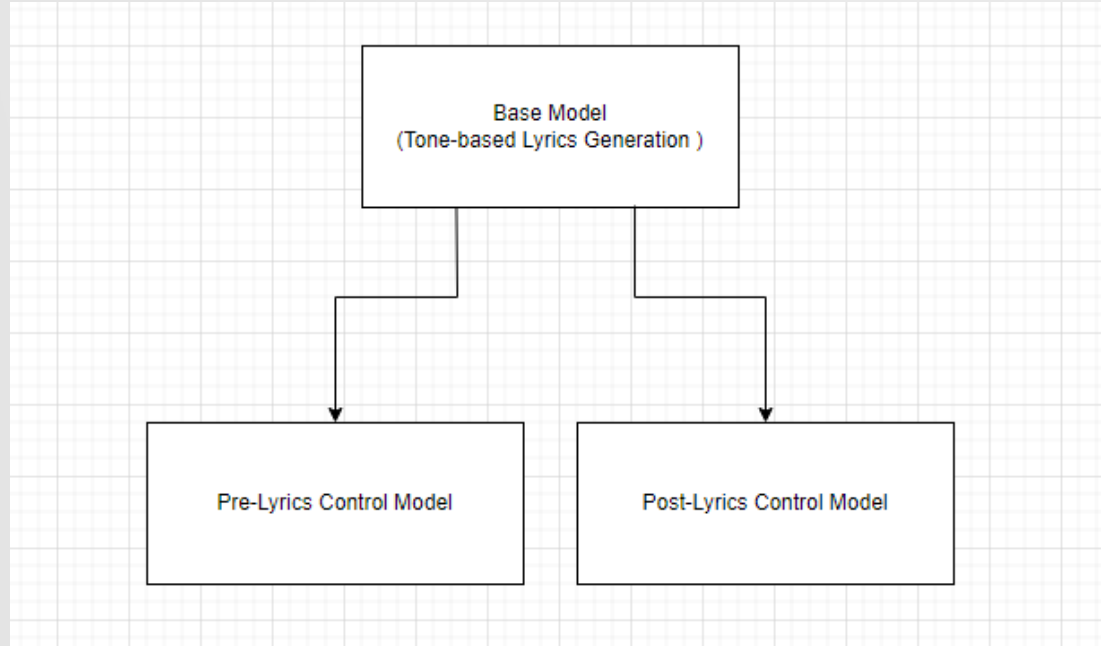


Figure 2.2 Flow chart of controllable models

# 03

## Pre-Lyrics Control Model

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# Pre-Lyrics Control Model

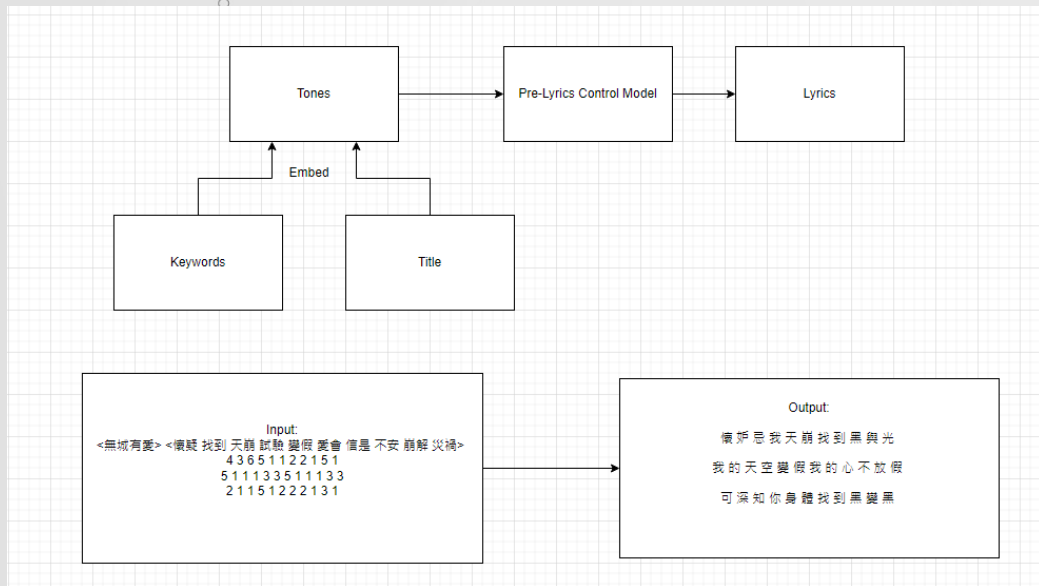


Figure 3.1 Flow of using Pre-Lyrics Control Model

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

# Title Extraction

時間裏.txt ×  
majim\_crawler > lyrics > 方皓玟 > 時間裏.txt

1  
2 放滿你所愛 幻想大家不會老  
3 大合照裝滿 怕每段記憶被消耗  
4 埋下你這個寶座 再過十年出土  
5 物件不會老 人卻已認不到  
6  
7 沒法阻 時間走 時間走 總要走  
8 等到天長地久 才來一句問候  
9 等不到還有 最怕這一刻已經最後  
10 沒法阻 時間走  
11  
12 每一日至少擁有 眼前人還能夠  
13 常常見為何等到內疚  
14 說要感激 現在請不要掩飾  
15 要抱多一下便抱 也許明晨已不保  
16  
17  
18 為何現在 活著的都比較糟糕  
19 要走了 才發覺更加好  
20 沒法阻 時間走 時間走 總要走  
21 等到天長地久 才來一句問候  
22 等不到還有 最怕這一刻已經最後  
23 沒法阻 時間走  
24  
25 每一日至少擁有 眼前人還能夠  
26 常常見為何等到內疚  
27 若要走 便要走 找藉口  
28 感受收藏在手 來年給你緊握  
29 古董再研究 最怕等不到太多以後  
30 時間走 就算走  
31  
32 每一日至少擁有 眼前人還能夠  
33 常常見為何等到內疚  
34 以為停留時間 然而你停留所愛沒有  
35

Title:  
時間裏

Figure 3.2 Illustration of title extraction

# Keyword Extraction

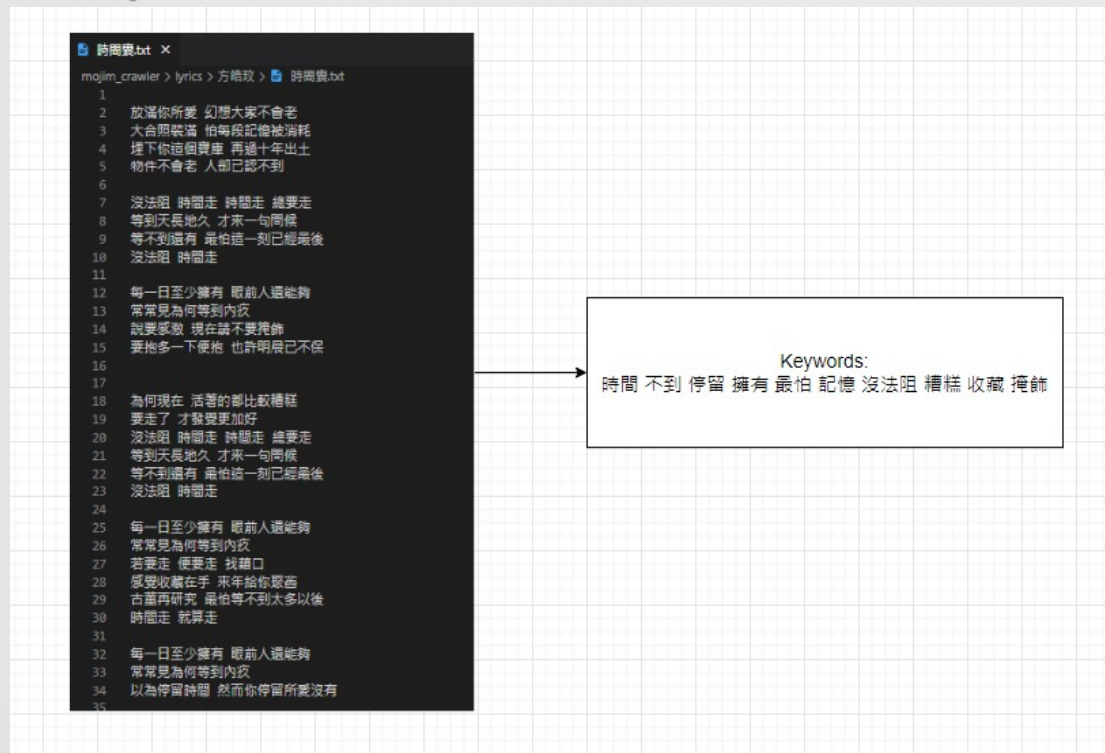


Figure 3.3 Illustration of keywords extraction

# Labelling

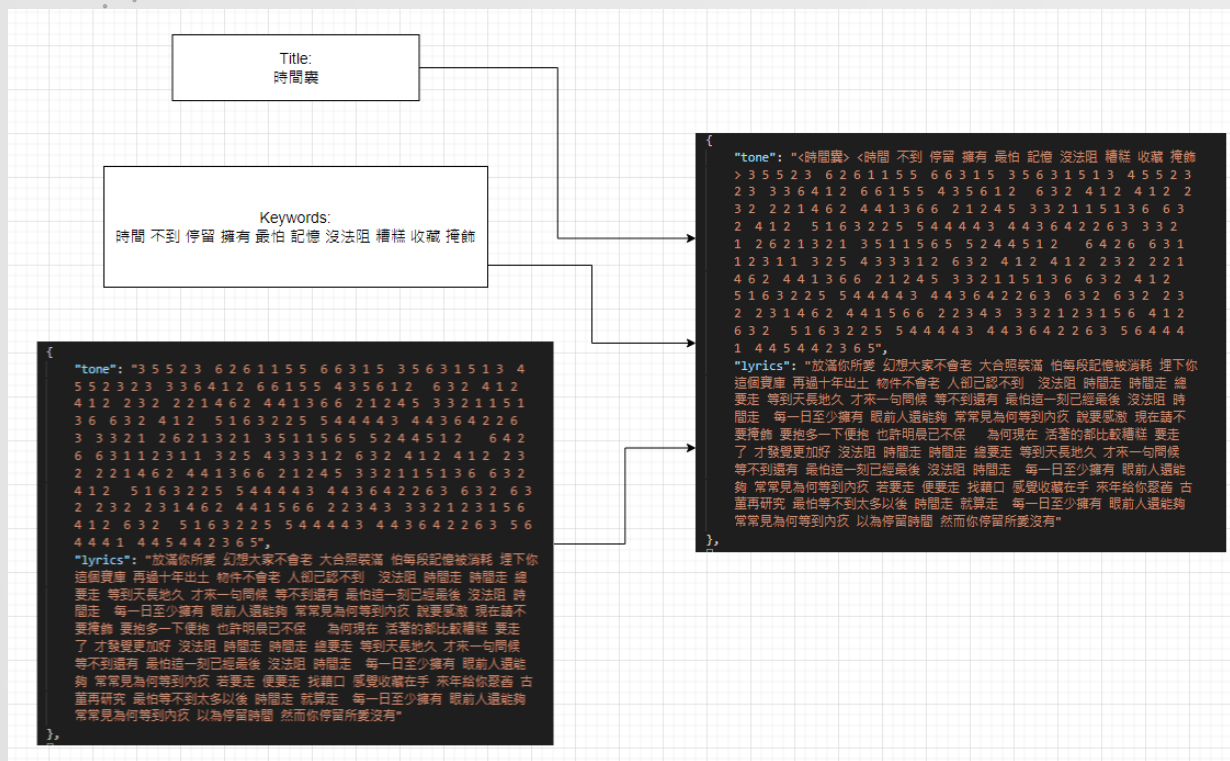


Figure 3.4 Illustration of Tone-to-Lyrics Dataset Labelling

# Implementation

## Third Stage: Pre-Lyrics Control Model

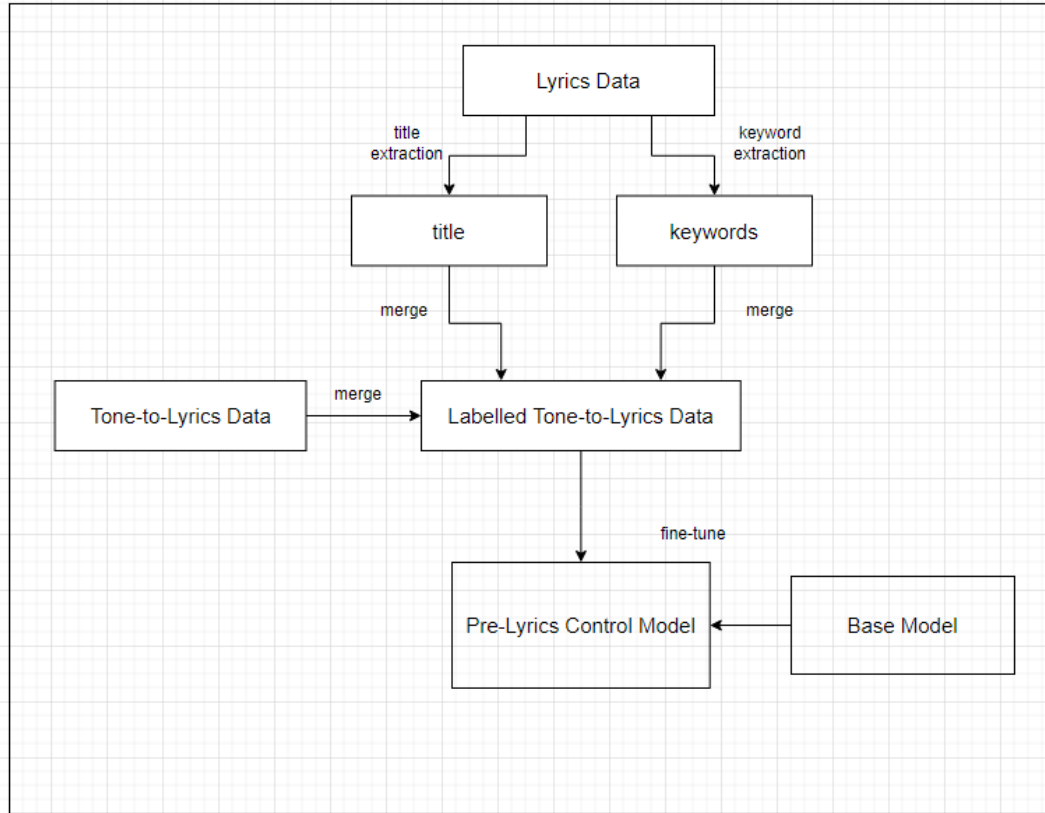


Figure 3.5 Flow chart of Pre-Lyrics Model phase

# Evaluation

	Base Model	Pre-Lyrics Control Model
BLEU	4.1	20.1
Perplexity	337.1880	177.8593
Tone Accuracy	0.9938	0.9868



# Evaluation

	Base Model	Pre-Lyrics Control Model	
BERTScore	0.4965	0.5523	
<hr/>			
	Base Model	Pre-Lyrics Control Model (Same tone, same keywords)	Pre-Lyrics Control Model (Same tone, different keywords)
Pairwise BLEU	24.9	55.6	6.9



# Samples

## Tones Input

43651122151

511133511133

21151222131

21225563613563



# Samples given same title and same keywords

Title: 無城有愛

Keywords: 懷疑 找到 天崩 試驗 變假 愛會 信是 不安 崩解 災禍

## Sample 1

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

可知瘋了多想找到心愛吧

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

# Samples given different title and different keywords

## 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 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 我都可使小心靠家  
小 天 使 賞我美麗雪亮 梳 化 我願跳

## 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 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

The background features a complex network of thin grey lines connecting various-sized dark grey circular nodes. These nodes are scattered across the slide, with a higher concentration on the right side. Some nodes are isolated, while others are part of larger, interconnected clusters. The overall effect is a technical, network-like aesthetic.

# 04

## Post-Lyrics Control Model

# Post-Lyrics Control Model

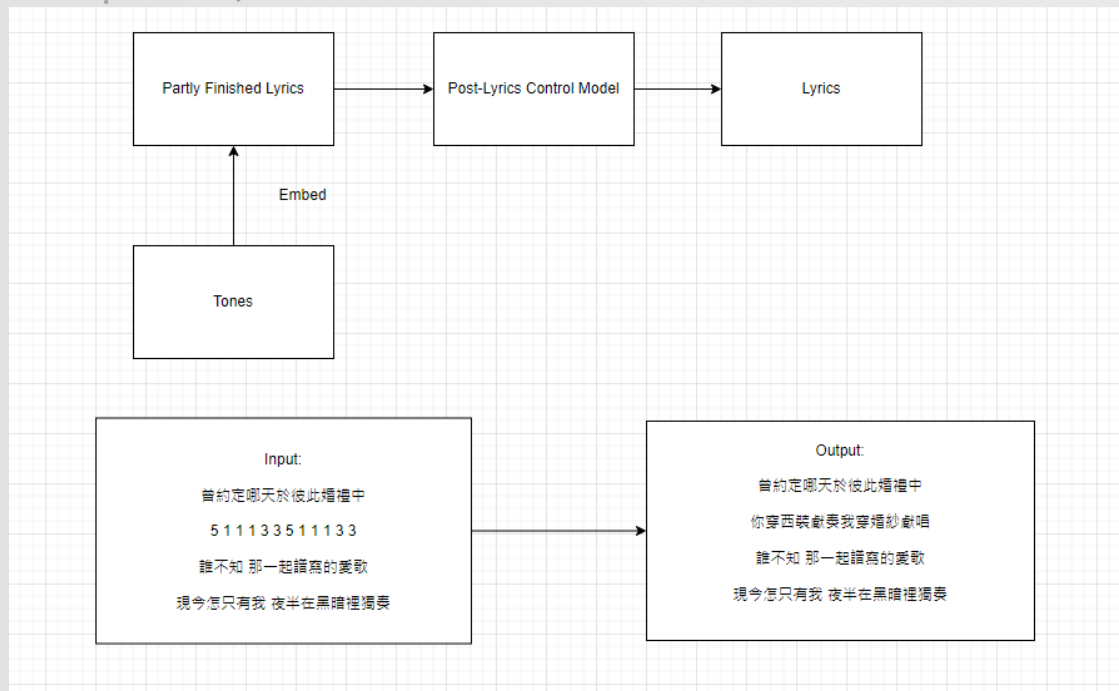


Figure 4.1 Flow of using Post-Lyrics Control Model

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

# Masked Language Model (MLM)

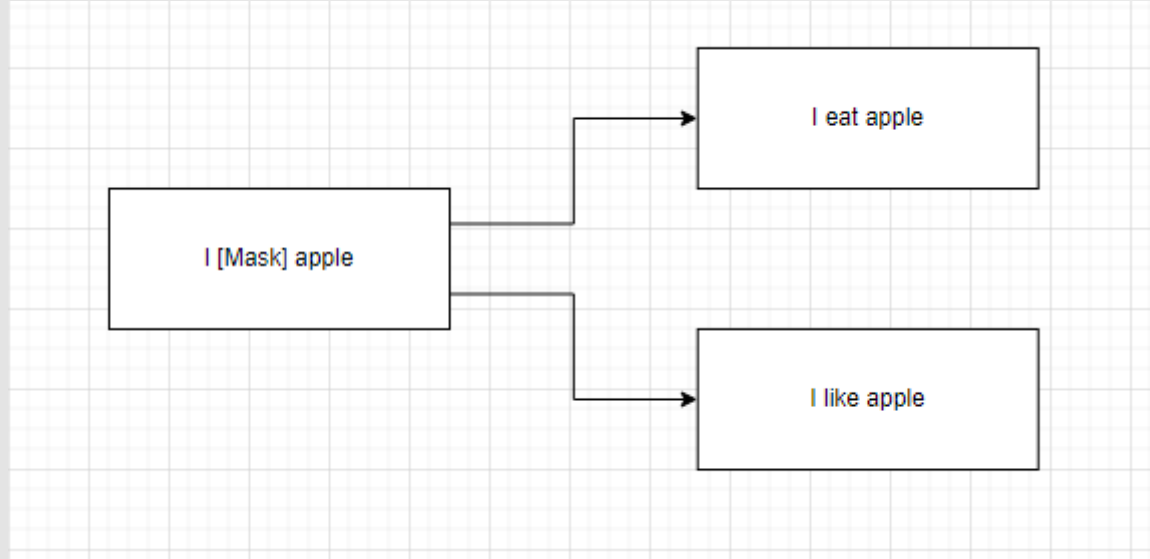


Figure 4.2 Illustration of MLM

# Tone Masking

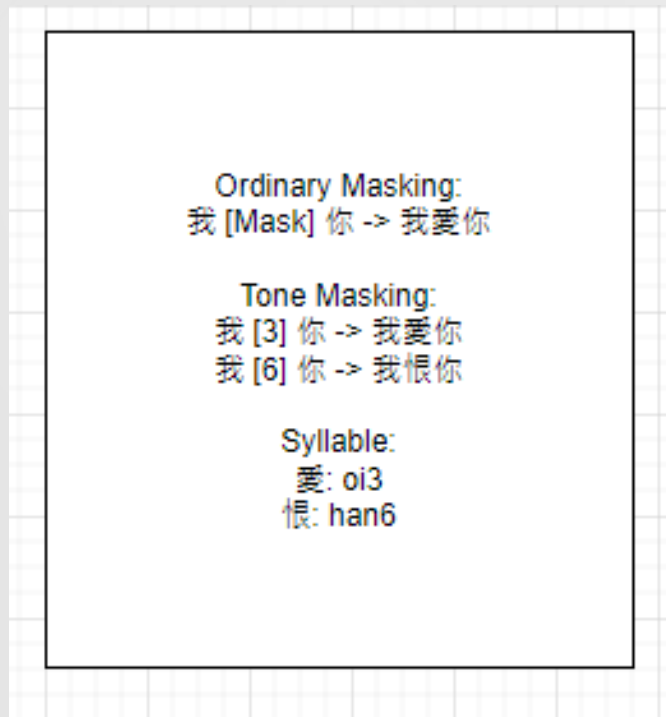


Figure 4.3 Diagram comparing ordinary masking and tone masking



# Tone Masking

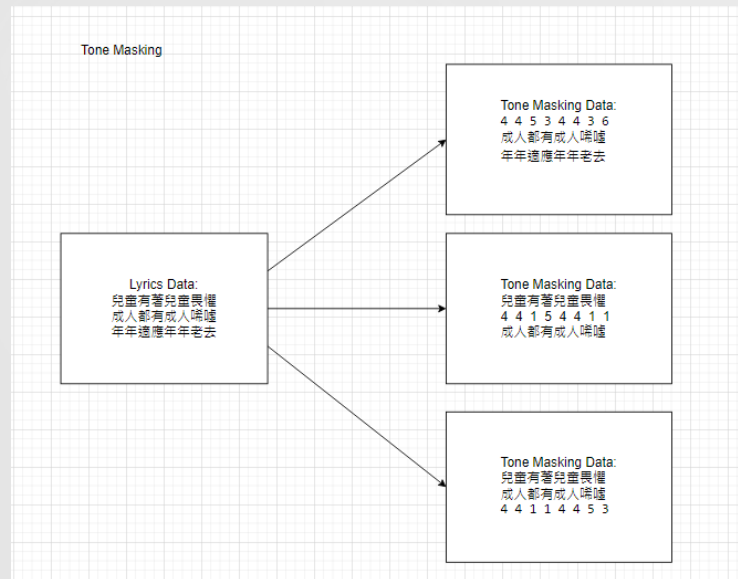


Figure 4.4 Illustration of Tone Masking Data

# Implementation

## Fourth Stage: Post-Lyrics Control Model

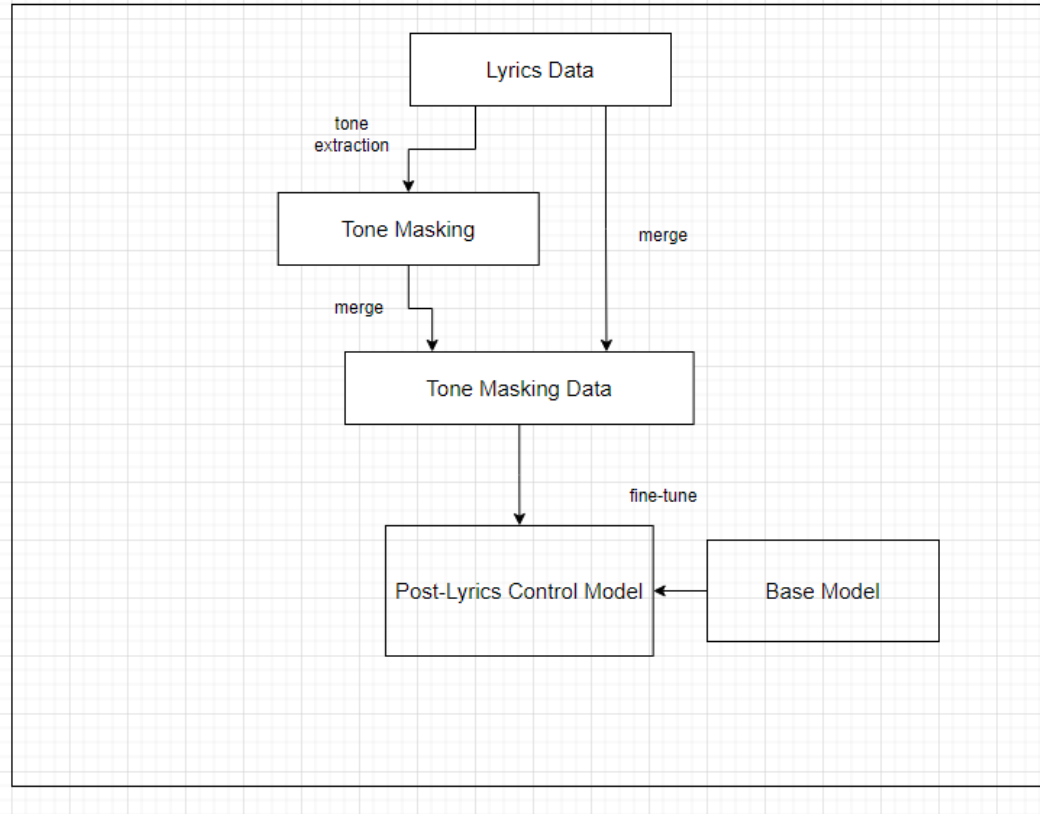


Figure 4.5 Flow chart of Post-Lyrics Model phase

# Evaluation

	Base Model	Post-Lyrics Control Model
BLEU	2.5	39.3
Perplexity	337.1880	119.0876
Tone Accuracy	0.9938	0.9945

# Evaluation

	Base Model		Post-Lyrics Control Model	
BERTScore	0.4608		0.4927	
	Base Model	Post-Lyrics Control Model (Same tone, same lyrics)	Post-Lyrics Control Model (Same tone, different lyrics)	
Pairwise BLEU	30.5	61.8	1.1	

# Samples given same partly finished lyrics

## Input

4 3 6 5 1 1 2 2 1 5 1

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

# Samples given different partly finished lyrics

## 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

曾互送上不死約誓

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

花光所有力盲拼嗎

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



# 05

## Tone2Cantopop

web tool for public to generate lyrics

# Lyrics Generation: Base Mode

Tone

1 2 3 5 6 4  
4 3 2 1 3 4  
3 4 5 1 2 6

Generate

number of sample (max 5)

4

Figure 5.1 Input interface for base mode

- Input the tones converted from the melody



# Lyrics Generation: Pre-Lyrics Mode

Title	Tone
無城有愛	4 3 6 5 1 1 2 2 1 5 1 5 1 1 1 3 3 5 1 1 1 3 3 2 1 1 5 1 2 2 2 1 3 1 2 1 2 2 5 5 6 3 6 1 3 5 6 3
Keywords 懷疑 找到 天崩 試驗 變假 愛會 信是 不安 崩解 災禍	

Figure 5.2 Input interface for Pre-Lyrics mode

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

# Lyrics Generation: Post-Lyrics Mode

Input

4 3 6 5 1 1 2 2 1 5 1

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

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


Figure 5.3 Input interface for Post-Lyrics mode

The background features abstract geometric patterns. In the top-left corner, there is a cluster of small circles and dots of varying sizes. In the bottom-right corner, there is a more complex network of lines connecting dots, forming a web-like structure with several triangles of different sizes interspersed within it.

## 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
- 

The background of the slide features a complex, abstract geometric pattern. It consists of numerous thin, light gray lines that intersect to form a network of triangles and other polygons. At the vertices of these shapes, there are small, dark gray circular dots. The pattern is more dense on the left side of the slide and becomes sparser towards the right. The overall aesthetic is modern and technical.

# THANKS

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