

Chinese Poetry Generation

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Outline

- Introduction to Chinese Poetry (Quatrains)
- Current Chinese Poetry Generation Models
- Chinese Poetry Generation with Improved Syntactic Level
 - Extend word embedding with syntactic features
 - Plug-in couplet model



Introduction to Chinese Poetry

- Classification:
 - Quatrains (4 lines)
 - Regulated verses (8 lines)
- Basic requirements for quatrains (“jueju” in Chinese):
 - Same number (5 or 7) of characters per line
 - Alternate level (平) and oblique (仄) tones between lines
 - Rhyme in last characters of even-numbered verses (or 1, 2, 4 lines)

Introduction to Chinese Poetry

Quatrains

江雪

Snow on the River

千山鸟飞绝，万径人踪灭。

From hill to hill no bird in flight; From path to path no man in sight.

孤舟蓑笠翁，独钓寒江雪。

A lonely fisherman afloat, Is fishing snow on lonely boat.

题李凝幽居

Li Ning's Seclusion

闲居少邻并，草径入荒园。

You may keep your seclusion if you please; A grassy path leads to your garden poor.

鸟宿池边树，僧敲月下门。

Only birds perch upon the poolside trees; Rarely a monk knocks at your moonlit door.

过桥分野色，移石动云根。

A bridge divides the fields from rural plain; Clouds float as if rocks were moving on high.

暂去还来此，幽期不负言。

Leaving your place now, I will come again; What I have promised, I will not belie.

English translation by Xu et al. [2014]

Regulated Verses

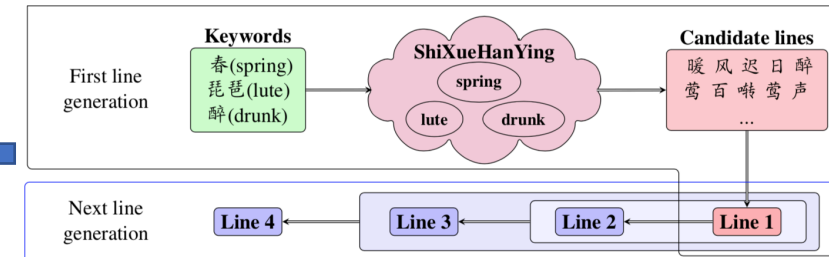
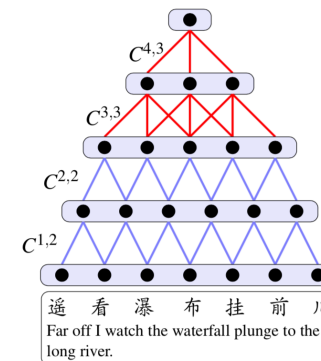
Current Chinese Poetry Generation Models

- Statistical Machine Translation (He et al. [2012])

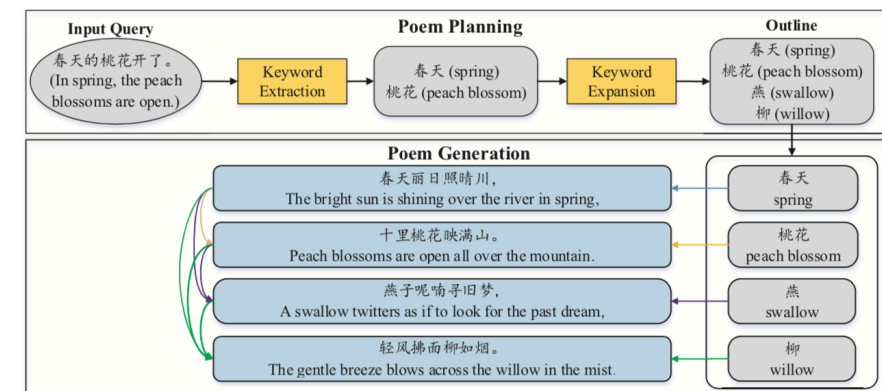
$h_1(S, F) = \prod_{i=1}^I p(\bar{f}_i \bar{s}_i)$	Phrase translation model
$h_2(S, F) = \prod_{i=1}^I p(\bar{s}_i \bar{f}_i)$	Inverted phrase translation model
$h_3(S, F) = \prod_{i=1}^I p_w(\bar{f}_i \bar{s}_i)$	Lexical weight
$h_4(S, F) = \prod_{i=1}^I p_w(\bar{s}_i \bar{f}_i)$	Inverted lexical weight
$h_5(S, F) = p(S)$	Language model

Table 1. Features Used in the SMT Model.

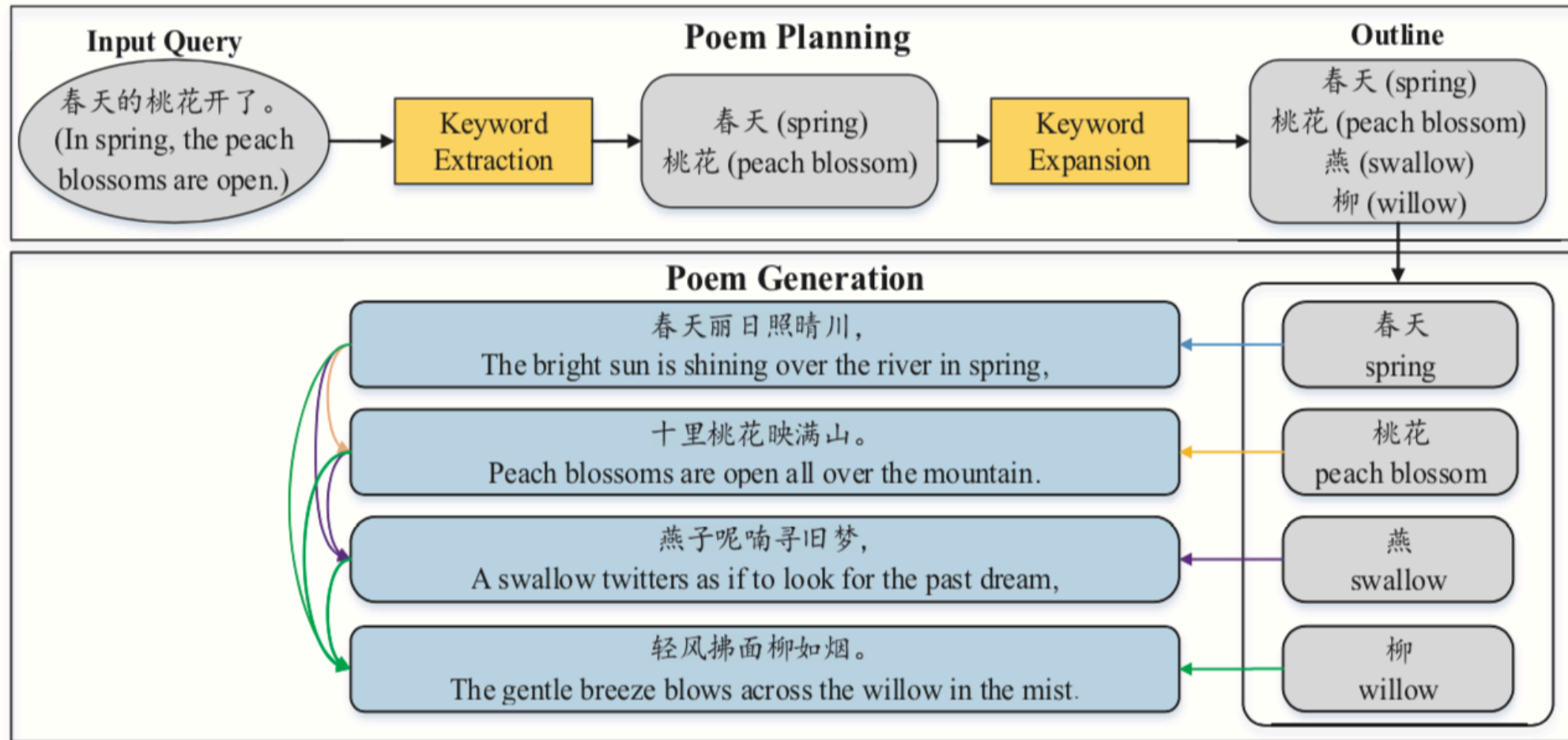
- Convolutional Neural Network & Recurrent Neural Network (Zhang and Lapata [2014])



- Planning Based Recurrent Neural Network (Wang et al. [2016])



Planning Based Recurrent Neural Network



Planning Based Recurrent Neural Network

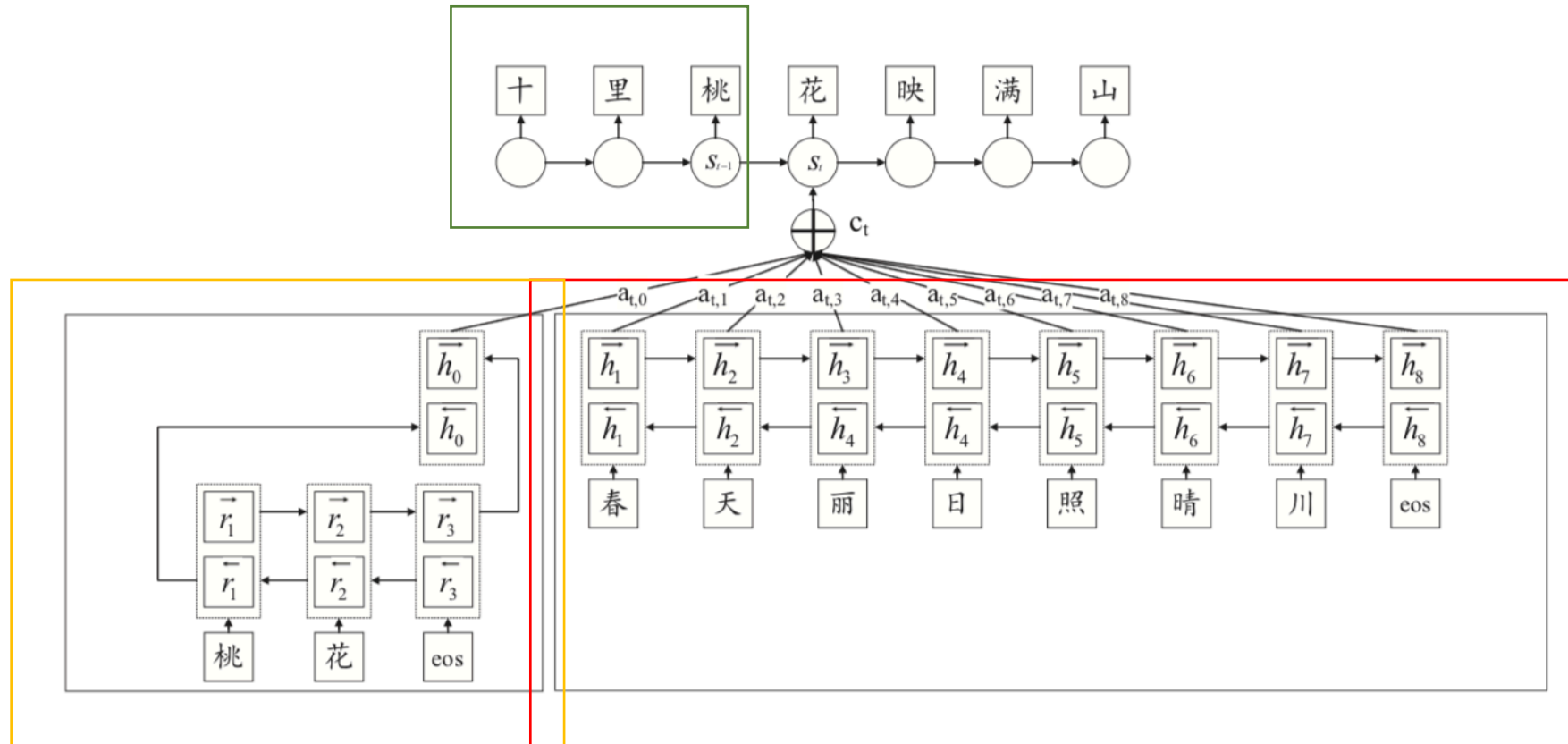


Figure 2: An illustration of poem generation model.

Problems & Goals

Problems:

- Failed to explicitly capture the tones and rhymes of Chinese characters
- The semantic meaning of characters in two lines inside one sentence are not fully matched

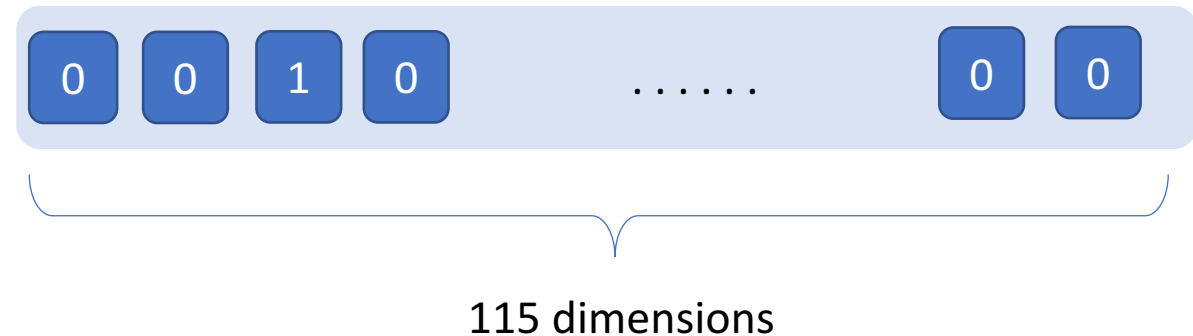
Goals of My Work

- To better capture the tonal and rhythmical restriction with neural network
- To reconstruct the parallel structure of certain couplets in the poems
- To improve the semantic coherence of the poems

Improvement - New Word Embedding

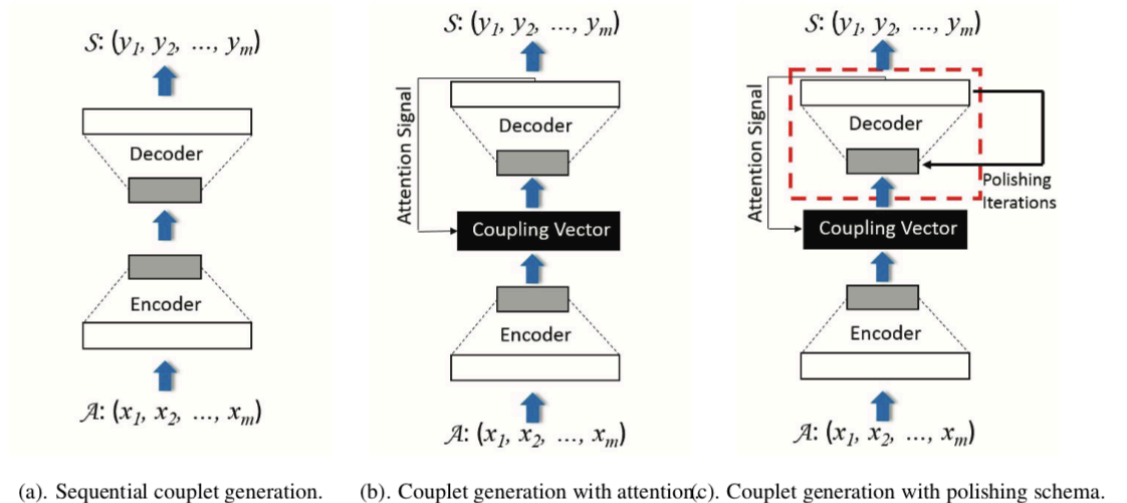
1. Context features: 128 dimension wording embedding according to characters in same line + characters in antithetical positions
2. Rhyme features: 115 one hot **rhyme** features according to a collection of ancient Chinese rhymes “平水韵”

千	山	鸟	飞	绝	,
万	径	人	踪	灭	。
孤	舟	蓑	笠	翁	,
独	钓	寒	江	雪	。

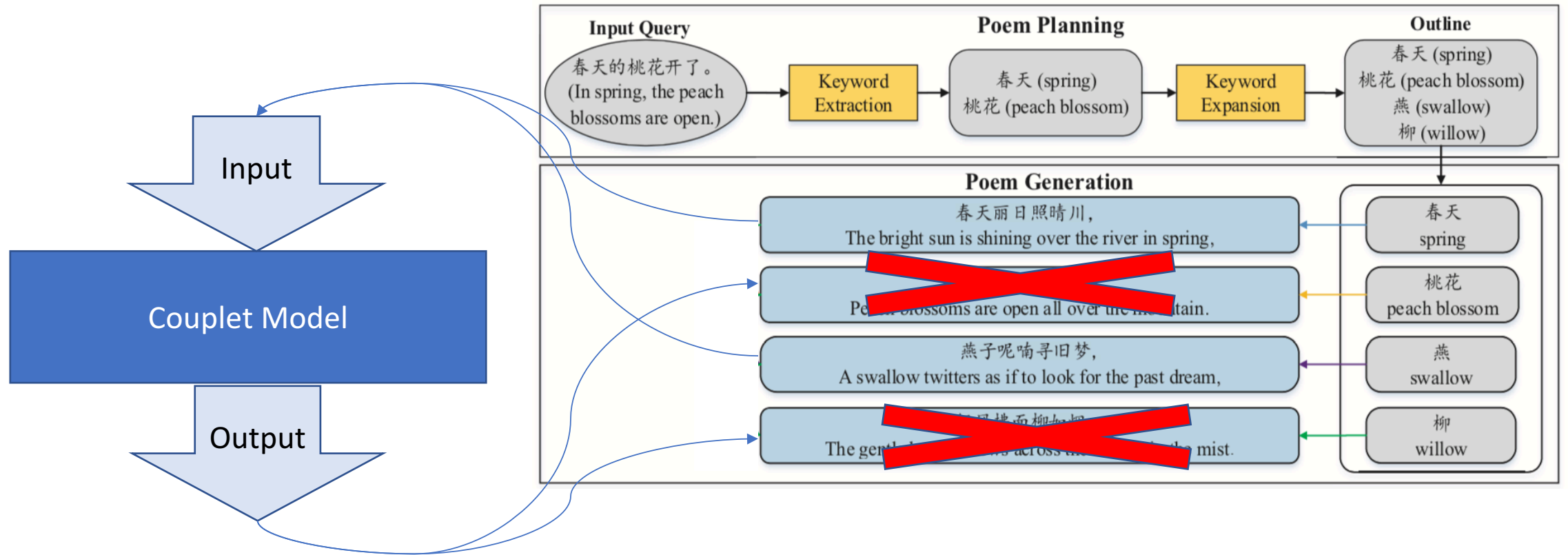


Improvement – Plugged-in Couplet Model

- Couplet: a sentence with 2 lines that are strictly dual
- Couplet model: a simple seq2seq model trained by “good quality” sentences (1 sentence = 2 lines)
 - Good quality sentences: ~ 800,000 sentences retrieved by regulated verses poems in Song Dynasty, where the poetry format is well-restricted and poetry rules are closely followed.



Improvement – Plugged-in Couplet Model



Results so far

- Input: 考试太难了 (exam is so hard)
- Output keywords: 空 春 径 考试
- Output Poem:
 - 载酒为官事不空,
 - Holding wines, I feel being an official is really busy
 - 碾春始觉雪花红。
 - Walking in the spring, I just realize the snowflakes are red
 - 原头四望谁孙柳,
 - Looking around who is Sun Liu
 - 便作侬期一笑中。
 - Just keep smile during my term
- Input: 小雨 (small raining)
- Output keywords: 数点 嫩 小雨 冻
- Output Poem:
 - 数点深藏碧玉枝,
 - Many pieces of rain hide themselves behind willow branches
 - 且看添水弄轻丝。
 - Look at they increasing the rainfall and playing with the shapes
 - 今朝一卷西窗雨,
 - Today the rain fall over my west window
 - 正抵芭蕉雨叶时。
 - It is perhaps just the time that raindrops are rattling on the leaves of bananas.

Thanks for Listening!