



Creative and Artistic Text Generation

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URL:<https://lijuntaopku.github.io/ijcai2019tutorial/>

What Contents Are Included in This Tutorial?

- Poetry Generation
- Story Generation
- Multi-Modal Generation
 - Visual Storytelling
 - Visual Poetry Generation
- Other Genres
 - Couplet
 - Lyrics

Target Audience

- Ph.D. **students** or **researchers** who are working on artistic text generation.
- Anyone who wants to learn how neural approaches (i.e., **deep learning techniques**) can be applied to artistic text generation.
- Anyone who wants to **build** an artistic text generation **system** (e.g., story, poetry, couplet) with state-of-the-art neural techniques.

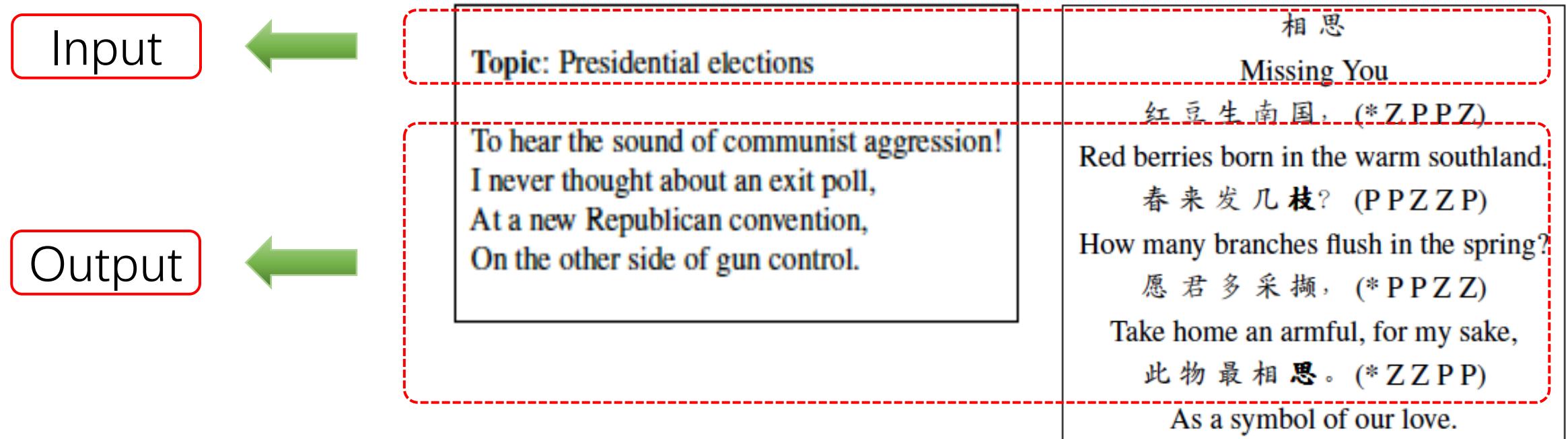
Outline

- Introduction
- Background Knowledge
- Existing Methods
 - Poetry Generation
 - Story Generation
 - Multi-Modal Generation
 - Other Genres
- Recent Trends and Conclusion
- Q&A

Roadmap

- Introduction
- Background Knowledge
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Task Description of Poetry Generation



- Input: a piece of text
- Output: a poem that meets given constraints

Marian Ghazvininejad et al. ACL' 17
Xingxing Zhang et al. EMNLP' 14

Example System: Jiuge

Settings

Input

Output

The screenshot shows the Jiuge poetry generation system interface. It is divided into three main sections: Settings, Input, and Output.

- Settings:** A row of circular buttons for selecting poem types. The first button, "Classical Quatrain", is highlighted in red. Other options include "Stylistic Quatrain", "Acrostic Poem", a logo featuring stylized characters and a flower, "Collective poem", "Iambics", and "Morden Poem". Below these buttons are two options: "Five Char" and "Seven Char".
- Input:** A text input field containing the Chinese character "夏天" and its English translation "summer". To the right of the input field are "Generate Poetry" and "Reset" buttons. Below the input field is a large red "Generate Result" button.
- Output:** The generated poem is displayed in four lines:
 - 夏天何所待
 - 此地一枝筇
 - 为有千年月
 - 能无半日松

https://jiuge.thunlp.cn/jueju_en.html

Task Description of Story Generation

- Definition 1: [Martin et al. AAAI' 18]
Automated story generation is the problem of automatically **selecting** a sequence of **events**, **actions**, or **words** that can be told as a story.
- Definition 2: [Xu et al. EMNLP' 18]
Input: A short description of a scene or an event.
Output: A relevant narrative story following the input.

Examples

Input: *Fans came together to celebrate the opening of a new studio for an artist.*

Output: *The artist provided champagne in flutes for everyone. Friends toasted and cheered the artist as she opened her new studio.*

Input: *Last week I attended a wedding for the first time.*

Output: *There were a lot of families there. They were all taking pictures together. Everyone was very happy. The bride and groom got to ride in a limo that they rented.*

Table 1: An illustration of narrative story generation.

Demo Story Generation System

Stories v1.0 Auto Interactive Advanced ▾ 4.82 seconds

Input

summer Generate

Ready

Storyline

school -> was -> asked -> said -> told

Output

Title to Story

it was a hot summer day .
the kids were bored .
they decided to go to the park .
they played in the water .
they had a great time .

Plan and Write

i went to school the other day.
it was my first day of school.
i asked my mom if she could go with me.
she said yes.
she said yes.

Plan and Revise

i went to school the other day.
it was my first day of high school.
i asked my mom to take me.
she said no.

Disclaimer: All the entries made in this website will be logged for academic research.

<http://cwc-story.isi.edu/>

Goldfarb-Tarrant et al., NAACL-HLT ' 2019

Image-Inspired Poetry Generation

Input



Output

扁舟一曲水平堤，
I sing a fishing song on a boat in the lake overflowing its bank,
一棹渔舟日向西。
rowing oars with the sun setting in the west.
长忆西湖水中月，
I often miss the moon reflected in the West Lake,
东风吹过武陵溪。
and the east breeze blowing across the WuLing River.



春风庭院养花姿，
Breeze blows beautiful flowers in the courtyard,
春入帘栊叶满枝。
Spring comes into my window, with leaves covering the branches.
堪笑门前青草树，
Glad to see green grass and trees in front of my door,
谁家芳节几多时。
However spring will not last very long.

Visual Storytelling

Input



Captions:

Output

- (a) A small boy and a girl are sitting together.
(b) Two kids sitting on a porch with their backpacks on.
(c) Two young kids with backpacks sitting on the porch.
(d) Two young children that are very close to one another.
(e) A boy and a girl smiling at the camera together.

Story #1: The brother and sister were ready for the first day of school. They were excited to go to their first day and meet new friends. They told their mom how happy they were. They said they were going to make a lot of new friends . Then they got up and got ready to get in the car .

Story #2: The brother did not want to talk to his sister. The siblings made up. They started to talk and smile. Their parents showed up. They were happy to see them.

Album Storytelling	1) After a long summer day of playing hard. 2) Swinging and playing and playing with friends. 3) Making up dances and helping clean up after the picnic. 4) We headed for the city fireworks. 5) What a great ending to a great day!
Image Captioning	1) The picture is of a little boy sitting in a swing. 2) A young blonde girl soaking wet holding onto a ladder. 3) Two young girls wearing pink and posing the same for the picture. 4) The fireworks are shot off in the distance. 5) A large firework exploding in the sky on a dark night.

Xin Wang et al., ACL' 18

Bairui Wang et al., AAAI' 19

Others

Couplet



Verse

And humble and their fit *flees* are wits size
but that one made and made thy step me lies

Cool light the golden dark in any way
the birds a *shade* a laughter turn away

Then adding wastes retreating white as thine
She watched what eyes are breathing awe what shine

But sometimes shines so covered how the beak
Alone in pleasant skies no more to seek

虞美人
Beauty Yu
春花秋月何时了, (*P*ZPPZ)
Flowers bloom and wither, the moon rises and sets.
When can it end?
往事知多少。(*ZPPZ)
As for stories buried in the past, who will really attend?
小楼昨夜又东风, (*P*ZZPP)
Wind blew over my attic last night,
故国不堪回首月明中。(**P*ZZPP)
How is my home country now, in the same moonlight?
雕阑玉砌应犹在, (*P*ZPPZ)
I bet the jade banisters and steps
are as exquisite as they were,
只是朱颜改。(*ZPPZ)
I guess it is only the people who changed for sure.
问君能有几多愁, (*P*ZZPP)
My sorrow,
恰是一江春水向东流。(**P*ZZPP)
Flows like the river. It never ends.

Iambics

Others

*But she fell in love with him
Girl when they feel the same
The princess was in love with the priest
Can't let go and it never goes out
She also abominated what he did
Be the things they said
The princess was shocked by the priest's actions
And though her heart cant take it all happens¹*

Ballads

The musical score consists of three staves of music in 3/4 time with a key signature of one sharp (F#). The lyrics are in Portuguese, with English translations provided for some words and phrases:

pes - so - a li - ber -tis - ta em dó me - nor re -par - te a pes - so - a e o jus -ta
dor ins -tru - men -tos de ten -ta pa - ra o re - frão é pre - ci - so dan -ças pi - po -cas
per -den - do se as es -fe -ras da trans -mis - são o que foi pa -pa de xa - réns
pessoa libertista em dó menor libertarian person in C minor
reparte a pessoa e o justador redistributes the person and the fighter
instrumentos de tenta para o refrão instrument of probe to the chorus
é preciso danças pipocas it takes dances popcorn
perdendo-se as esferas da transmissão if lost the transmission domains
o que foi papa de xaréns what was xarém food

Song Lyrics

References

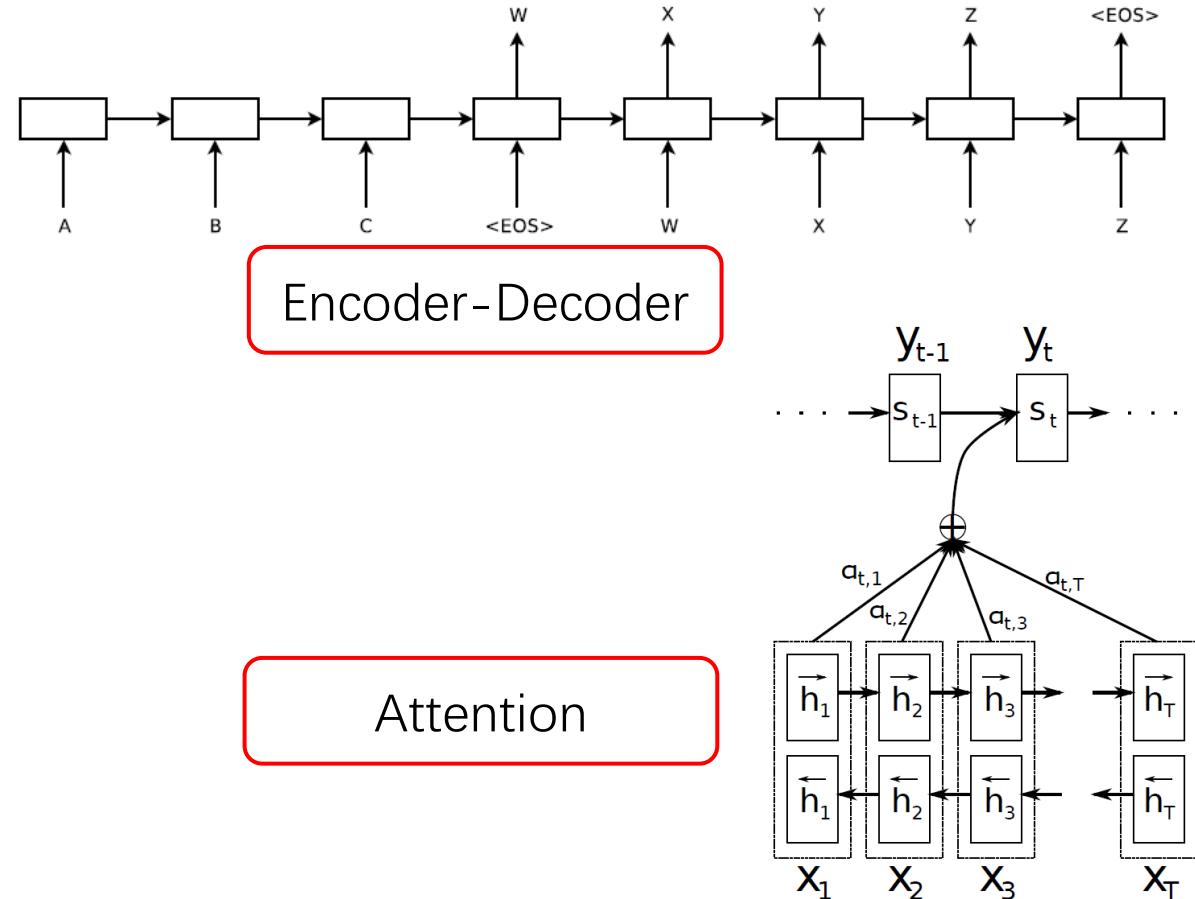
- Zhang, Xingxing, and Mirella Lapata. "Chinese poetry generation with recurrent neural networks." EMNLP, 2014.
- Oliveira, Hugo Gonçalo. "Tra-la-lyrics 2.0: Automatic generation of song lyrics on a semantic domain." Journal of Artificial General Intelligence, 2015.
- Yan, Rui, et al. "Chinese couplet generation with neural network structures." ACL, 2016.
- Wang, Qixin, et al. "Chinese song iambics generation with neural attention-based model." IJCAI, 2016.
- Singh, Divya, Margareta Ackerman, and Rafael Pérez y Pérez. "A Ballad of the Mexicas: Automated Lyrical Narrative Writing." ICCC, 2017.
- Ghazvininejad, Marjan, et al. "Hafez: an interactive poetry generation system." ACL, System Demonstrations, 2017.
- Hopkins, Jack, and Douwe Kiela. "Automatically generating rhythmic verse with neural networks." ACL, 2017.
- Martin, Lara J., et al. "Event representations for automated story generation with deep neural nets." AAAI, 2018.
- Xu, Linli, et al. "How images inspire poems: Generating classical chinese poetry from images with memory networks." AAAI, 2018.
- Wang, Xin, et al. "No Metrics Are Perfect: Adversarial Reward Learning for Visual Storytelling." ACL, 2018.
- Xu, Jingjing, et al. "A Skeleton-Based Model for Promoting Coherence Among Sentences in Narrative Story Generation." EMNLP, 2018.
- Wang, Bairui, et al. "Hierarchical Photo-Scene Encoder for Album Storytelling." AAAI, 2019.
- Goldfarb-Tarrant12, Seraphina, Haining Feng, and Nanyun Peng. "Plan, Write, and Revise: an Interactive System for Open-Domain Story Generation." NAACL-HLT, 2019.
- Zhipeng, Guo, et al. "Jiuge: A Human-Machine Collaborative Chinese Classical Poetry Generation System." ACL, System Demonstrations, 2019.

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Sequence to Sequence Model

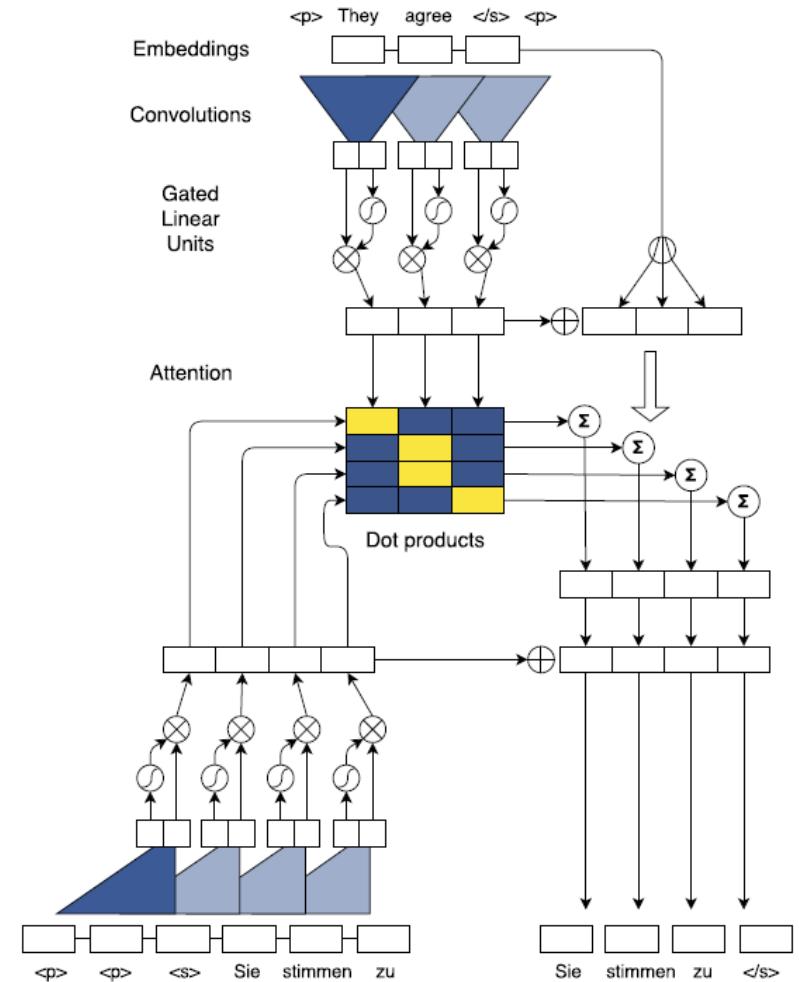
- Common Used Sequence Generation Method
- Stable and Easy for Training
- Flexibility



Sutskever, Ilya et al. NIPS, 2014
Bahdanau, Dzmitry et al., ICLR, 2015

Convolutional Sequence to Sequence

- Fast Training
- Strong Language Model for Capturing Long-Range Dependencies
- Bounded CNN Context Window

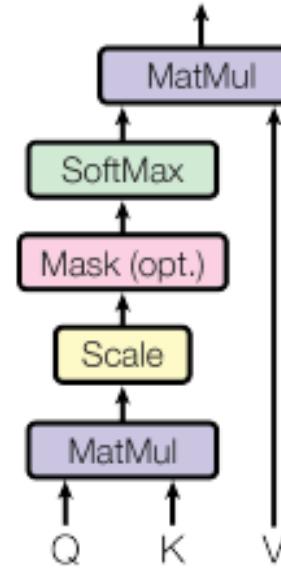


Gehring, Jonas, et al., ICML, 2017

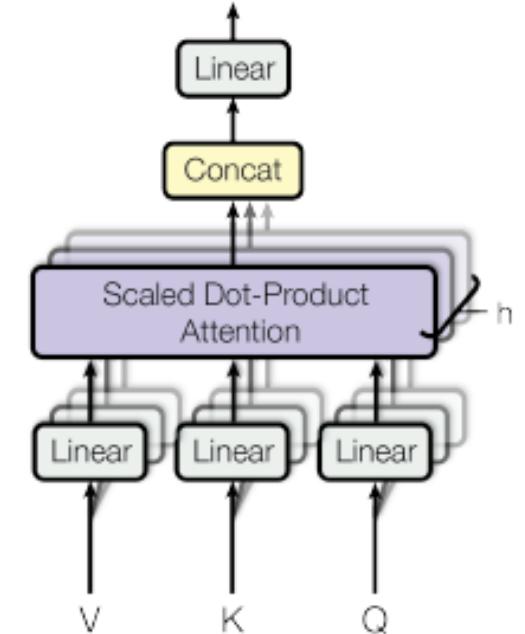
Transformer

- Fast Training
- Strong Language Model for Capturing Long-Range Dependencies
- Correlations Learning
- The SOTA Language Model

Scaled Dot-Product Attention



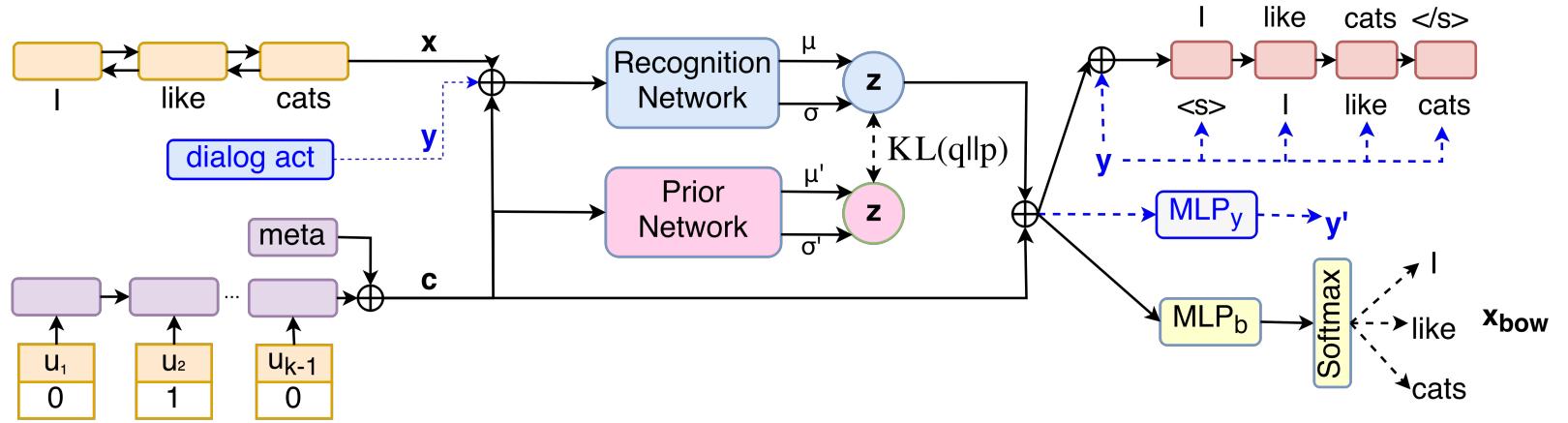
Multi-Head Attention



Ashish, et al., NIPS, 2017

Variational Autoencoder

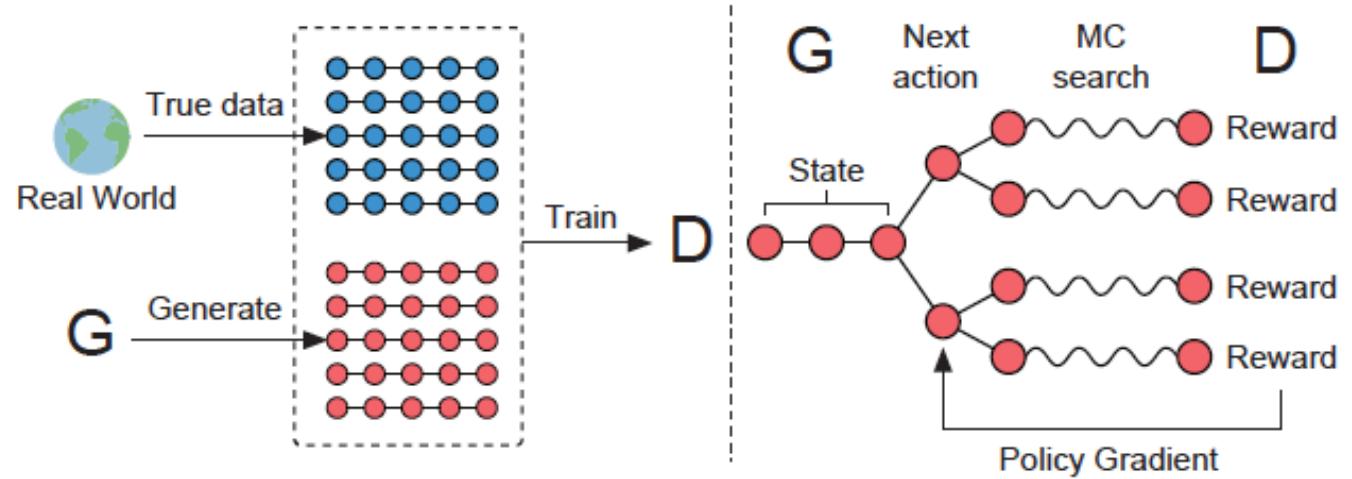
- Generative Model
- Wording Diversity
- Intra-Sentence Consistency
- Address Sparsity



Zhao, Tiancheng et al., ACL, 2017

Generative Adversarial Nets

- One-to-Many Generation
- Enhancing Generator
- Supervision Signal



Yu, Lantao, et al., AAAI, 2017

Reinforcement Learning

- Directly Model Discrete Sequence
- Address Loss-Evaluation Mismatch

References

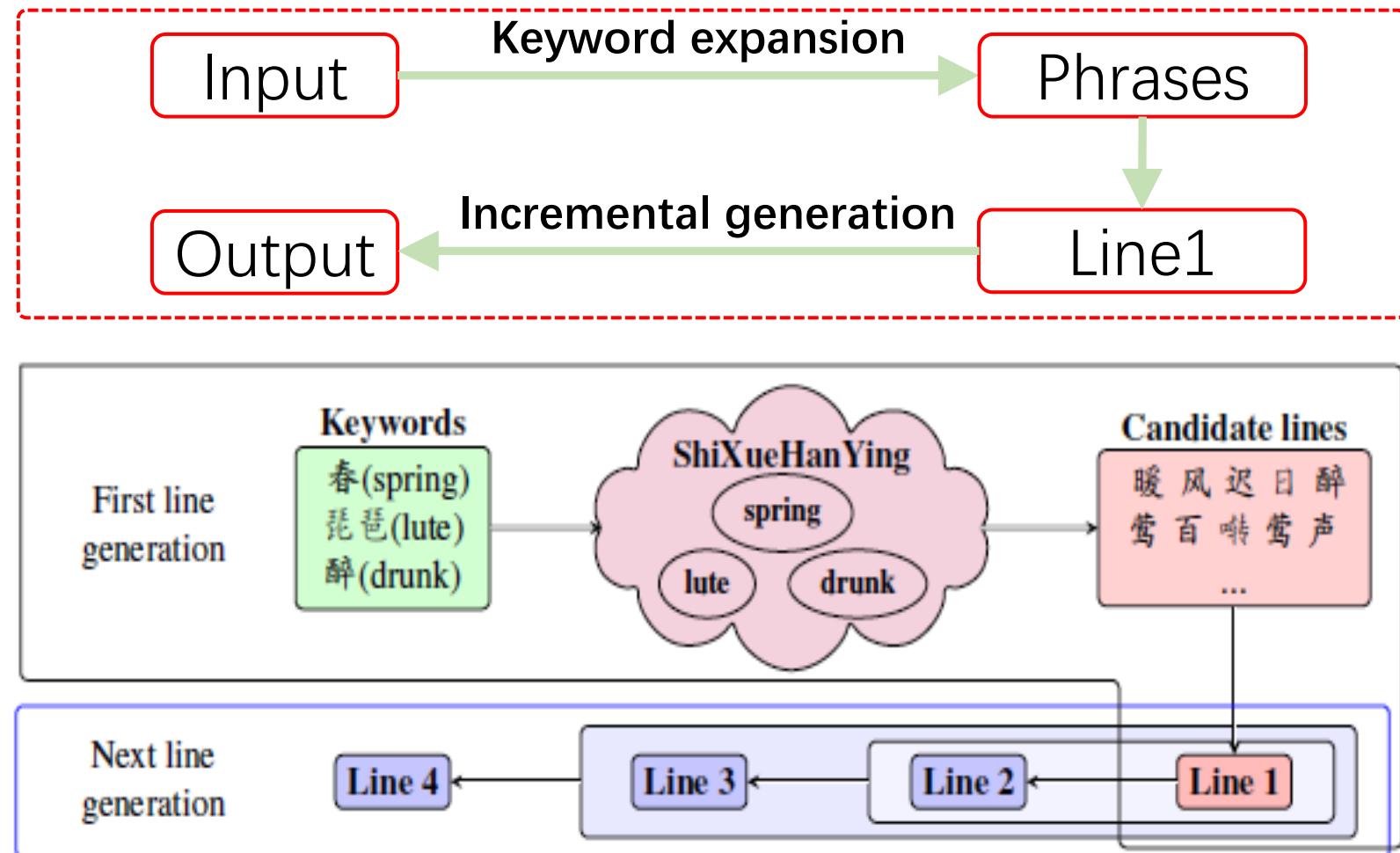
- Sutskever, Ilya, Oriol Vinyals, and Quoc V. Le. “Sequence to sequence learning with neural networks.” NIPS, 2014.
- Diederik P. Kingma and Max Welling. 2015. “Autoencoding variational bayes.” ICLR, 2015.
- Bahdanau, Dzmitry et al. “Neural machine translation by jointly learning to align and translate.” ICLR, 2015.
- Bowman, Samuel R., et al. “Generating sentences from a continuous space.” arXiv:1511.06349.
- Yu, Lantao, et al. "Seqgan: Sequence generative adversarial nets with policy gradient. " AAAI, 2017.
- Zhao, Tiancheng et al. “Learning Discourse-level Diversity for Neural Dialog Models using Conditional Variational Autoencoders.” ACL, 2017.
- Gehring, Jonas, et al. “Convolutional Sequence to Sequence Learning.” ICML, 2017.
- Ashish, et al. “Attention is all you need.” NIPS, 2017.
- Radford, Alec, et al. “Improving Language Understanding by Generative Pre-Training.” 2018.
- Devlin, Jacob, et al. “BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding.” NAACL-HLT, 2019.

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Recurrent Neural Model

- Task
Chinese Quatrain
- Generation Process
Keywords
Keywords expansion
Incremental generation

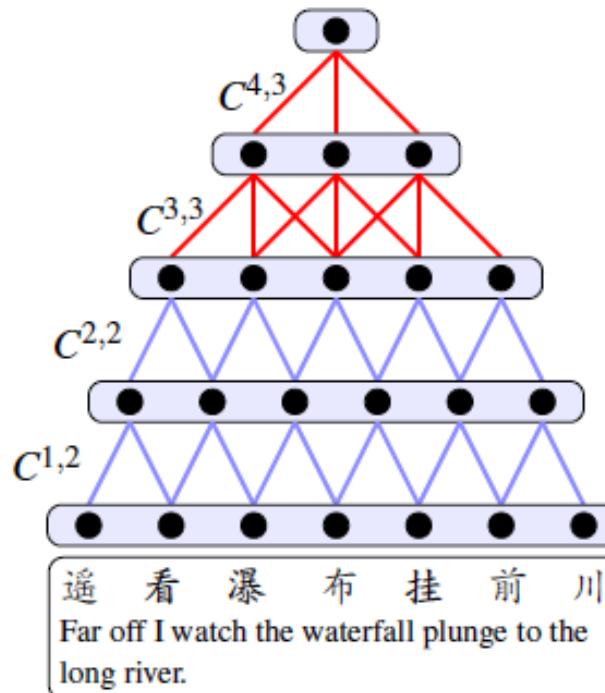


Xingxing Zhang et al. EMNLP' 14

Recurrent Neural Model

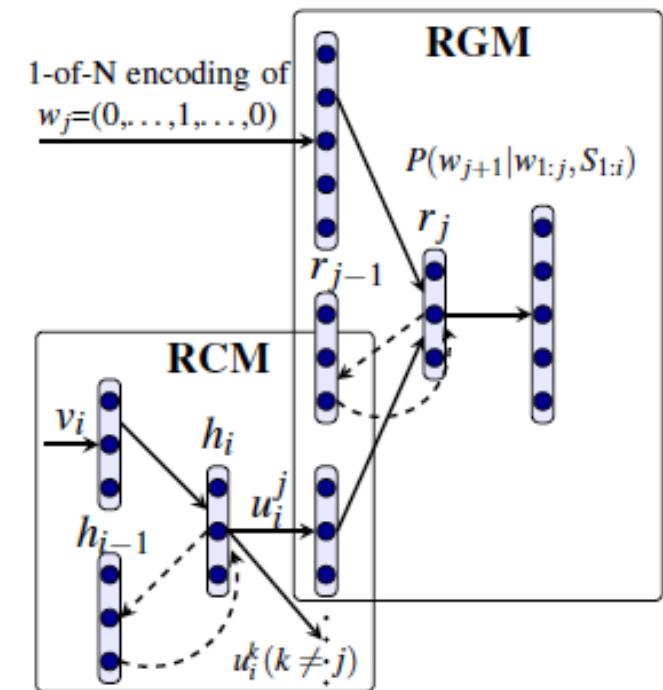
- Convolutional Sentence Model (CSM)
 $v_i = \text{CSM}(S_i)$

CSM



- Recurrent Context Model (RCM)
 $u_i^j = \text{RCM}(v_{1:i}, j)$

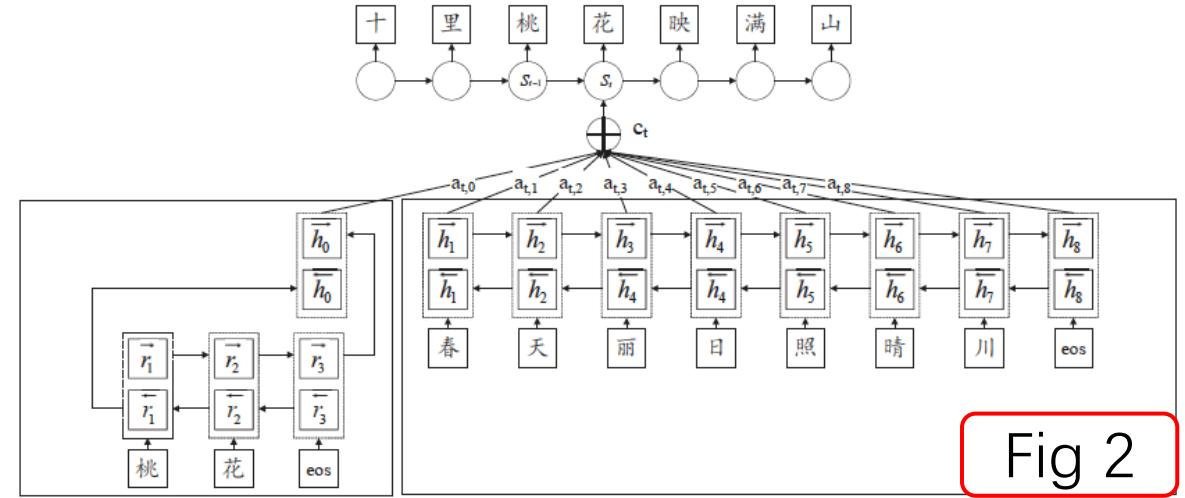
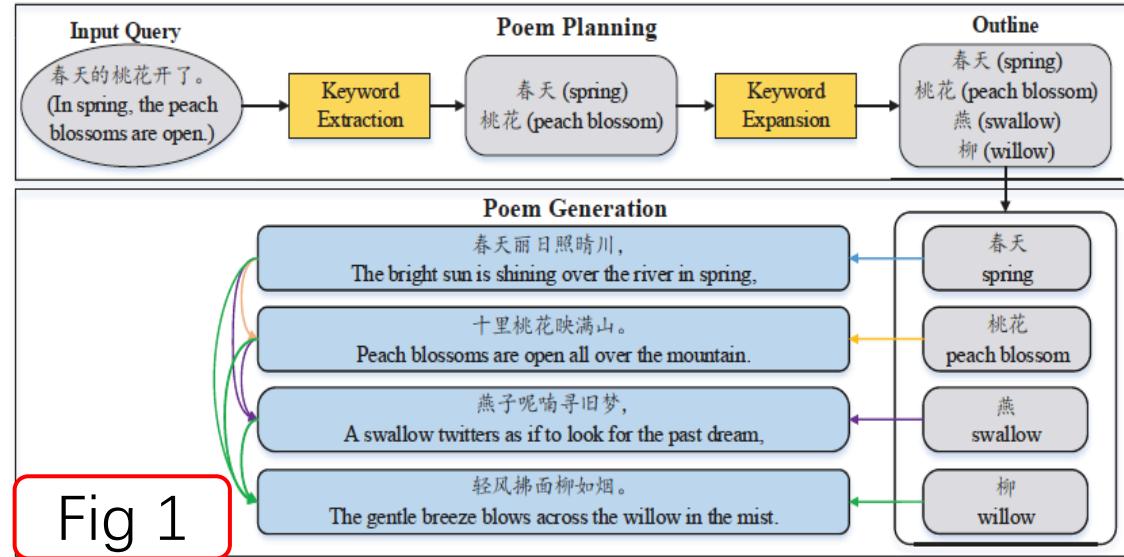
Encoder — Decoder



- Recurrent Generation Model (RGM)
 $P(w_{j+1}|w_{1:j}, S_{1:i}) = \text{RGM}(w_{1:j+1}, u_i^{1:j})$

- Training
Cross Entropy Errors

Planning-Based Recurrent Neural Model

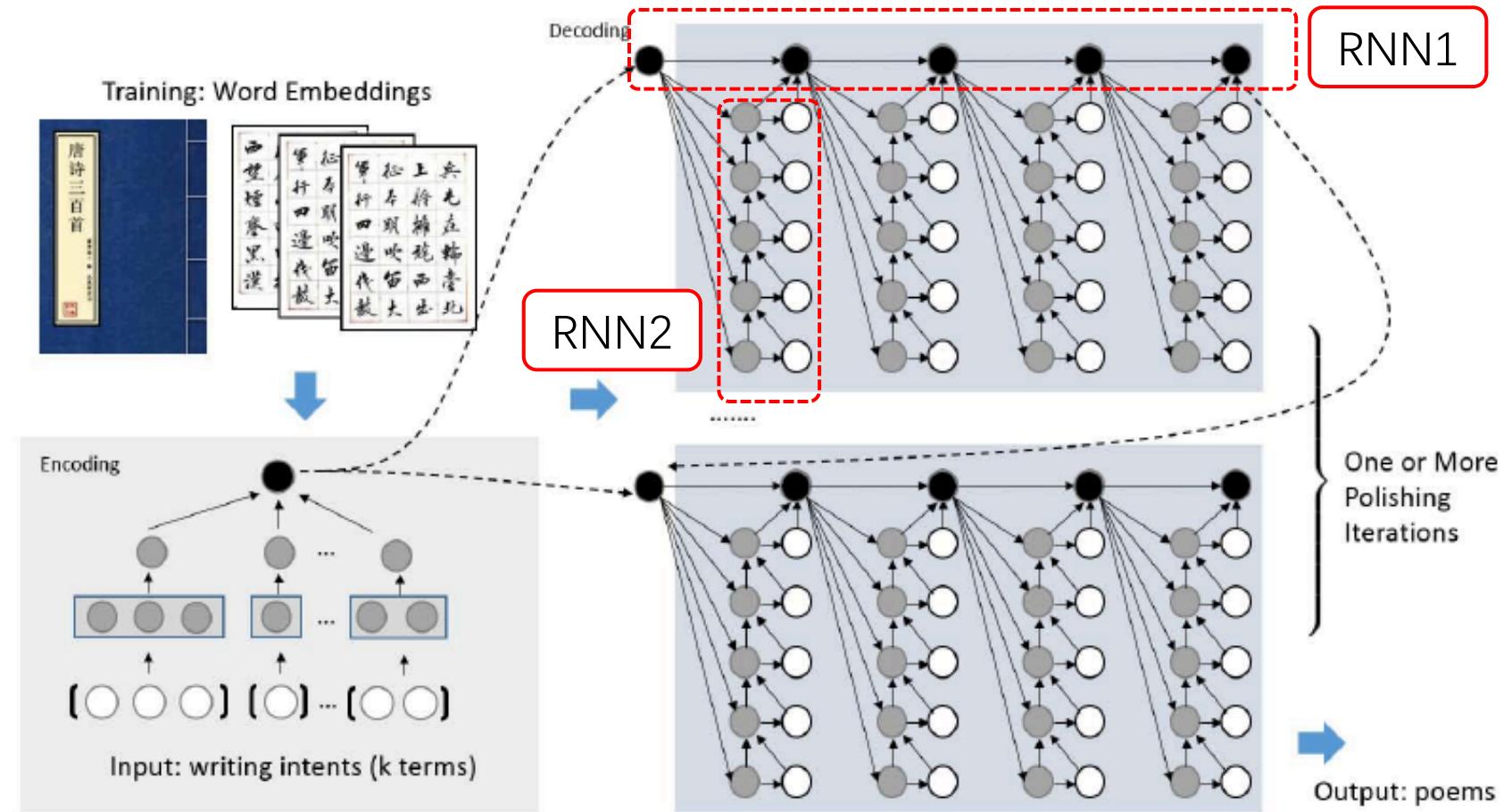


- **Keyword Extraction:** TextRank Algorithm
- **Keyword Expansion:** RNNLM-Based Method; Knowledge-Based Method
- **Poetry generation:** Bidirectional RNN (GRU) Encoder; Attention; RNN (GRU) Decoder

Zhe Wang et al. COLING' 16.

Iterative Polishing

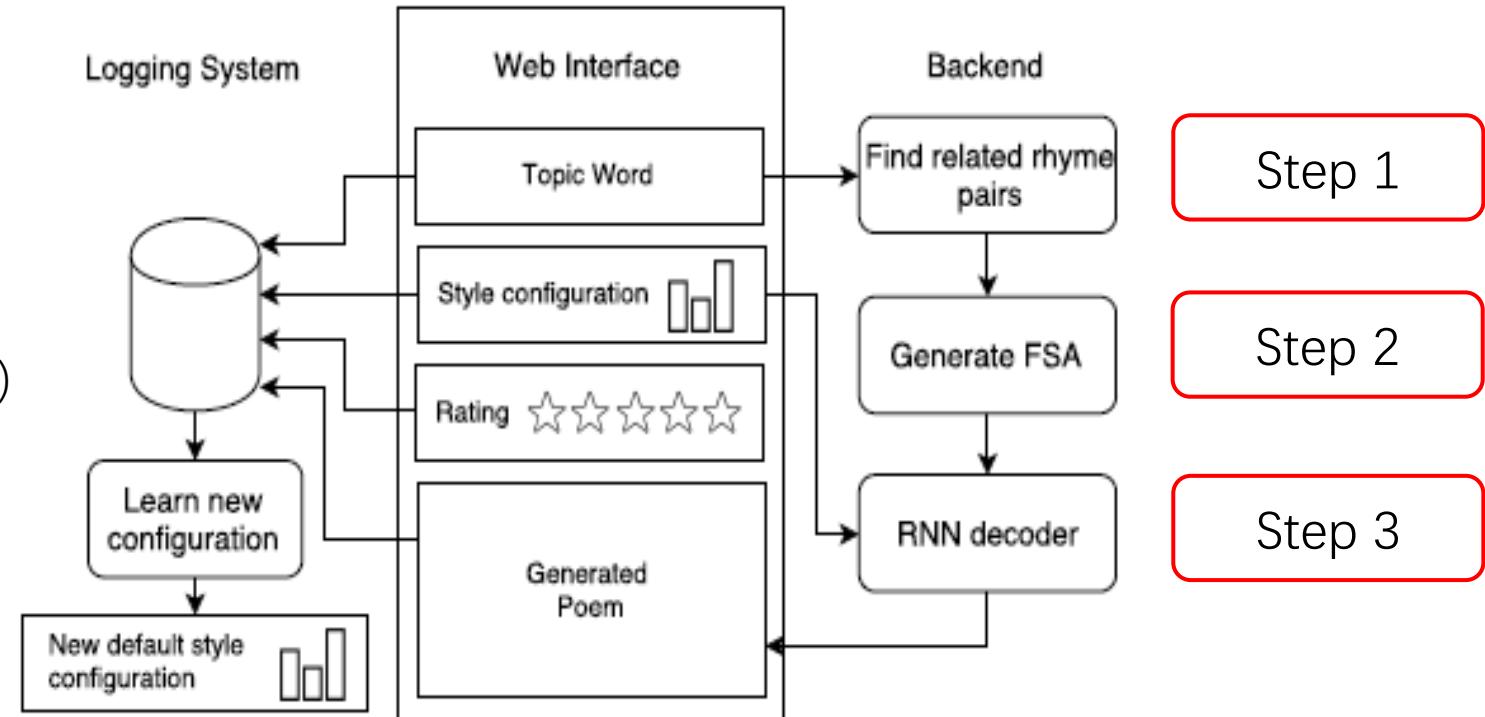
- Intention Representation
CNN
RNN
- Sequential Generation
Hierarchical RNN
Character by Character
- Iterative Polishing
Re-Generation



Rui Yan et al. IJCAI' 16.

Interactive Poetry Generation

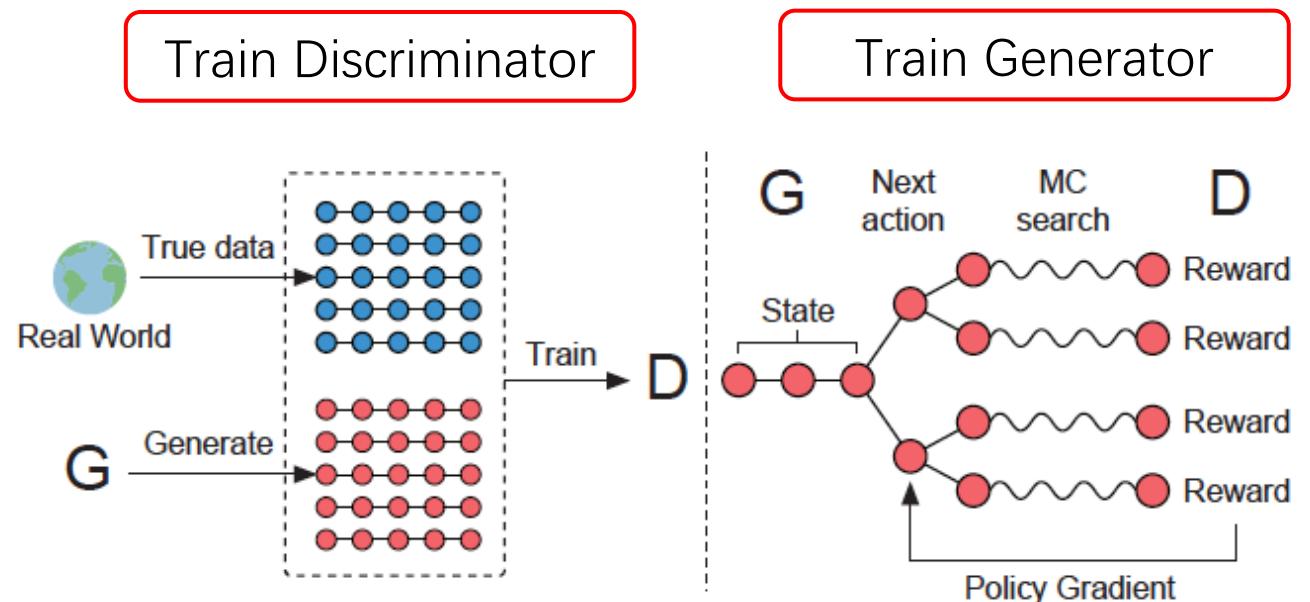
- Step 1
Search related rhyme words
- Step 2
Create a finite-state acceptor (FSA)
- Step 3
RNN guided by FSA



Marjan Ghazvininejad et al., ACL' 17

GAN for Poetry Generation

- GAN
Min-Max Game
- Generator
Reinforcement learning
MC search
- Discriminator



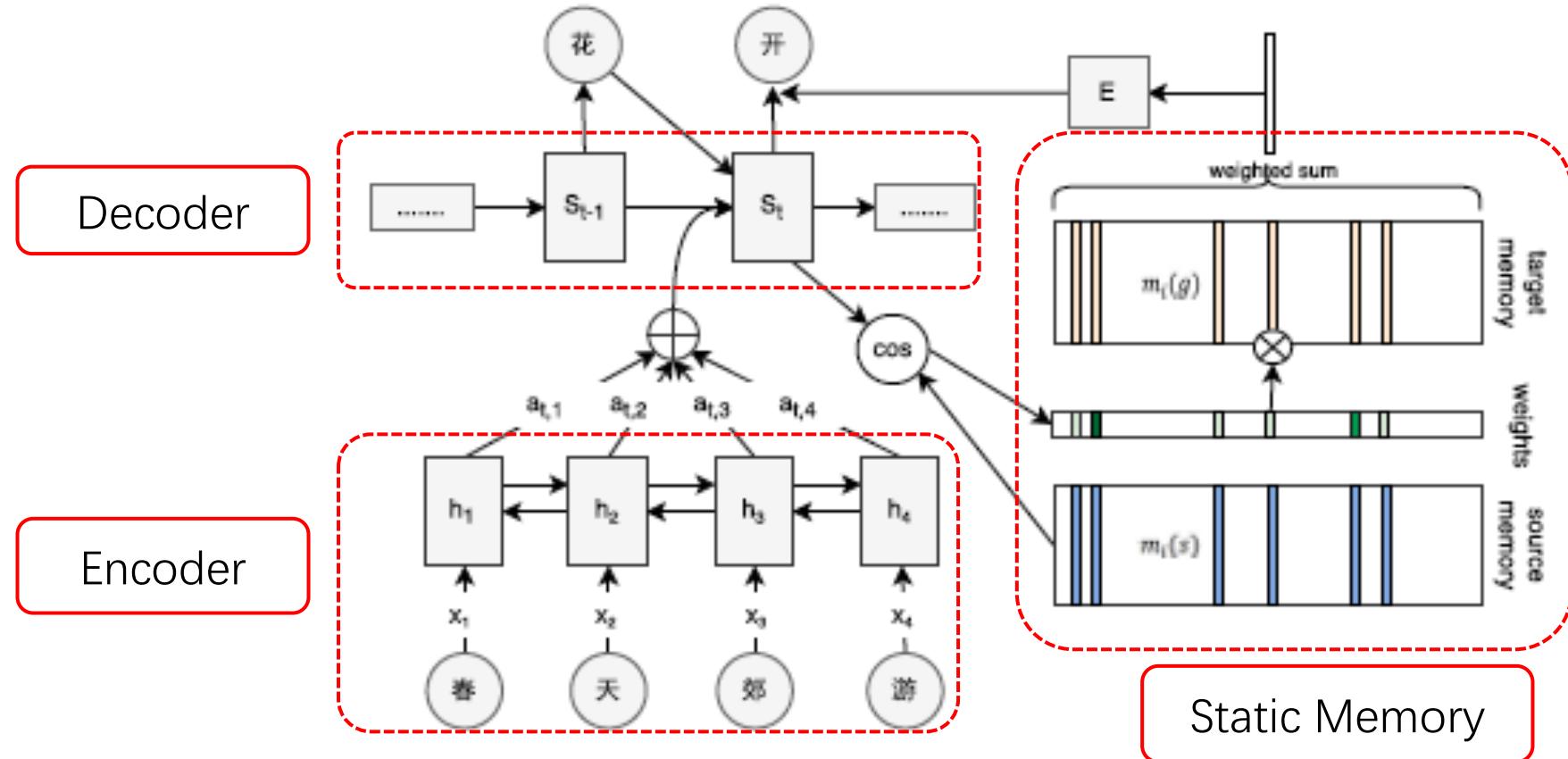
Algorithm	Human score	<i>p</i> -value	BLEU-2	<i>p</i> -value
MLE	0.4165	0.0034	0.6670	$< 10^{-6}$
SeqGAN	0.5356		0.7389	
Real data	0.6011		0.746	

Lantao Yu et al, AAAI' 17

Static Memory Model

- Encoder
Bidirectional RNN
- Decoder
One-Layer RNN
- Memory Contents
Poem Cases
- Memory Index
Hidden States
- Memory Combing

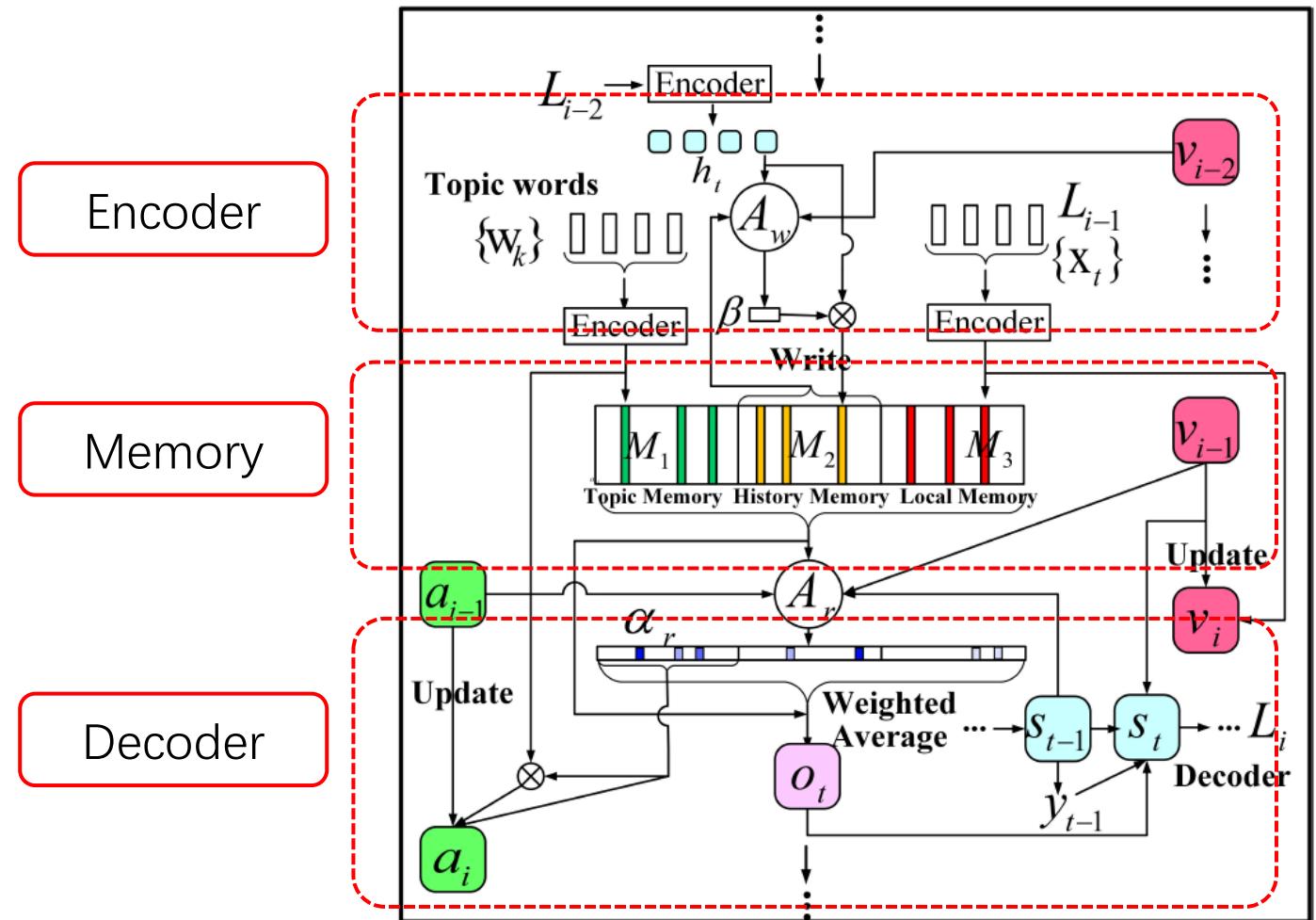
$$v_t = \sum_{i=1}^K \cos(s_t, m_i(s))m_i(g)$$



Jiyuan Zhang et al., ACL' 17

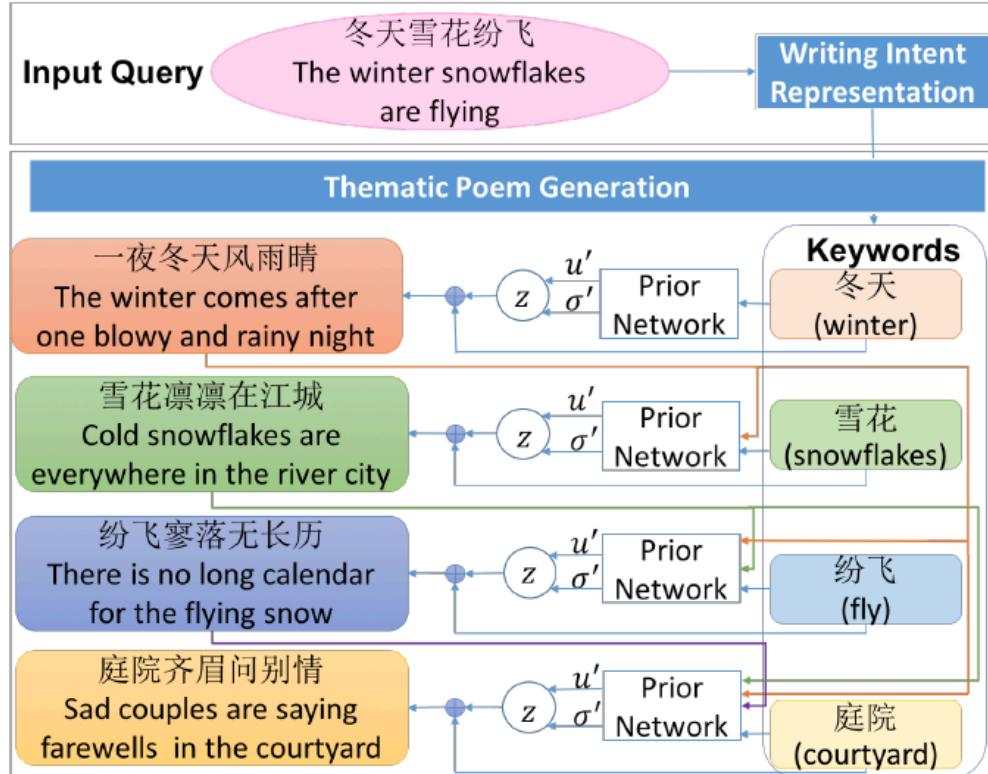
Working Memory Model

- Line-by-Line Generation
- Bidirectional Encoder and GRU Decoder
- Memory
 - Topic Memory
 - History Memory
 - Local Memory
 - Memory Reading
 - Memory Writing

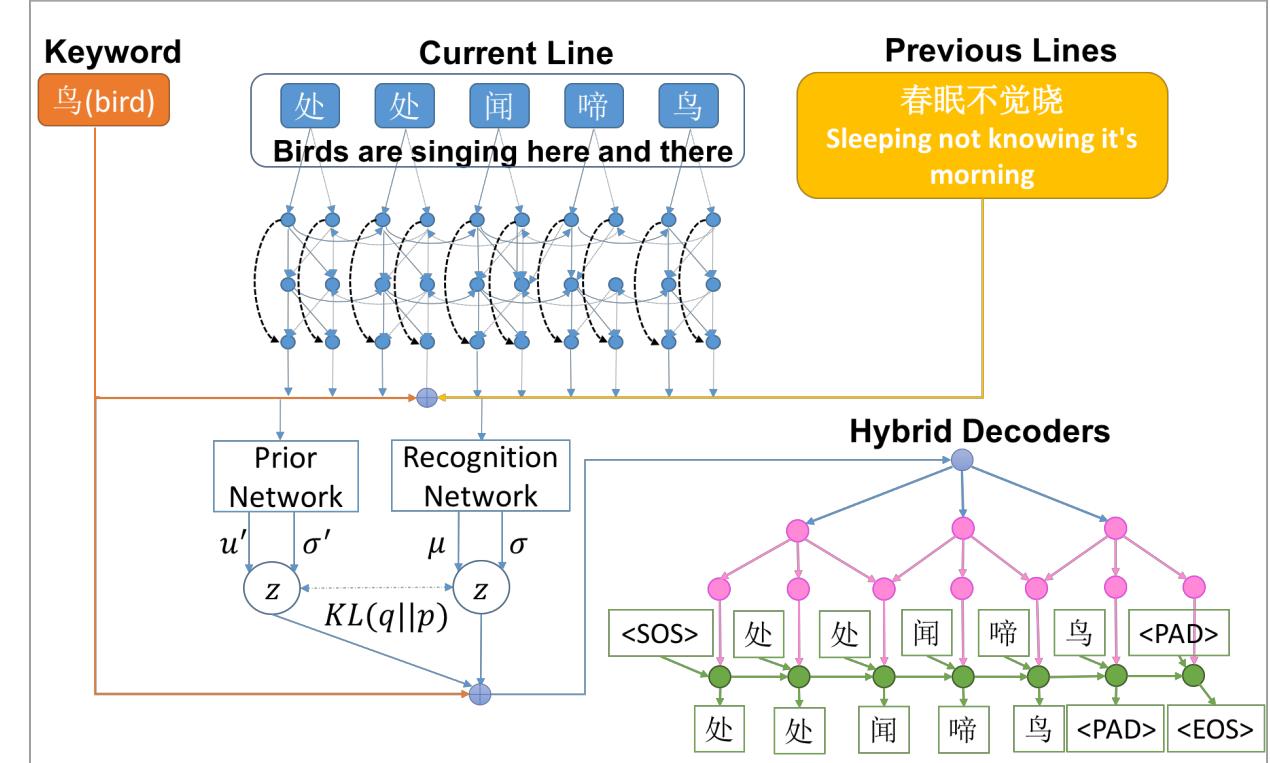


Xiaoyuan Yi et al., IJCAI' 18

Conditional Variational Autoencoder



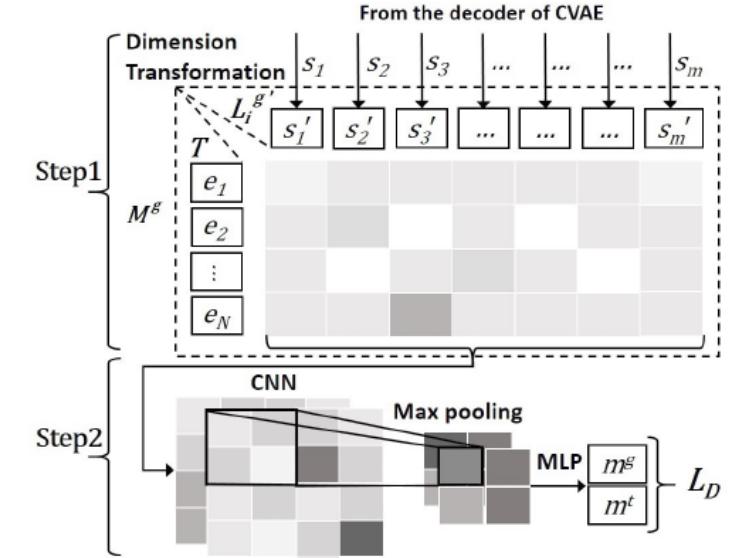
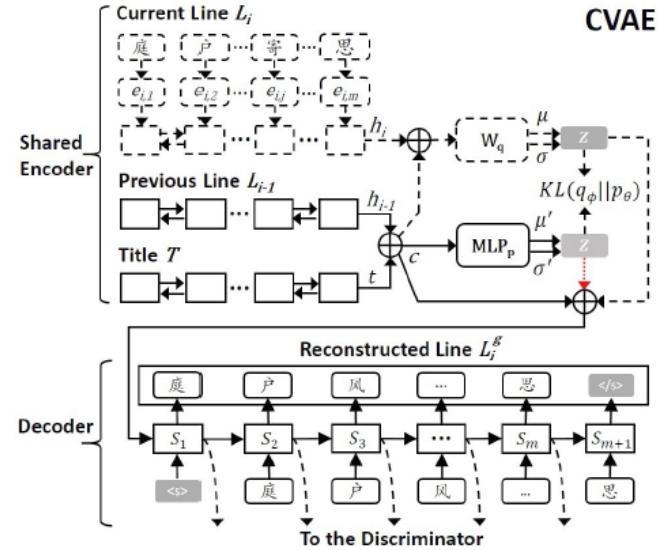
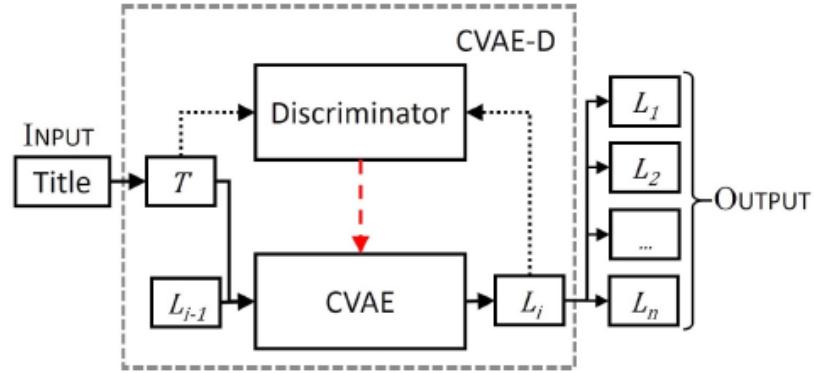
Generation Pipeline



CVAE Model

Xiaopeng Yang et al., IJCAI' 18

CVAE-GAN Model



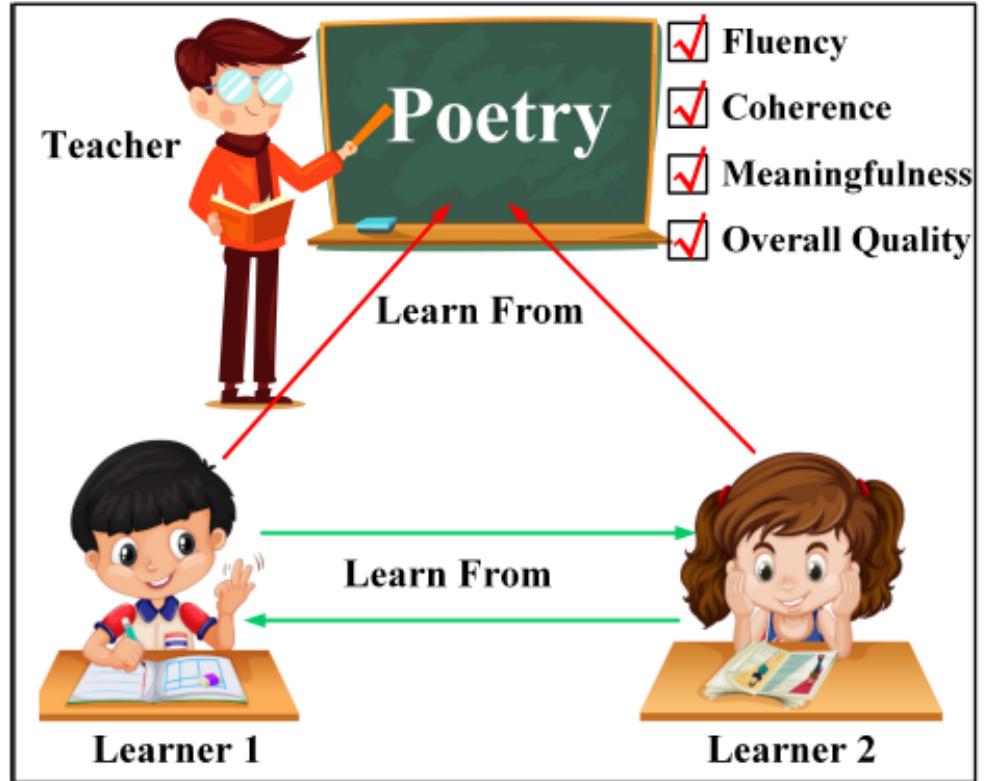
Overall Framework

CVAE Generator

Discriminator

Mutual Reinforcement Learning

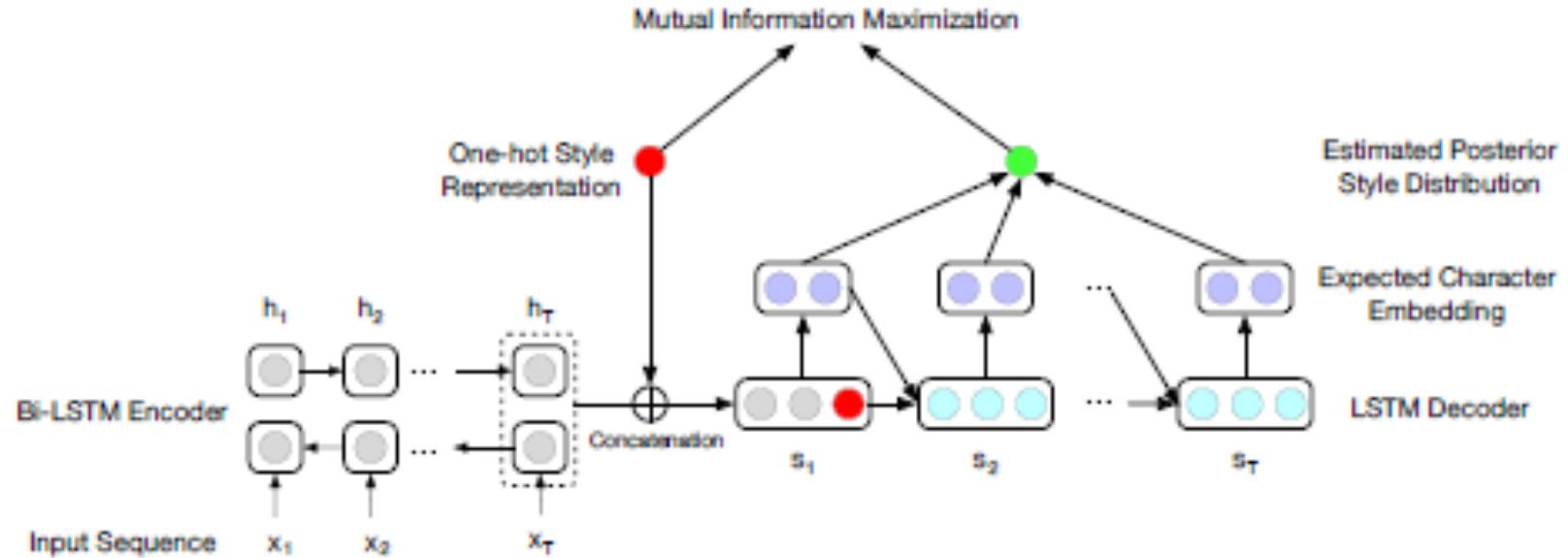
- Modeling Poetry Generation as RL Problem
- Fine-Grained Reward Designing
Fluency Rewarder (LM)
Coherence Rewarder (MI)
Meaningfulness Rewarder (TF-IDF)
Overall Quality Rewarder (Classifier)
- Mutual Reinforcement Learning
Two Generators
Instance-Based Method
Distribution Level Mutual learning



Xiaoyuan Yi et al., EMNLP' 18

Stylistic Poetry Generation

- Input
 - Input sentence
 - Style id
- Encoder-Decoder
- Mutual Information
Dependency of variables



Cheng Yang et al., EMNLP' 18

Pretraining-Based Model

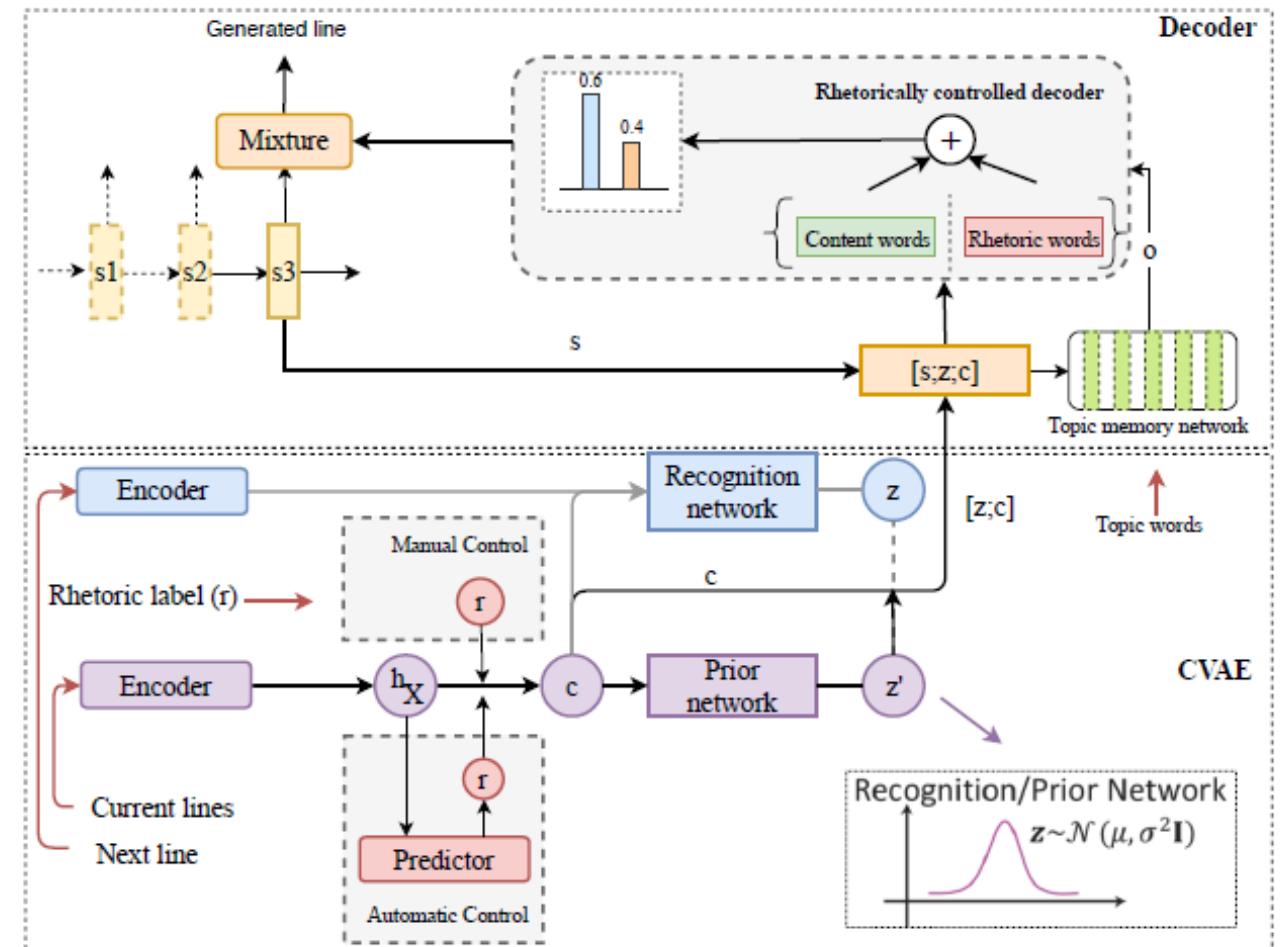
- Pre-trained Model
GPT
- Genres
Quatrains
Iambics
Couplet
- Fine-Tuning Model
Transformer
Auto-regressive Language Model



Yi Liao et al., arXiv:1907.00151

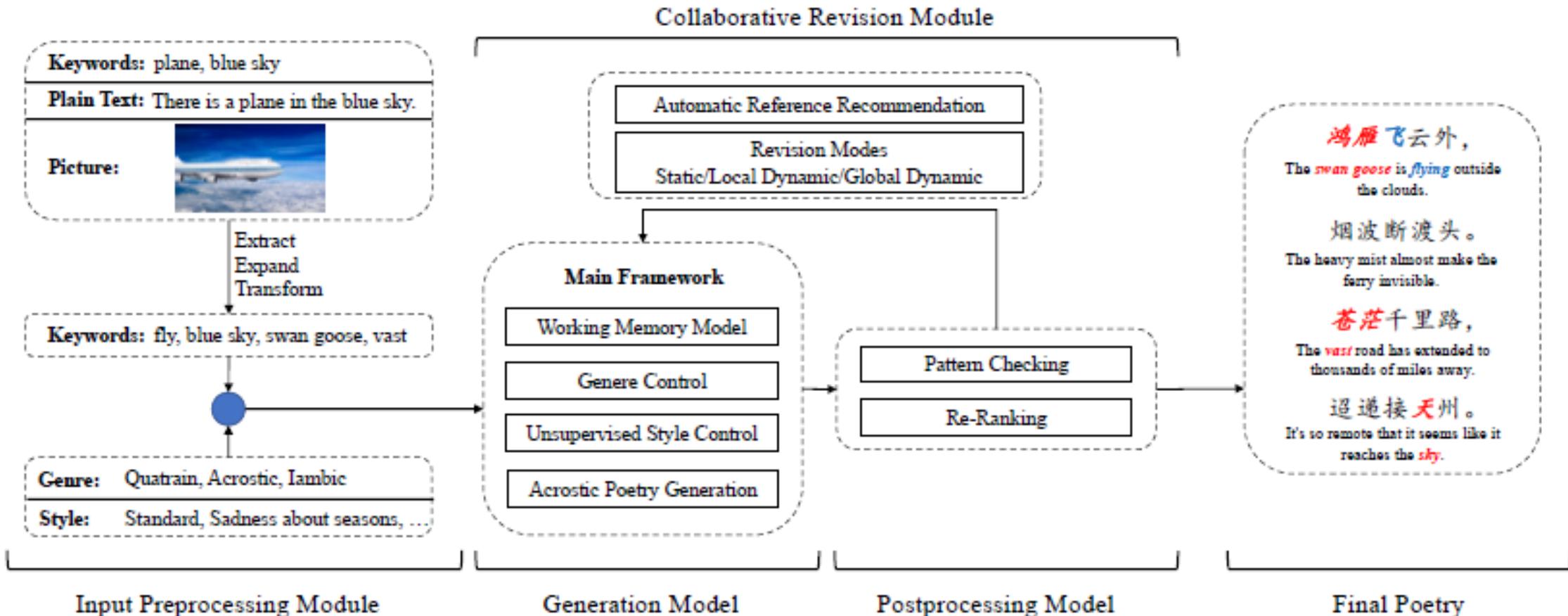
Rhetorically Controlled Generation

- Modern Poetry Generation
- Manual Control CVAE Model
Process User Input As Rhetorical Label
- Automatic Control CVAE
Predict *When* Use Rhetoric Label
- Topic Memory
Store Topic Information
- Rhetorically Controlled Decoder
Generate Sentence with Forms of Rhetoric



Zhiqiang Liu et al., ACL' 19

Human-Machine Collaborative Generation



Zhipeng Guo et al., ACL' 19

References

- Zhang, Xingxing, and Mirella Lapata. "Chinese poetry generation with recurrent neural networks." EMNLP, 2014.
- Yan, Rui. "i, Poet: Automatic Poetry Composition through Recurrent Neural Networks with Iterative Polishing Schema." IJCAI, 2016.
- Wang, Qixin, Tianyi Luo, and Dong Wang. "Can machine generate traditional Chinese poetry? A feigenbaum test." *International Conference on Brain Inspired Cognitive Systems*. Springer, Cham, 2016.
- Wang, Zhe, et al. "Chinese poetry generation with planning based neural network." COLING, 2016.
- Yu, Lantao, et al. "Seqgan: Sequence generative adversarial nets with policy gradient." AAAI, 2017.
- Oliveira, Hugo Gonçalo. "A survey on intelligent poetry generation: Languages, features, techniques, reutilisation and evaluation." ACL, 2017.
- Ghazvininejad, Marjan, et al. "Generating topical poetry." EMNLP, 2016.
- Zhang, Jiyuan, et al. "Flexible and Creative Chinese Poetry Generation Using Neural Memory." ACL, 2017.
- Yi, Xiaoyuan, Ruoyu Li, and Maosong Sun. "Generating chinese classical poems with rnn encoder-decoder." Springer, Cham, 2017.

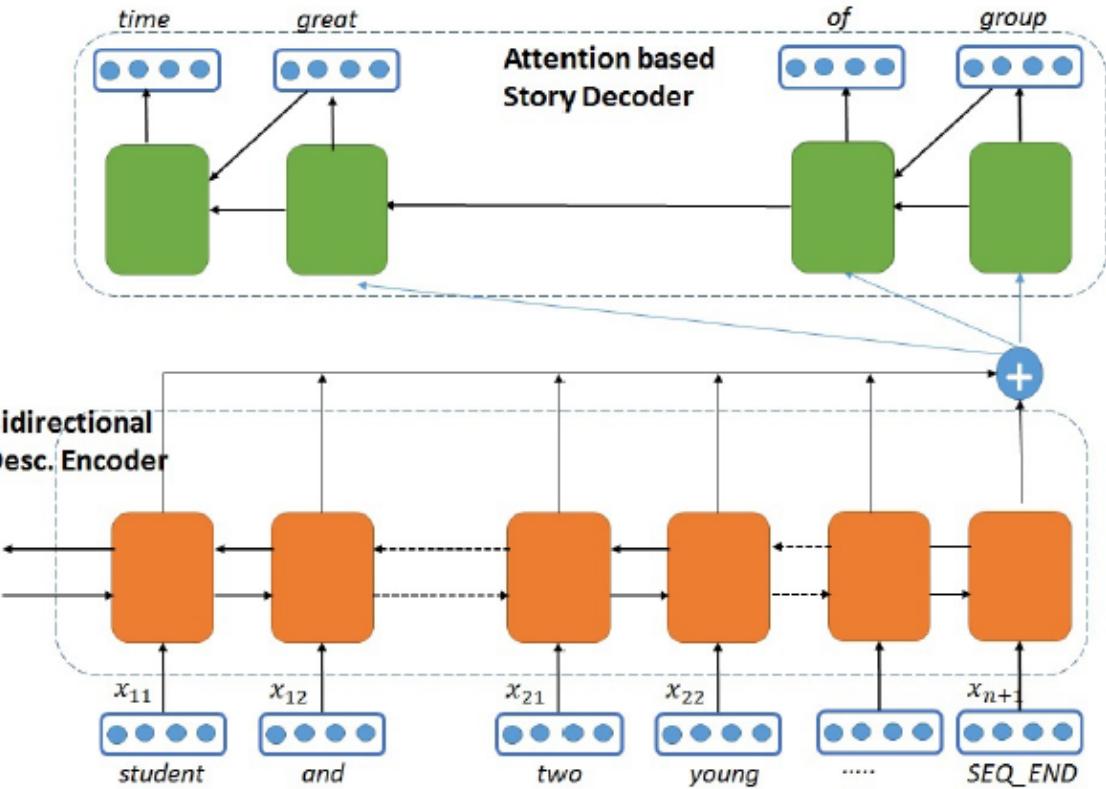
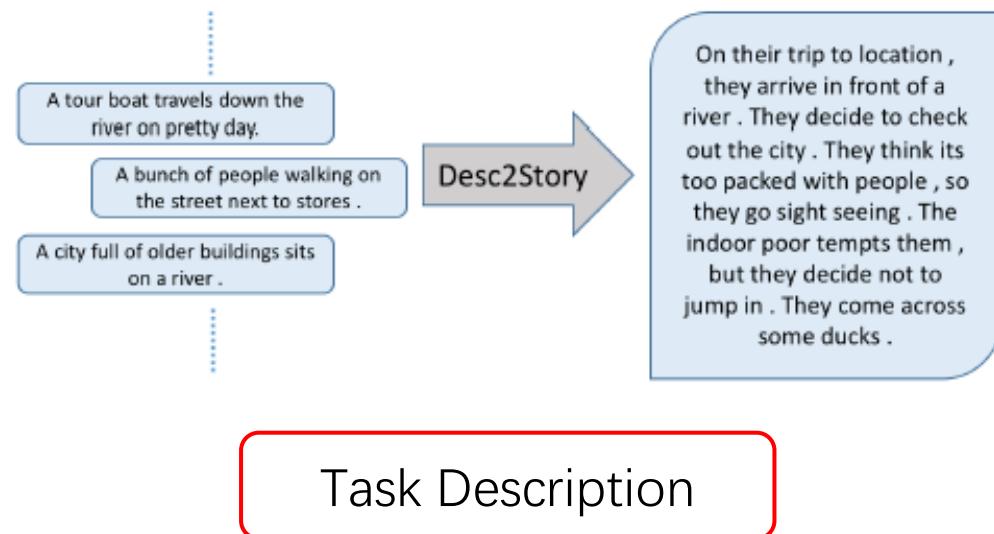
References

- Ghazvininejad, Marjan, et al. "Hafez: an interactive poetry generation system." ACL, System Demonstrations, 2017.
- Yi, Xiaoyuan, et al. "Automatic poetry generation with mutual reinforcement learning." EMNLP, 2018.
- Yang, Cheng, et al. "Stylistic chinese poetry generation via unsupervised style disentanglement." EMNLP, 2018.
- Li, Juntao, et al. "Generating Classical Chinese Poems via Conditional Variational Autoencoder and Adversarial Training." EMNLP, 2018.
- Liao, Yi, et al. "GPT-based Generation for Classical Chinese Poetry." *arXiv:1907.00151*, 2019.
- Yi, Xiaoyuan, et al. "Chinese Poetry Generation with a Working Memory Model." IJCAI, 2018.
- Yang, Xiaopeng, et al. "Generating Thematic Chinese Poetry using Conditional Variational Autoencoders with Hybrid Decoders." IJCAI, 2018.
- Zhipeng, Guo, et al. "Jiuge: A Human-Machine Collaborative Chinese Classical Poetry Generation System." ACL, System Demonstrations, 2019.
- Liu, Zhiqiang, et al. "Rhetorically Controlled Encoder-Decoder for Modern Chinese Poetry Generation." ACL, 2019.

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Coherent Story Generation

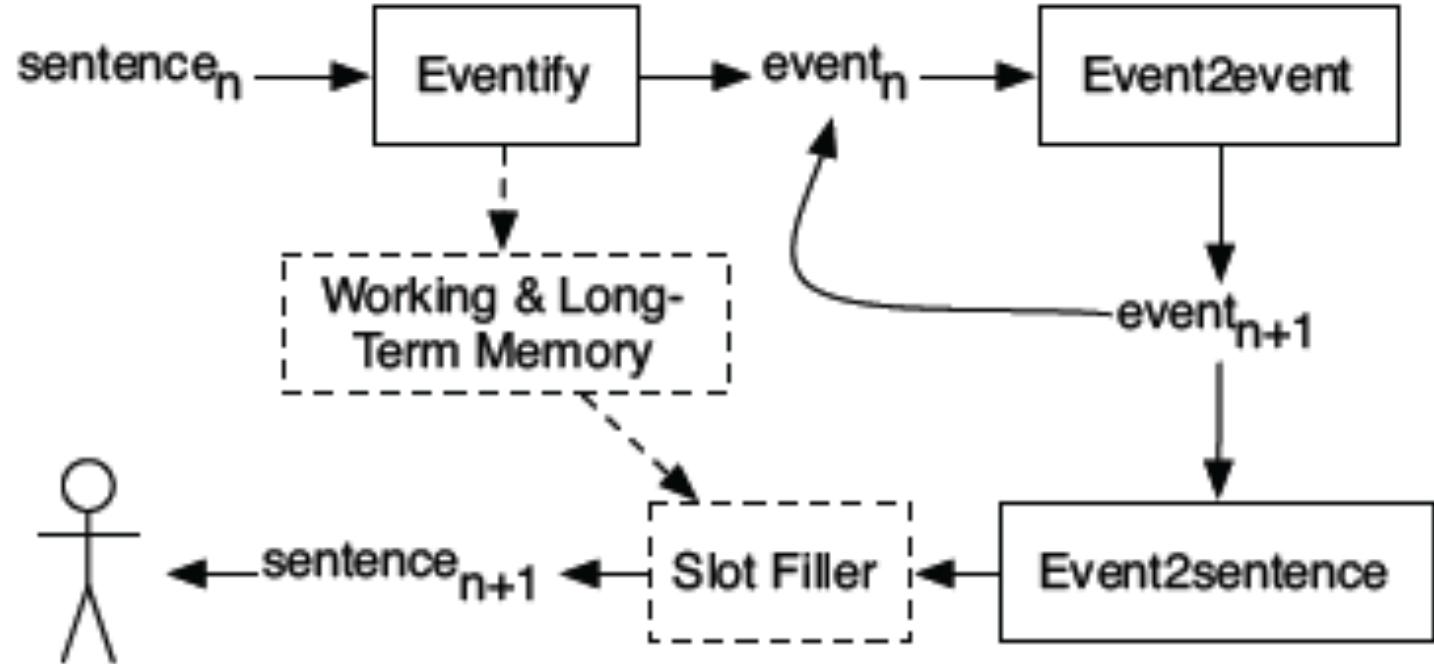


Model

Jain, Parag, et al., arXiv:1707.05501, 2017

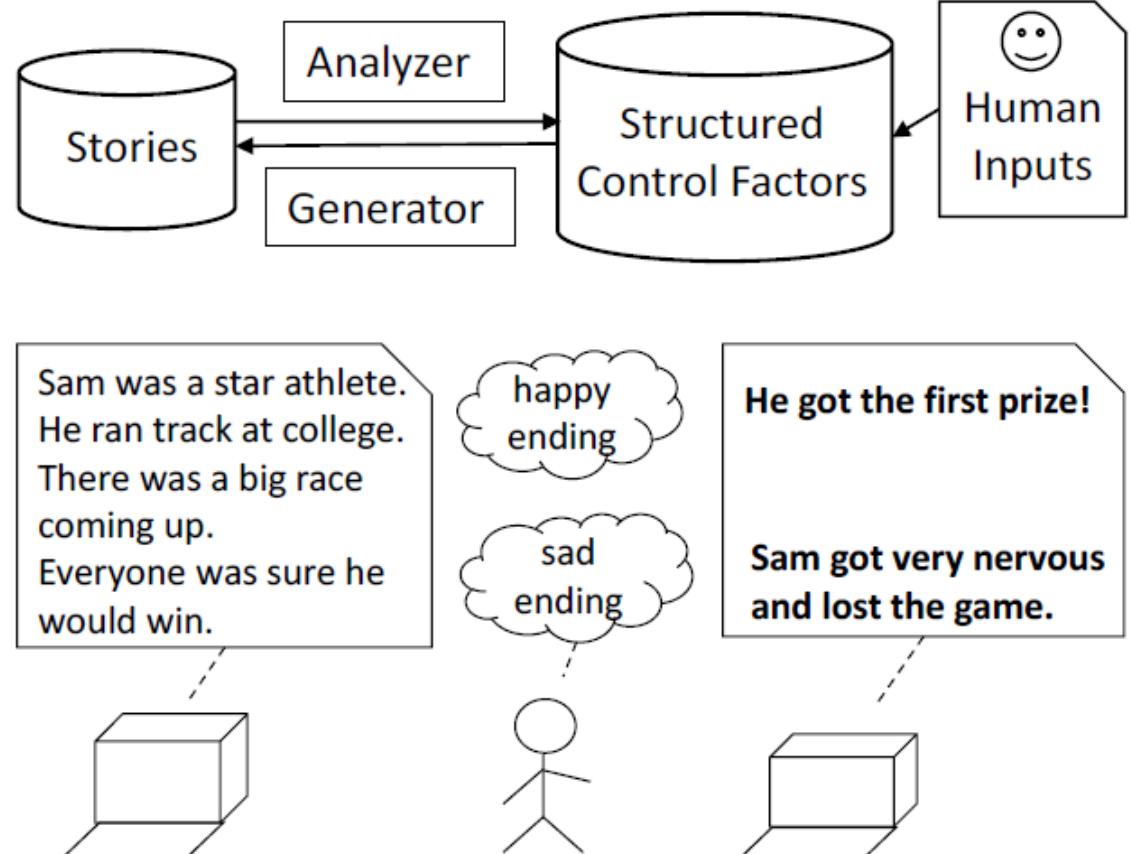
Event Representations

- Story to Event Sequences
5-tuple Event Representations
- Event to Event Generation
Event-Level Seq2seq
- Event to Story Generation
Seq2seq



Controllable Story Generation

- Input
 - Human inputs
 - Controllable factors
- Output
 - A story that coherent to human inputs
- Ending Valence Control
 - Data labeling
 - Supervised classifier
 - Conditional LM for generation
- Storyline Control
 - Keywords extractor
 - Conditional LM for generation



Peng, Nanyun, et al., Workshop, 2018

Hierarchical Story Generation

- Hierarchical Generation Pipeline
Generating Prompts---Story
- Convolutional Seq2seq For Generating Prompts
Conventional Convolutional Seq2seq Model
- Gated Multi-Scale Attention
Gated self-attention to attend Information at different position
Multi-scale attention to attend information at different granularity
- Prompts Fusion
Residual Learning Upon pre-trained Convolutional seq2seq model

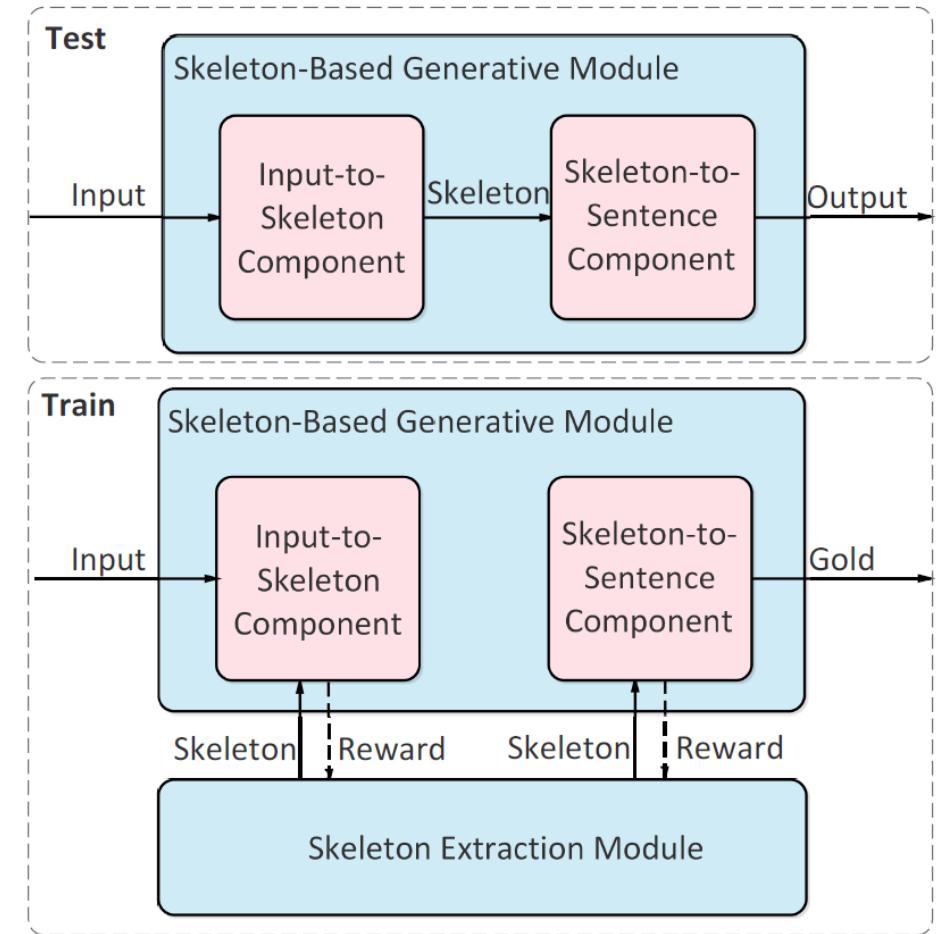
Prompt: The Mage, the Warrior, and the Priest

Story: A light breeze swept the ground, and carried with it still the distant scents of dust and time-worn stone. The Warrior led the way, heaving her mass of armour and muscle over the uneven terrain. She soon crested the last of the low embankments, which still bore the unmistakable fingerprints of haste and fear. She lifted herself up onto the top the rise, and looked out at the scene before her. [...]

Fan Angela et al., ACL, 2018

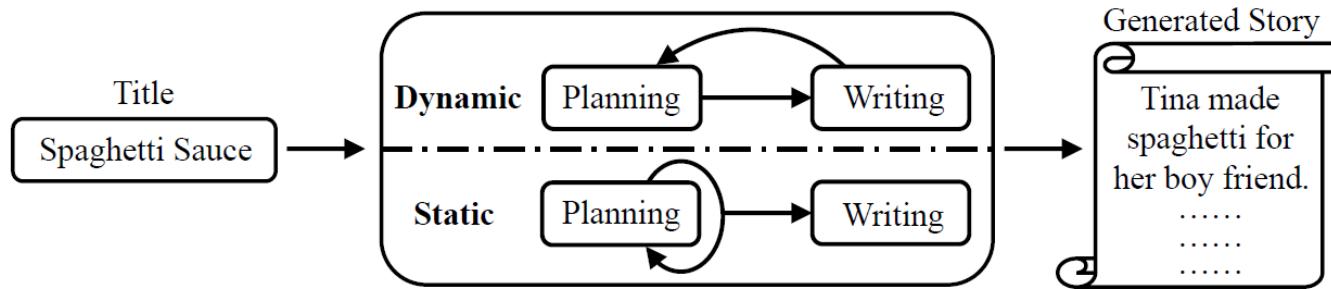
Skeleton to Story Generation

- Skelton-Based Generative Module
 - Input-to-Skeleton
 - Skeleton-to-Sentence
- Skeleton Extraction Module
 - Pretraining on Sentence Compression Dataset
 - Reinforcement Learning Training
 - Two Entropy Loss Reward
 - Iterative Optimization



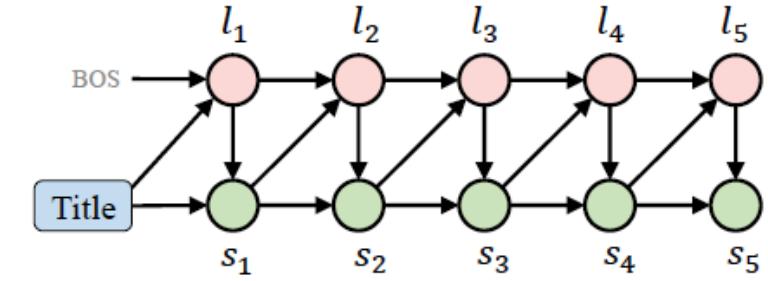
Xu, Jingjing, et al., EMNLP, 2018

Planning-Based Method

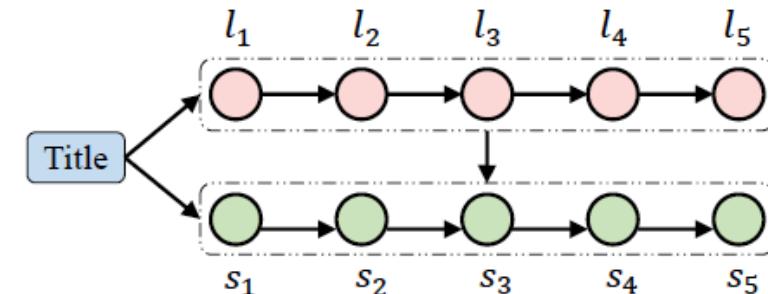


System Overview

- Plan and Write
- Static Planning
- Dynamic Planning



(a) Dynamic schema work-flow.



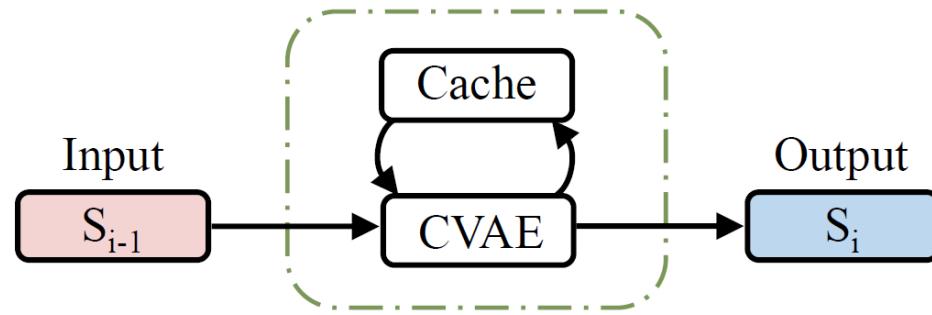
(b) Static schema work-flow.

Planning Method

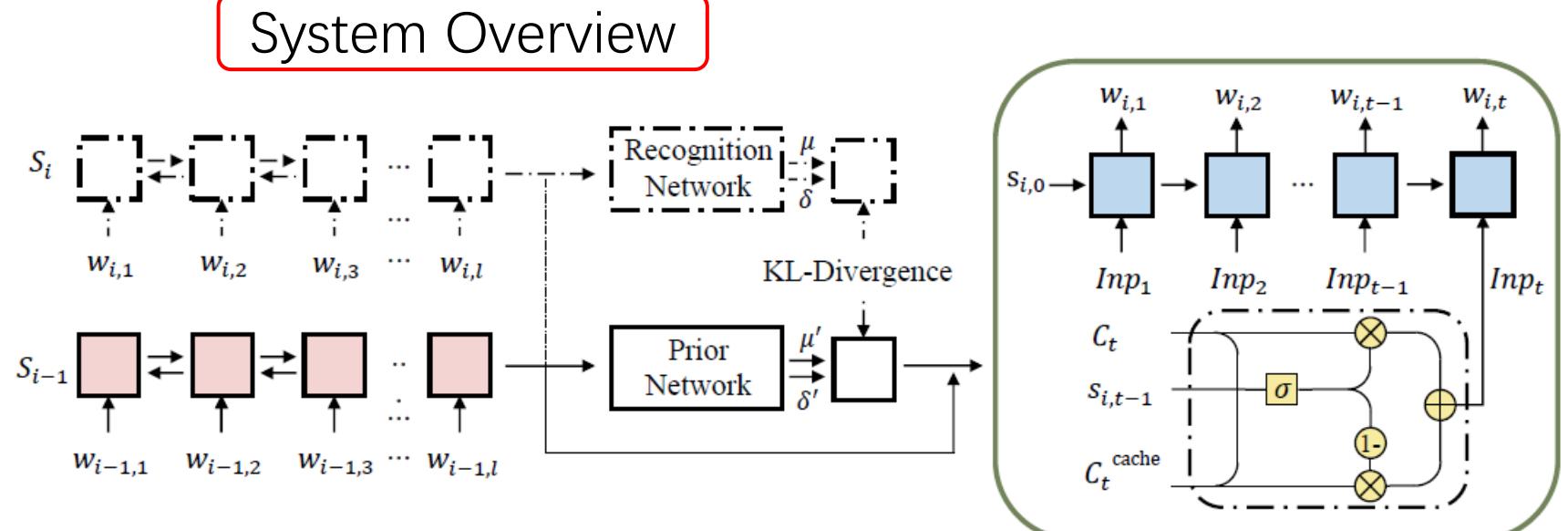
Yao, Lili, et al., AAAI, 2019

CVAE and Memory Network

- CVAE
Wording Novelty



- Cache
Coherence

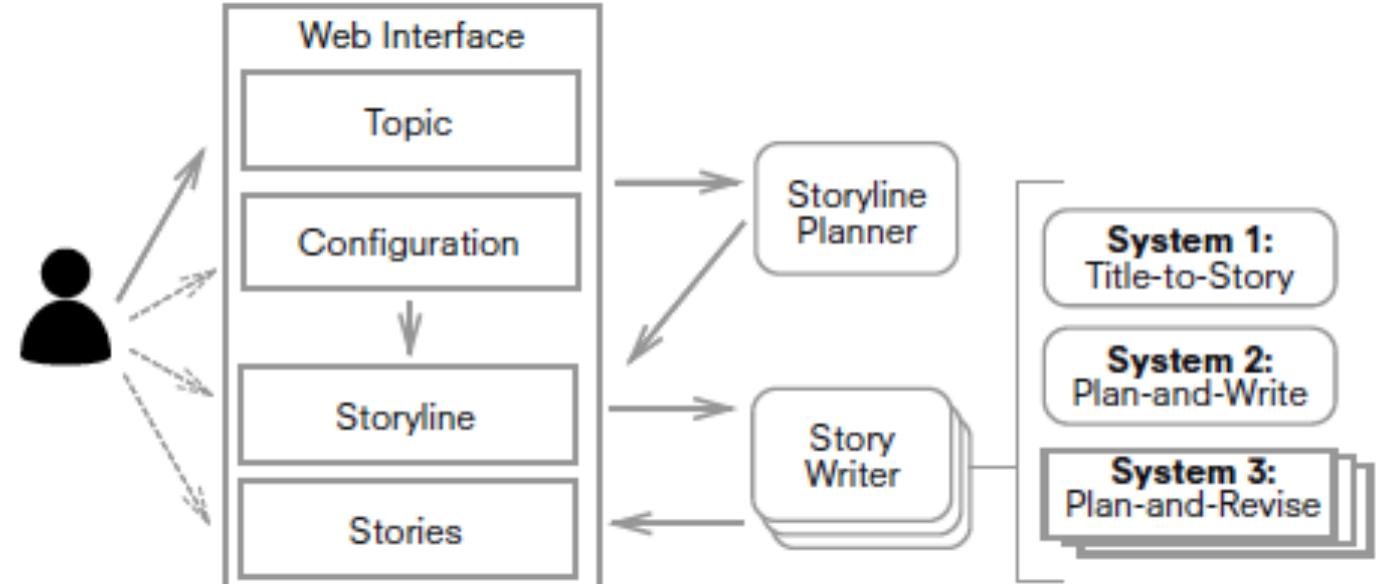


Model

Li, Juntao, et al., AAAI, 2019

Plan Write and Revise

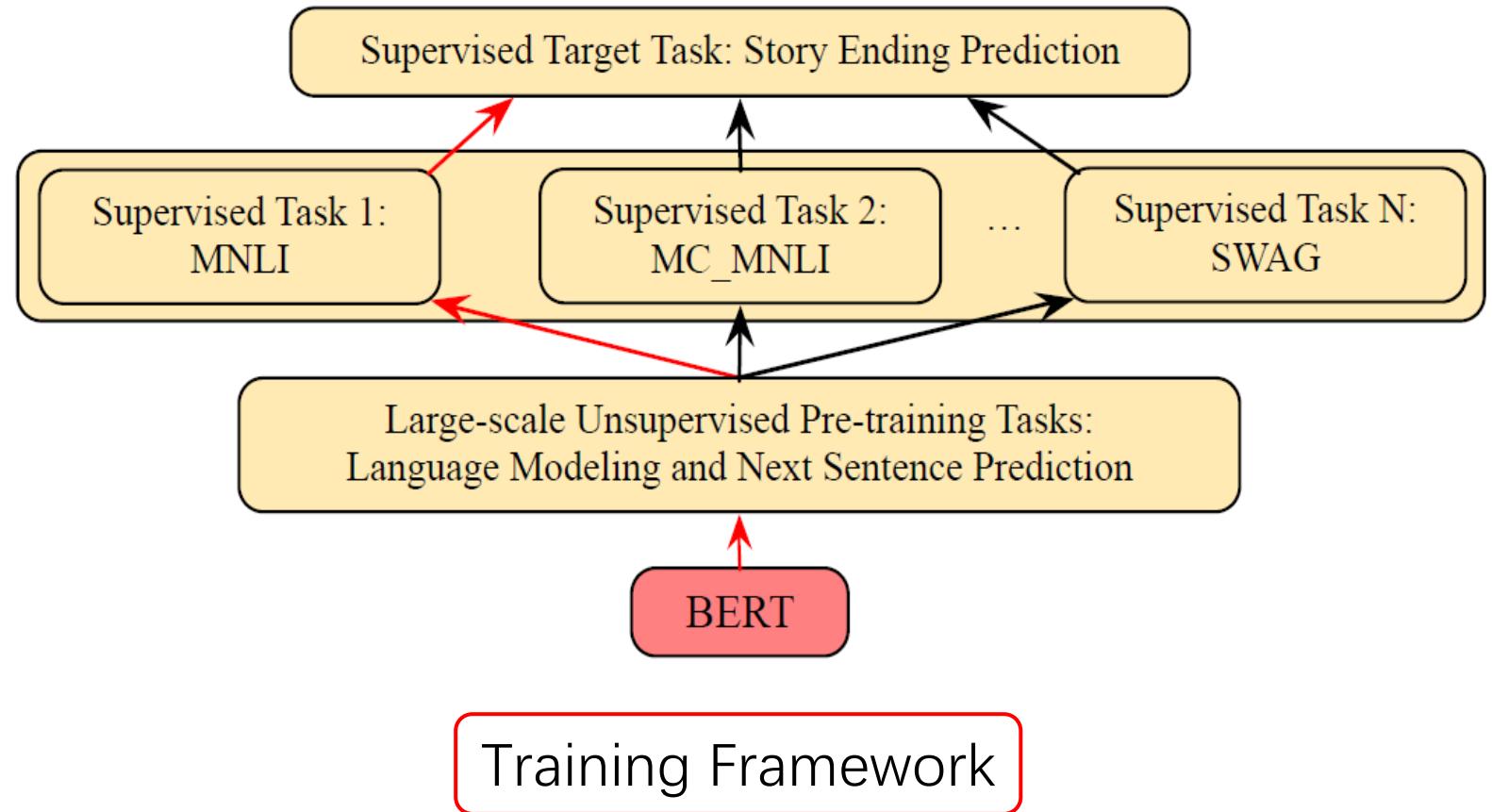
- System Combination
- Cross-Model Mode
- Intra-Model Mode
- Story Writer
 - Title-to-Story
 - Plan-and-Write
 - Plan-and-Revise



Goldfarb-Tarrant, Seraphina et al., NAACL-HLT, 2019

BERT Augmented Story Ending Prediction

- Unsupervised Pre-Training
- Supervised Pre-Training
- Supervised Fine-Tuning



Li, Zhongyang et al., IJCAI, 2019

References

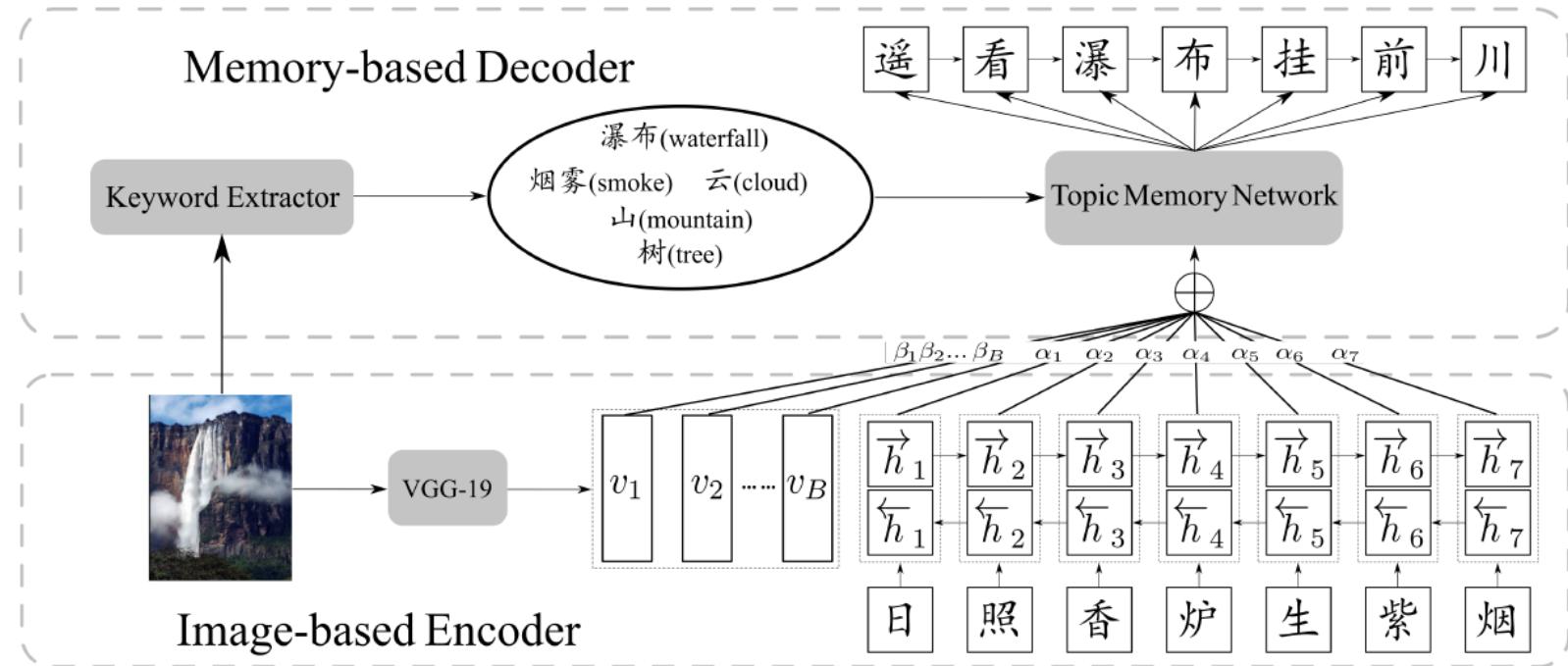
- Jain, Parag, et al. "Story Generation from Sequence of Independent Short Descriptions." 2017.
- Martin, Lara J., et al. "Event representations for automated story generation with deep neural nets. " AAAI, 2018.
- Fan, Angela, Mike Lewis, and Yann Dauphin. "Hierarchical Neural Story Generation." ACL, 2018.
- Wang, Su, et al. "Picking Apart Story Salads. " EMNLP, 2018.
- Peng, Nanyun, et al. "Towards controllable story generation." Workshop, 2018.
- Xu, Jingjing, et al. "A Skeleton-Based Model for Promoting Coherence Among Sentences in Narrative Story Generation." EMNLP, 2018.
- Angela, Fan et al. "Strategies for Structuring Story Generation" , ACL, 2019.
- Goldfarb-Tarrant12, Seraphina, Haining Feng, and Nanyun Peng. "Plan, Write, and Revise: an Interactive System for Open-Domain Story Generation." NAACL-HLT, 2019.
- Luo, Fuli, et al. "Learning to Control the Fine-grained Sentiment for Story Ending Generation." ACL, 2019.
- Li, Zhongyang, Xiao Ding, and Ting Liu. "Story Ending Prediction by Transferable BERT." IJCAI, 2019.
- Li, Juntao, et al. "Learning to Write Stories with Thematic Consistency and Wording Novelty." AAAI, 2019.
- Yao, Lili, et al. "Plan-and-write: Towards better automatic storytelling." AAAI, 2019.
- Guan, Jian, Yansen Wang, and Minlie Huang. "Story ending generation with incremental encoding and commonsense knowledge." AAAI, 2019.

Roadmap

- Introduction
- Background Knowledge
- Existing Methods
 - Poetry Generation
 - Story Generation
 - Multi-Modal Generation
 - Other Genres
- Recent Trends and Conclusion
- Q&A

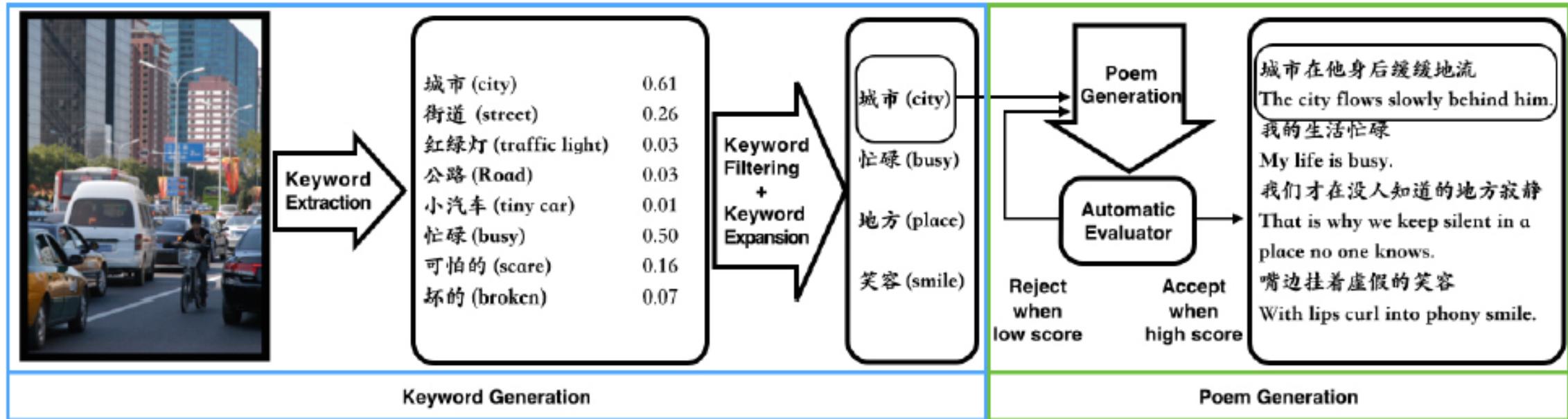
Image Inspired Poetry Generation

- Image-Based Encoder
CNN
Bidirectional RNN
- Memory-Based Decoder
Keyword Extractor
Vector Representations



Xu, Linli, et al., AAAI, 2018

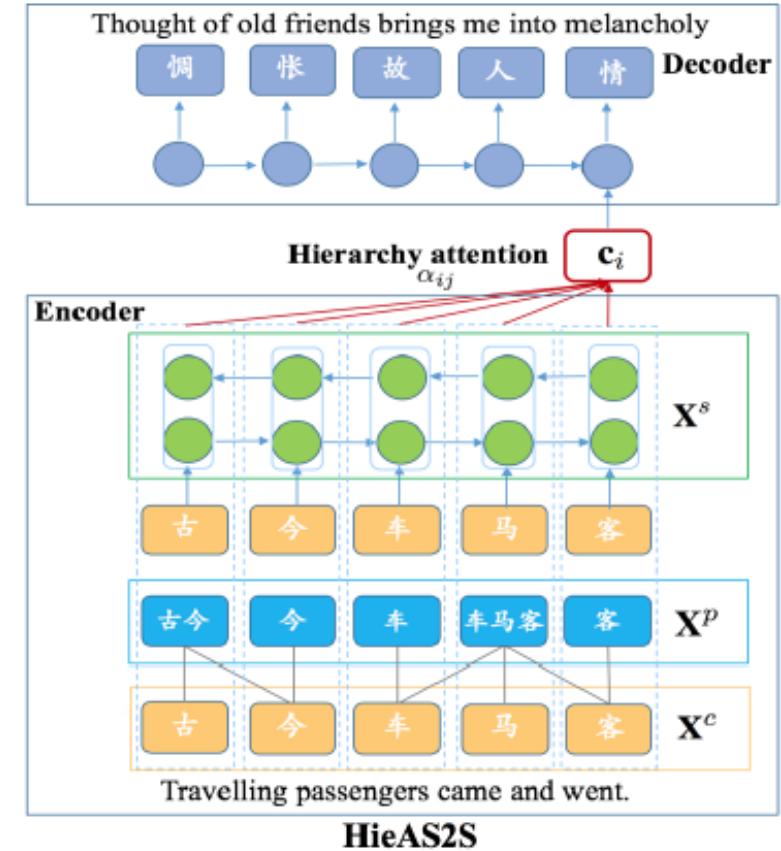
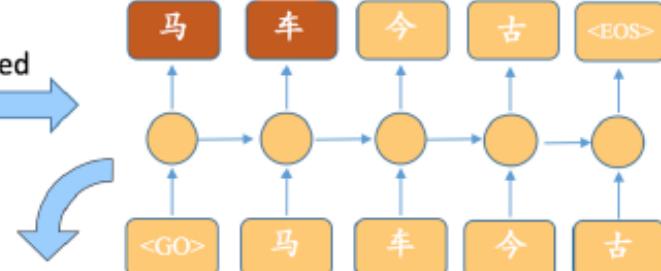
Visual Poetry Generation of Xiaoice



Framework

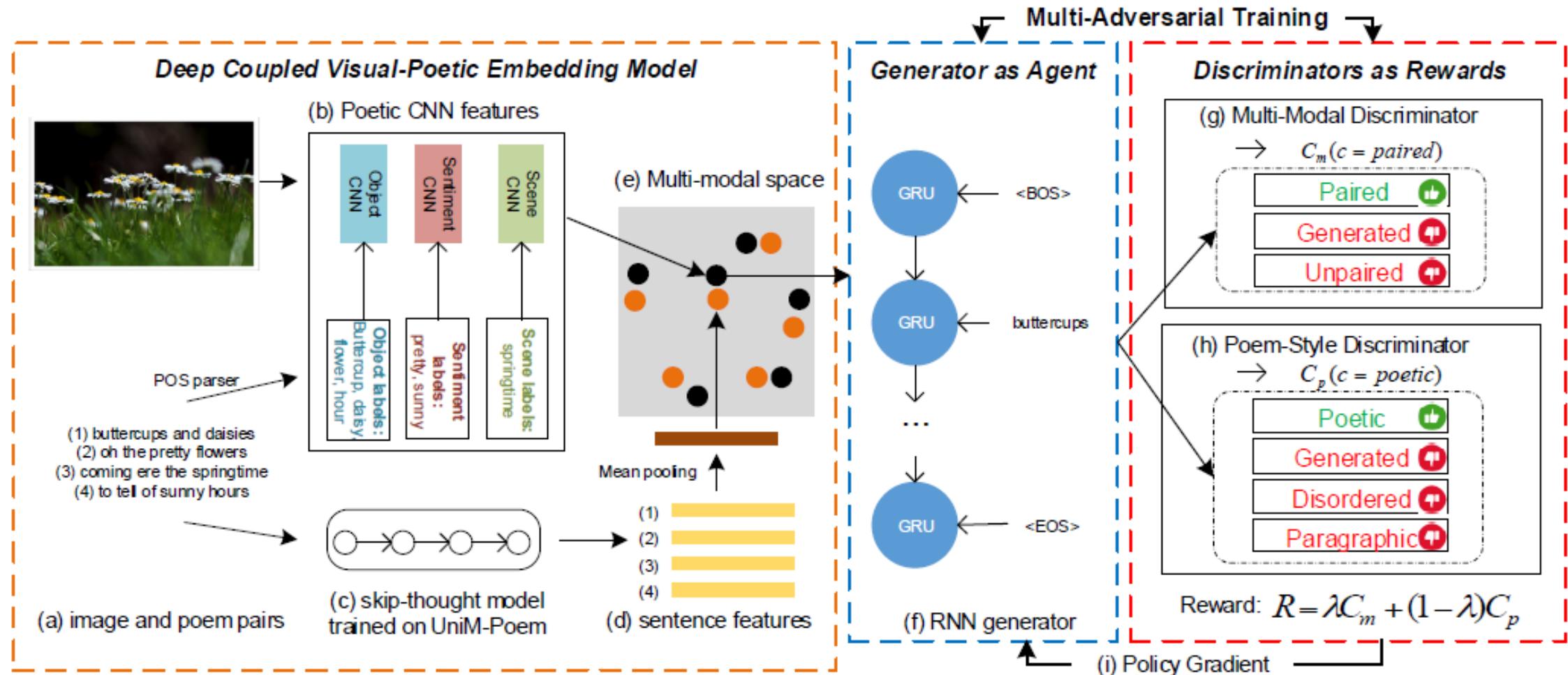
Cheng, Wen-Feng, et al., arXiv:1808.03090, 2018

Multi-Modal Poetry Generation



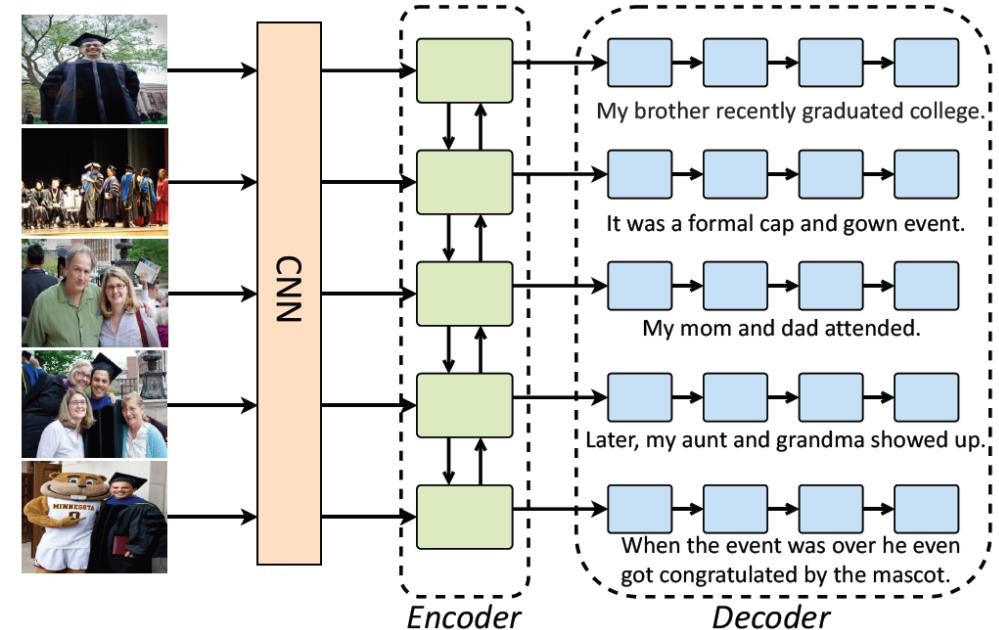
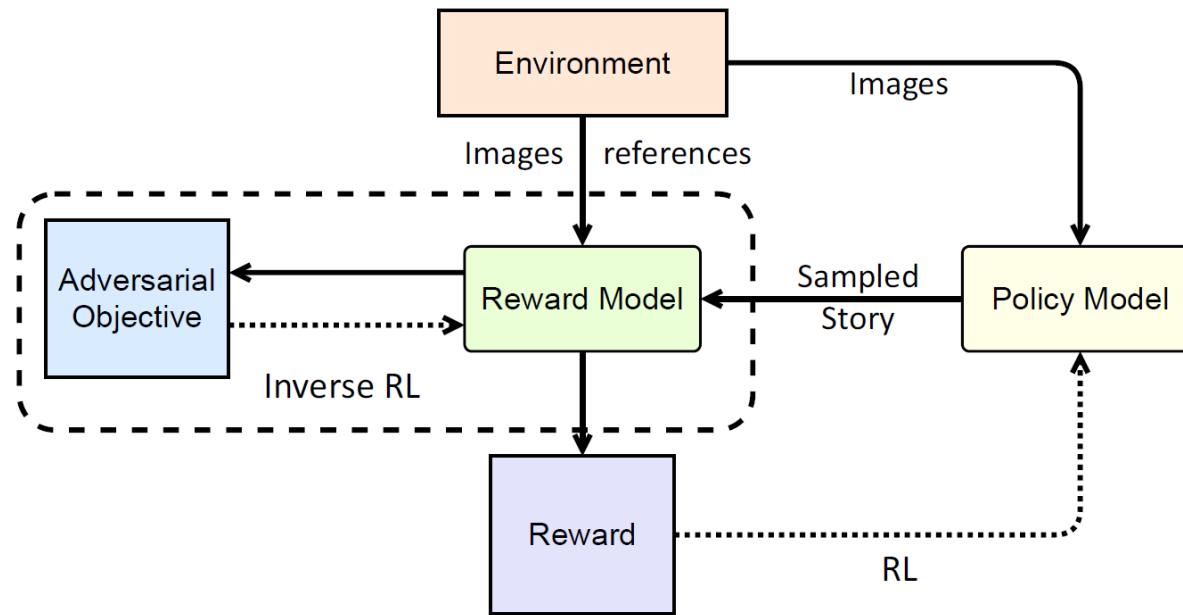
Liu, Dayiheng, et al., IJCNN, 2018

Multi-Adversarial Training



Liu, Bei, et al., ACM, MM, 2018

Inverse Reinforcement Learning

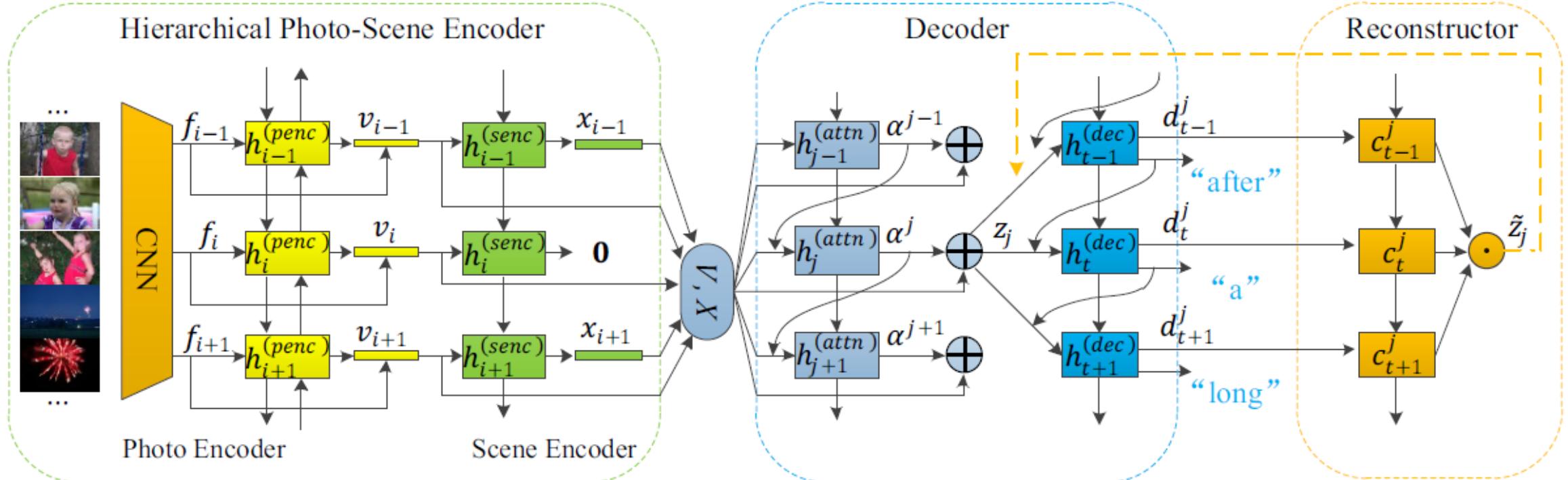


Overall Framework

Policy Model

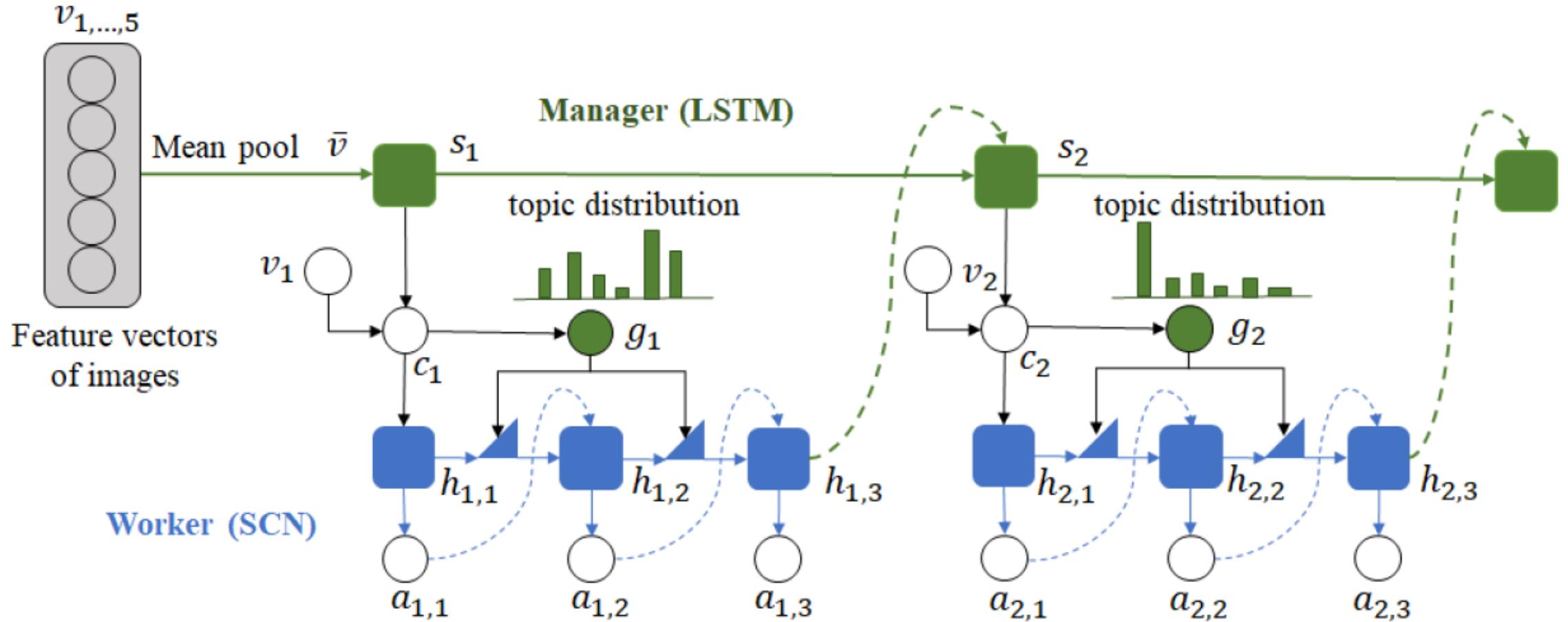
Wang, Xin, et al., ACL, 2018

Hierarchical Photo-Scene Encoder



Wang, Bairui, et al., AAAI, 2019

Hierarchically Structured Reinforcement Learning



References

- Huang, Ting-Hao Kenneth, et al. "Visual storytelling." ACL, 2016.
- Chen, Zhiqian, et al. "Multimodal storytelling via generative adversarial imitation learning." AAAI, 2017.
- Liu, Dayiheng, et al. "A multi-modal Chinese poetry generation model. " IJCNN, 2018.
- Xu, Linli, et al. "How images inspire poems: Generating classical chinese poetry from images with memory networks." AAAI, 2018.
- Wang, Xin, et al. "No Metrics Are Perfect: Adversarial Reward Learning for Visual Storytelling." ACL, 2018.
- Cheng, Wen-Feng, et al. "Image inspired poetry generation in xiaoice." arXiv:1808.03090, 2018.
- Liu, Bei, et al. "Beyond narrative description: Generating poetry from images by multi-adversarial training." ACM, MM, 2018.
- Wang, Bairui, et al. "Hierarchical Photo-Scene Encoder for Album Storytelling." AAAI, 2019.
- Huang, Qiuyuan, et al. "Hierarchically structured reinforcement learning for topically coherent visual story generation." AAAI, 2019.
- Ting-Yao Hsu et al. "Visual Story Post-Editing." ACL, 2019.

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Overview

Tasks	Main Techniques
Rap Lyric Generation [Potash Peter et al.,15]	LSTM + Explicit Templates
Rap Lyric Generation [Malmi Eric et al., 16]	Information Retrieval Task
Chinese Song Iambics Generation [Wang et al.,16]	Attention-Based Seq2seq
Chinese Couplet Generation [Yan Rui et al., 16]	Seq2seq + Attention + Polishing
Rhythmic Verse Generation [Hopkins Jack, 17]	Multi-LSTM LM + Finite State Transducers
Theme-Aware Lyrics Generation [Wang Jie, 19]	Multi-Channel Seq2seq + LDA

References

- Watanabe, Kento, et al. "Modeling structural topic transitions for automatic lyrics generation." ACL, 2014.
- Oliveira, Hugo Gonçalo. "Tra-la-lyrics 2.0: Automatic generation of song lyrics on a semantic domain." Journal of Artificial General Intelligence, 2015.
- Potash, Peter, Alexey Romanov, and Anna Rumshisky. "Ghostwriter: Using an lstm for automatic rap lyric generation." ACL, 2015.
- Wang, Qixin, et al. "Chinese song iambics generation with neural attention-based model." IJCAI, 2016.
- Yan, Rui, et al. "Chinese couplet generation with neural network structures." ACL, 2016.
- Malmi, Eric, et al. "Dopelearning: A computational approach to rap lyrics generation." ACM SIGKDD, 2016.
- Singh, Divya, Margareta Ackerman, and Rafael Pérez y Pérez. "A Ballad of the Mexicas: Automated Lyrical Narrative Writing." ICCC, 2017.
- Hopkins, Jack, and Douwe Kiela. "Automatically generating rhythmic verse with neural networks." ACL, 2017.
- Wang, Jie, and Xinyan Zhao. "Theme-aware generation model for chinese lyrics." arXiv:1906.02134, 2019.

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Recent Trends

- Learning Method
 - Reinforcement Learning
 - Inverse Reinforcement Learning
 - Mutual Learning
 - Imitation Learning
- Fine-Grained Controlling
 - Sentiment
 - Ending
 - Forms
- Pre-Training Method
 - GPT
 - BERT
 - XLNet

Recent Trends

- Better Evaluation Metrics
- Commonsense and Knowledge
- Reasoning
- New Forms of Artistic Text
- Explainability

Conclusion

- Poetry Generation
- Story Generation
- Multi-Modal Generation
 - Image-Inspired Poetry Generation
 - Visual Storytelling
- Other Genres

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Thank you!