

i, Poet:

Automatic Poetry Composition through Recurrent Neural Networks with Iterative Polishing Schema

Rui Yan Baidu NLP yanrui02@baidu.com



Poetry



- Why important?
 - Long cultural heritage
 - Attractive popularity nowadays
 - Personal emotion, political view, or communicative messages

Why challenging?

- Unlike free language
 - Aestheticism, conciseness, etc.
- Constraints
 - Structural, semantic, or even phonological requirements
 - Rigid formats, fixed length, coherence



Motivation



Why A.I. for poetry

- It is convenient for computers to sort out appropriate terms and combinations
- Computers can recognize, learn and even remember patterns

Motivation

- A tool aids people to master proficiency in poem writing
 - I, a poet: everyone could be a poet
 - Augmenting human expertise/experience in poetry composition
- In the long run, computers will write/create for us!



Innovations



- Neural networks (who wouldn't?)
 - Recurrent neural networks
 - Sequential language modeling
- Multi-pass generation
 - Single-pass generation
 - Polishing
- Hierarchical generation
 - Line (sentence)-level
 - Character-level within a line



Problem Formulation





- Keywords as writing intents
- A keyword consists one or more characters

Outputs

- Poems: m lines, n characters per line
- E.g. 五言/七言, 律诗/绝句



System Framework



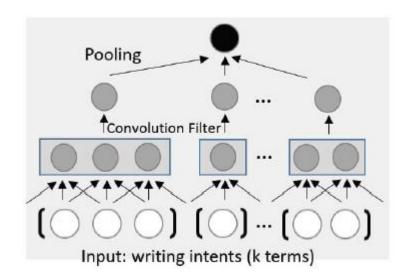
- Encoding-decoding fashion:
 - From "intents" to "poems"
- Intention representation
 - CNN/RNN
- Sequential generation
 - RNN for global information across "lines"
 - Another RNN for local information within lines
- Iterative polishing
 - One-pass generation
 - Multi-pass generation
 - · Previous draft will be utilized as additional information

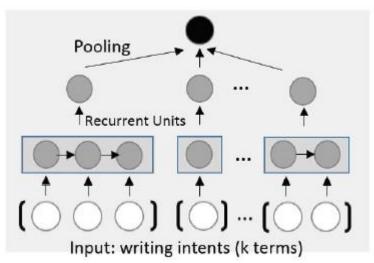


Intent Representation



- Word embedding
- Convolution neural networks
- Recurrent neural networks

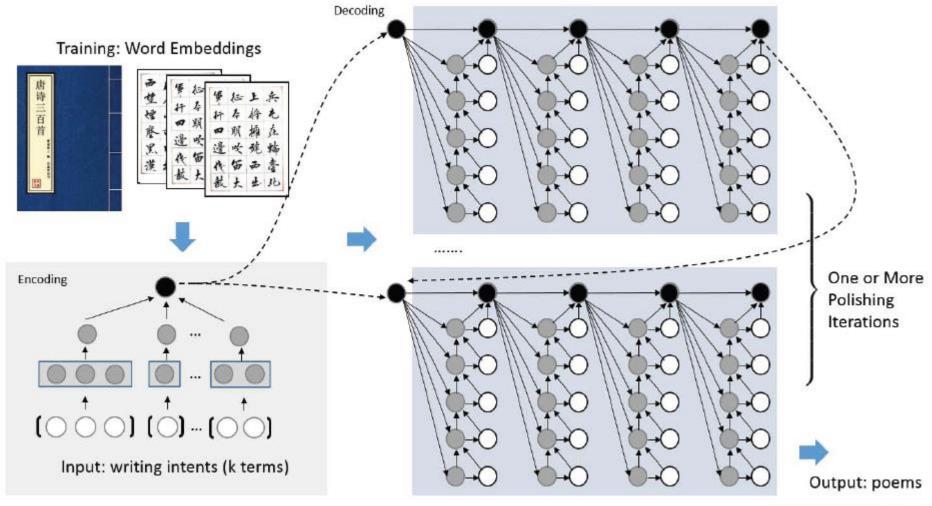






Sequential Generation





- Global/Local level RNN
- Stopping criteria



Experiments



Datasets

- Poems of Tang Dynasty
- Poems of Song Dynasty
- Title as intents

	#Poem	#Line	#Character
PTD	42,974	463,825	10,205
PSD	18,986	268,341	6,996

Experimental setups

- 128-dimensional word embedding
- Convolution filter width as 3
- 2000 validation, 1000 testing, others training



Evaluation





- Perplexity
- BLEU score
- Human evaluation (0 No, 1 Yes)
 - Fluency
 - Poeticness
 - Coherence
 - Meaning

Fluency	Is the poem grammatically & syntactically formed?
Poeticness	Does the text display the features of a poem?
Coherence	Is the poem thematically coherent across lines?
Meaning	Does the poem convey meaningful information?



Baselines



- Random
- SMT: Statistical Machine Translation
- SUM: constrained generative summarization
- RNNPG: RNN-based poem generator
- LSTM-RNN
- iPoet



Performance



Results against baselines

Algo.	5-Character			7-Character		
	PPL	BLEU	Human	PPL	BLEU	Human
Random	_	0.002	0.259	_	0.051	0.135
SMT	126	0.051	1.943	134	0.144	1.957
SUM	149	0.035	2.219	131	0.128	2.013
RNNPG	103	0.053	1.964	119	0.163	2.205
LSTM-RNN	123	0.048	1.762	136	0.159	1.633
iPoet	91	0.088	2.352	96	0.185	2.568

Components

Algo.	5-Character		7-Character	
Aigo.	PPL	BLEU	PPL	BLEU
CNN for Intents	95	0.085	103	0.181
RNN for Intents	91	0.088	96	0.185
No Polishing/Hierarchy	121	0.045	132	0.142
No Polishing	105	0.064	116	0.168
No Hierarchy	114	0.049	123	0.161
iPoet	91	0.088	96	0.185



Conclusions



- Contributions
 - Encoding-decoding: sequential language modeling
 - Polishing schema with multi-pass generation
 - Hierarchical structure for lines/characters
- Q & A
 - http://www.ruiyan.me
- Thank you

