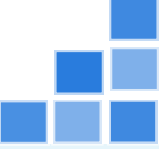


Yearly report(2015-01~12)

Tianyi Luo, Tsinghua University

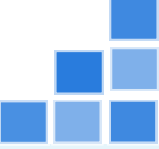




Work done in last year

Research:

- A long oral paper(9 pages) accepted by EMNLP 2015(**CCF B**) as the first author(**5/30/2015**)
- Submit one short paper(4 pages) to EMNLP 2015 as the second author (**6/15/2015**)
- Submit one paper(6 pages) to AAAI 2016 as the equal contribution author (**9/15/2015**)

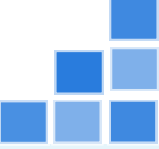


A long oral paper(9 pages) accepted by EMNLP

- <<Stochastic Top-k ListNet>>
 - ListNet is a well-known **listwise learning to rank** model.
 - In this paper, we propose a stochastic **sample** method that significantly reduces the training complexity and better ranking performance.

Model	Top-k	Sampling	Time (s)	P@1			P@10		
				Train	Val.	Test	Train	Val.	Test
C-ListNet	k=1	-	2.509	0.4101	0.4107	0.4119	0.2684	0.2684	0.2676
S-ListNet	k=1	UDS	0.753	0.4097	0.4106	0.4120	0.2680	0.2683	0.2676
S-ListNet	k=1	FDS	0.391	0.4094	0.4090	0.4127	0.2679	0.2681	0.2676
S-ListNet	k=1	ADS	0.375	0.4102	0.4097	0.4121	0.2680	0.2682	0.2677
C-ListNet	k=2	-	2275.5	0.4119	0.4043	0.4043	0.2678	0.2674	0.2674
S-ListNet	k=2	UDS	2.898	0.4140	0.4143	0.4130	0.2682	0.2686	0.2681
S-ListNet	k=2	FDS	2.410	0.4145	0.4144	0.4164	0.2684	0.2688	0.2684
S-ListNet	k=2	ADS	2.013	0.4162	0.4168	0.4145	0.2686	0.2689	0.2687
S-ListNet	k=3	UDS	4.358	0.4167	0.4204	0.4152	0.2686	0.2681	0.2680
S-ListNet	k=3	FDS	3.997	0.4137	0.4205	0.4131	0.2687	0.2695	0.2685
S-ListNet	k=3	ADS	3.483	0.4184	0.4196	0.4177	0.2692	0.2697	0.2689
S-ListNet	k=4	UDS	6.161	0.4145	0.4226	0.4104	0.2686	0.2694	0.2687
S-ListNet	k=4	FDS	5.773	0.4145	0.4232	0.4150	0.2690	0.2695	0.2686
S-ListNet	k=4	ADS	4.358	0.4149	0.4247	0.4164	0.2692	0.2700	0.2689

Table 1: Averaged training time (in seconds), P@1 and P@10 on training, validation (Val.) and test data with different Top-k methods. ‘C-ListNet’ stands for conventional ListNet, ‘S-ListNet’ stands for stochastic ListNet.



A long oral paper(9 pages) accepted by EMNLP

- <<Stochastic Top-k ListNet>>
 - Accepted by EMNLP 2015 (Acceptance rate: 312/1315=24%).
 - Paper: <http://www.aclweb.org/anthology/D/D15/D15-1079.pdf>
 - Code: <https://github.com/pkuluotianyi/topKStoListNet>

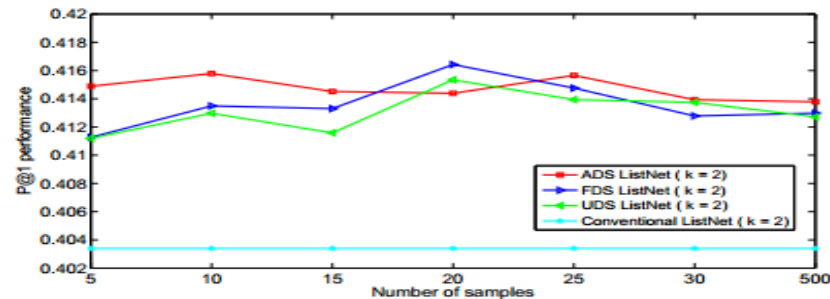
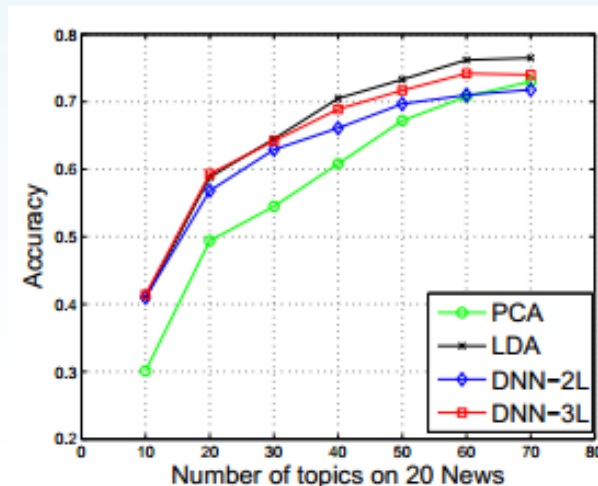


Figure 2: The P@1 performance on the test data with the Top-2 ListNet utilizing the three sampling approaches. The size of the permutation subset varies from 5 to 500.



Submit one short paper(4 pages) to EMNLP 2015

- <<Learning from LDA using Deep Neural Networks>>
 - **Motivated** by the transfer learning approach(**Dark knowledge**) proposed by Hinton et al. (2015), we present a novel method that **uses LDA to supervise the training of a deep neural network (DNN)**.





Submit one short paper(4 pages) to EMNLP 2015

- <<Learning from LDA using Deep Neural Networks>>
 - Our experiments on a document classification task show that a **simple DNN can learn the LDA behavior pretty well**, while the inference is **speeded up tens or hundreds of times**.

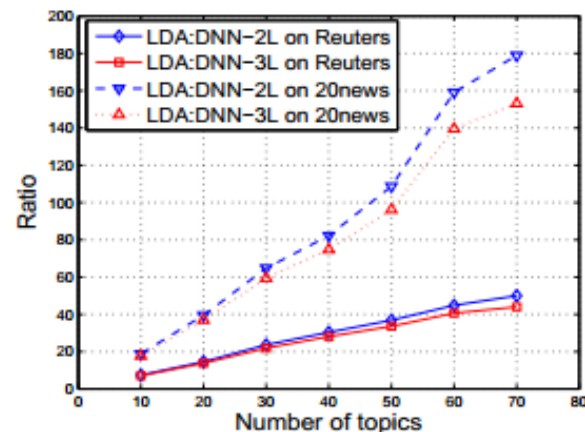
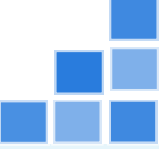


Figure 3: The ratio of inference time of LDA to DNN.



Submit one short paper(4 pages) to EMNLP 2015

- <<Learning from LDA using Deep Neural Networks>>
 - **Topic discovery by transfer learning.**
 - Paper: <http://arxiv.org/pdf/1508.01011.pdf>
 - Code: <http://pan.baidu.com/s/1i3Ek35b>

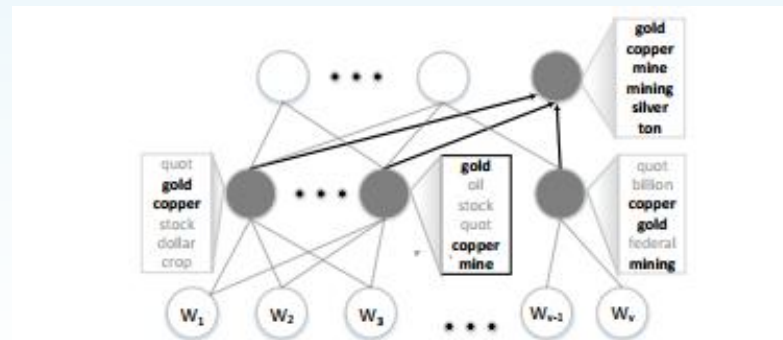
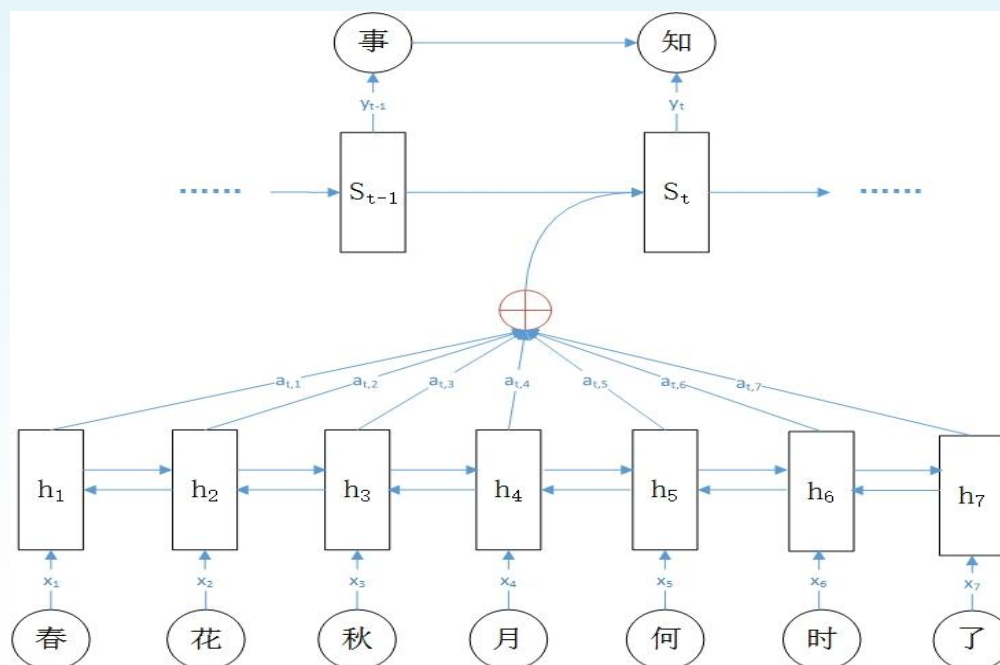


Figure 4: Discovery for the topic ‘mining’ with DNN. The words in dark are topic related words.

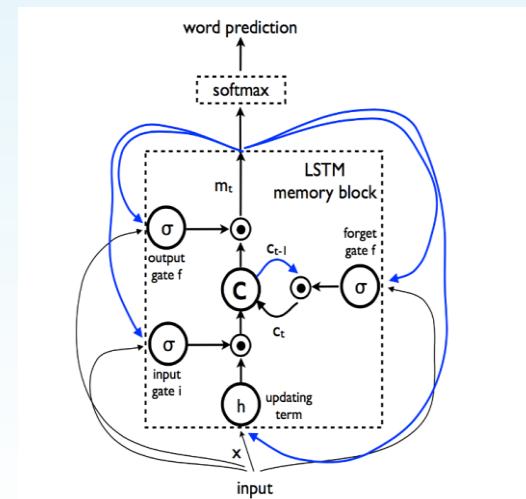
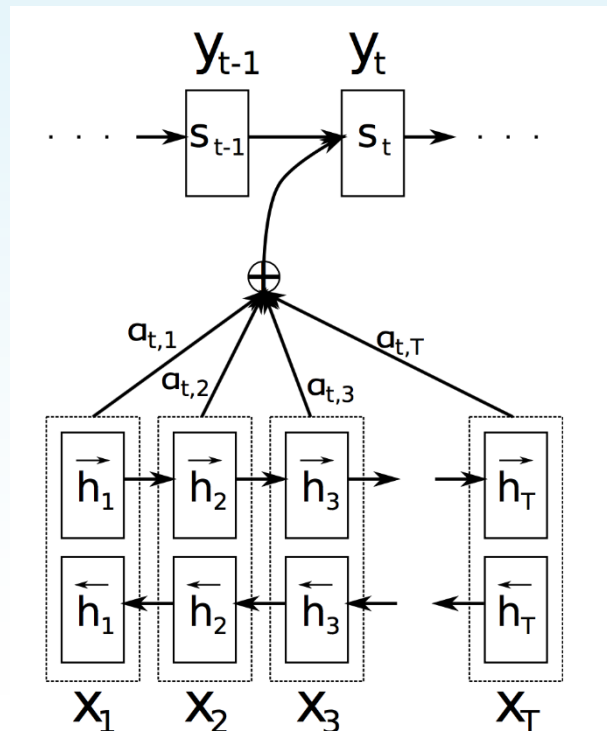
Submit one paper(6 pages) to AAAI 2016

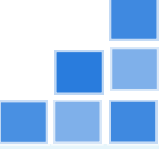
- <<Chinese Song Iambics Generation with Neural Attention-based Model>>



Submit one paper(6 pages) to AAAI 2016

- <<Chinese Song Iambics Generation with Neural Attention-based Model>>





Submit one paper(6 pages) to AAAI 2016

- << Chinese Song Iambics Generation with Neural Attention-based Model >>

–Paper:

<http://csit.riit.tsinghua.edu.cn/mediawiki/images/3/34/Songci.pdf>

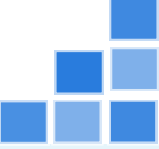
–Code: Will be published.

五言唐诗

北国有佳人，
朝中何处深。
泪出三四秋，
东世事多身。

七言唐诗

君问归期未有期，
今夜月江明似衣。
行到城头时看金，
几方飞马雪花枝。



Submit one paper(6 pages) to AAAI 2016

- <<Chinese Song Iambics Generation with Neural Attention-based Model>>

《蝶恋花 * 梦里江河》

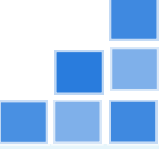
万事都归一梦了，
行尽青山，
江上分来尊。
好语燕时难少事，
点破园林无几许。

多闲愁歌中趣了，
两鬓苍苔，
未免教轻寒。
飞入空谷云音路，
不闻何曾相映景。

《虞美人 * 梦里江河》

芙蓉落尽天涵水，
烟水秋平岸。
绿荷多少夕阳中，
背飞双燕贴云独高楼。

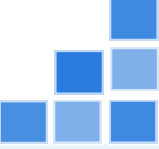
一声长合江南枝，
无人早晚来。
流与量酒重携空，
谁家台畔楚宫门阑干。



Work done in last year

Engineering:

- Integrate the learning to rank module to the whole software and get about 4% improvement in the p@1 evaluation.
- Implement Chinese Automatic Error Correction based on language model.
- Implement Chinese Poem, Songci and Couplet generation
- Implement similar questions identification



Implement the learning to rank module

- Offline learning:
 - p@1 准确率: 61%→65%
 - 训练速度: 最多提升1000倍
 - 论文发表: EMNLP 2015, 一篇long oral论文
- Online learning:
 - 用户可输入QA对进行系统调教→实时增加QA对
 - 用户对排名靠后结果点赞→实时排名提升



Chinese Automatic Error Correction based on Im

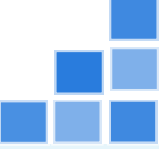
- System design and function:
 - 大语料语言模型（全领域）+小语料语言模型（具体领域）
 - 支持国家领导人名字纠错
 - 支持错别字纠错对手动扩充
- Performance(test set provide by Huilian):
 - 系统标出71处错误（实际错误6处，误报比约9/10）

我进期要申请美国。青华大学。李瑞坏是第十五届中央委员。



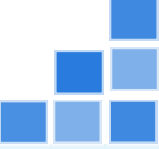
一个需要纠错的文本

纠错结果: **1** 进期 **null 9** 青华大学 **null 16** 坏 环



Implement Poem, Songci and Couplet generation

- **System design and function :**
 - 利用attention RNN（循环神经网络）进行唐诗、宋词和对联的自动生成
- **Samples:**
 - 五言唐诗：北国有佳人（后三句略，请看10页）
 - 七言唐诗：君问归期未有期（后三句略，请看10页）
 - 宋词：虞美人 芙蓉落尽天涵水（后几句略，请看11页）
 - 对联：生意如春天，新行胜旧军
雄心开伟业，妙秋系九州
文坛放异彩，艺生花溢芳



Implement similar questions identification

- **System design and function :**

- 利用RNN（循环神经网络）进行相似问句判别
- 系统用于自动模板扩充和问句相似度判别
- 训练集：300多万QA对

- **Performance:**

- Q:芜湖 的 计算机 软件 水平 考试 在 什么 地方 报名 ?

A:你 可以 到 安徽 师大呀。

相似度为：0.823901910035

- Q:芜湖 的 计算机 软件 水平 考试 在 什么 地方 报名 ?

A:1 . 找到 卖 你 电脑 发 的 磁盘 2 . 把 磁盘 放 进 光 驱 3 . 按照
向导 安装

相似度为：0.759943815081



Summarize

- Research:
 - Paper: 1
 - Technical report: 2
 - Patent: 1 (pending)
- Project:
 - 爱客服 <http://www.aikf.com/>
 - Learning to rank, 唐诗宋词藏头诗, RNN句子相似度判断, 错别字识别等科研成果均已经或即将转化到产品中。

Thank You !

