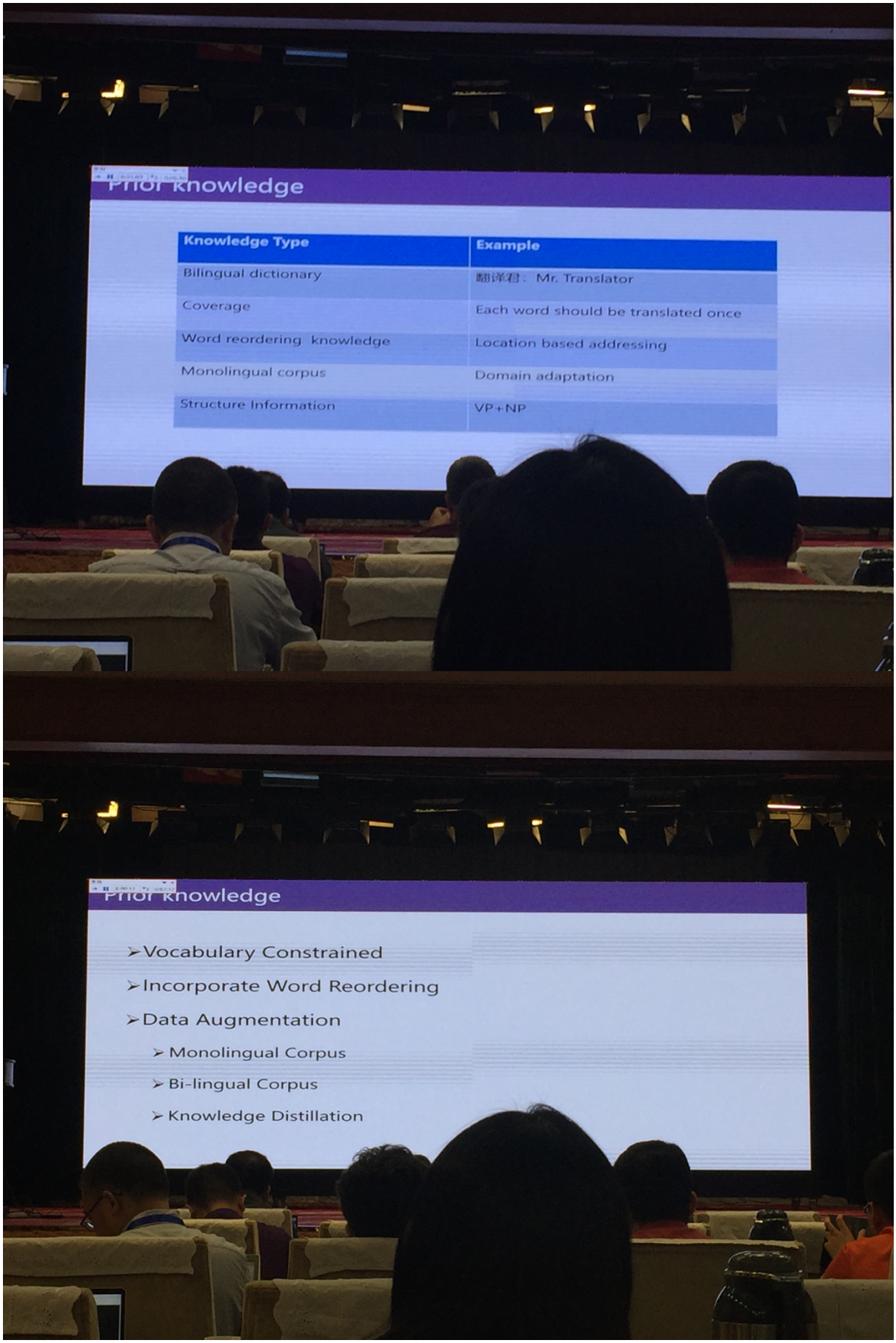
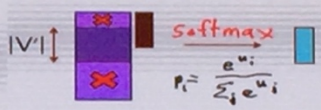

Prior knowledge
Knowledge Type
Example
Bilingual dictionary
翻译君： Mr. Translator
Coverage
Each word should be translated once
Word reordering knowledge
Location based addressing
Monolingual corpus
Domain adaptation
Structure Information
VP+NP
Prior knowledge
Vocabulary Constrained
Incorporate Word Reordering
Data Augmentation
Monolingual Corpus
Bi-lingual Corpus
Knowledge Distillation

Limited Vocabulary

- Sampling limited vocabulary for softmax $|V'| << |V|$
- Hard restrain the generation of the output sequence

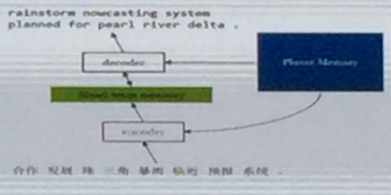


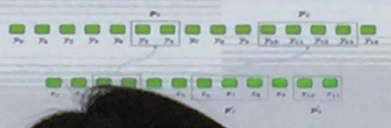
$$p(y_t \mid y_{<t}, x) = \frac{\exp\left\{\mathbf{w}_t^\top \phi\left(y_{t-1}, z_t, c_t\right) + b_t\right\}}{\sum_{k:y_k \in V'} \exp\left\{\mathbf{w}_k^\top \phi\left(y_{t-1}, z_t, c_t\right) + b_k\right\}}.$$

(Jean et al., 2018)

Phrase Memory

- Embed the bilingual dictionary
- Query from the phrase table during each decoding step

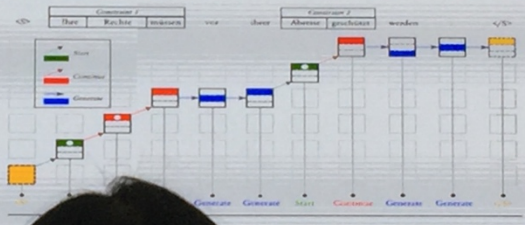




(Tang et al., 2015)

Lexically Constrained Decoding

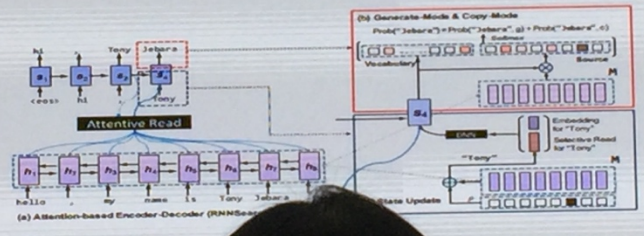
- Allows the specification of subsequences
- Individual constraints may be single tokens or multi-word phrases



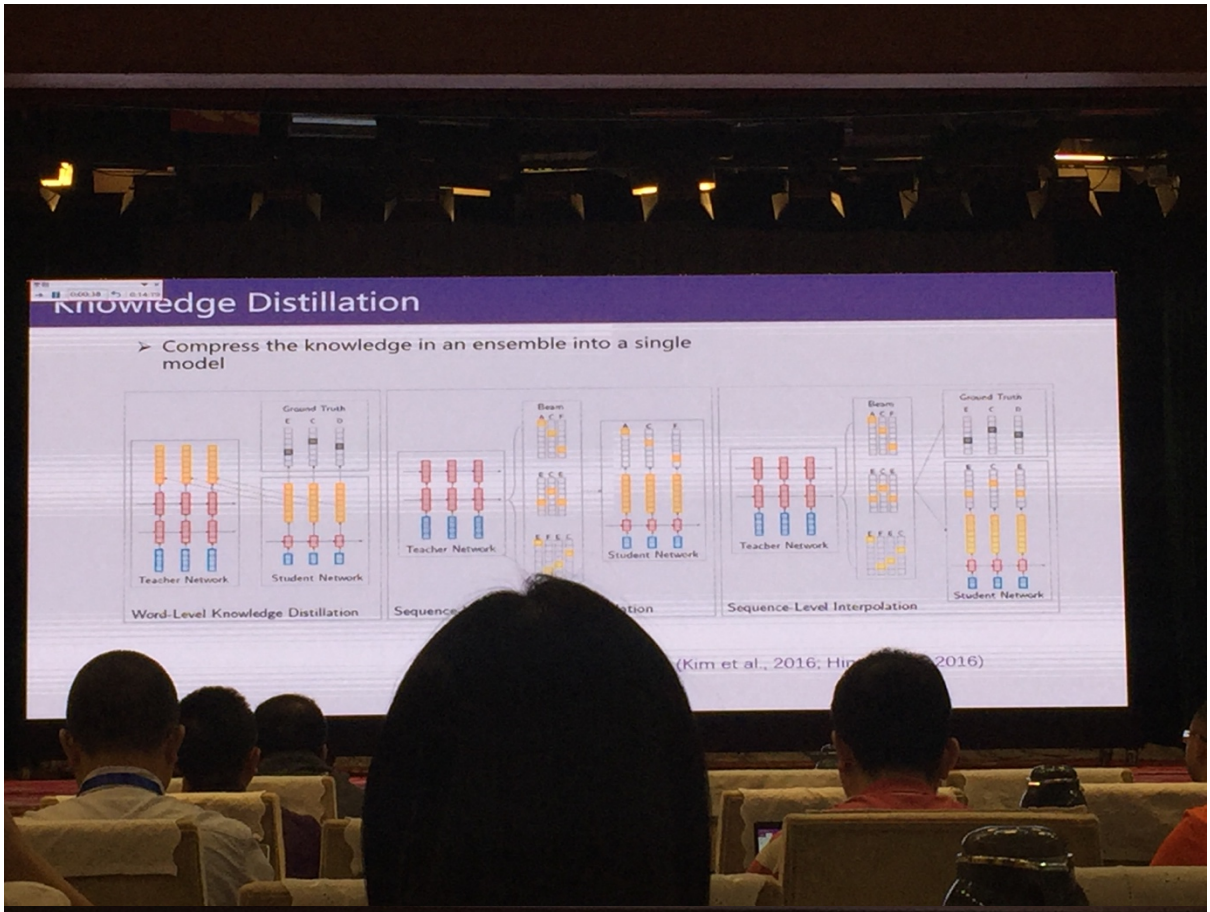
(Chris et al., 2015)

Copy Network

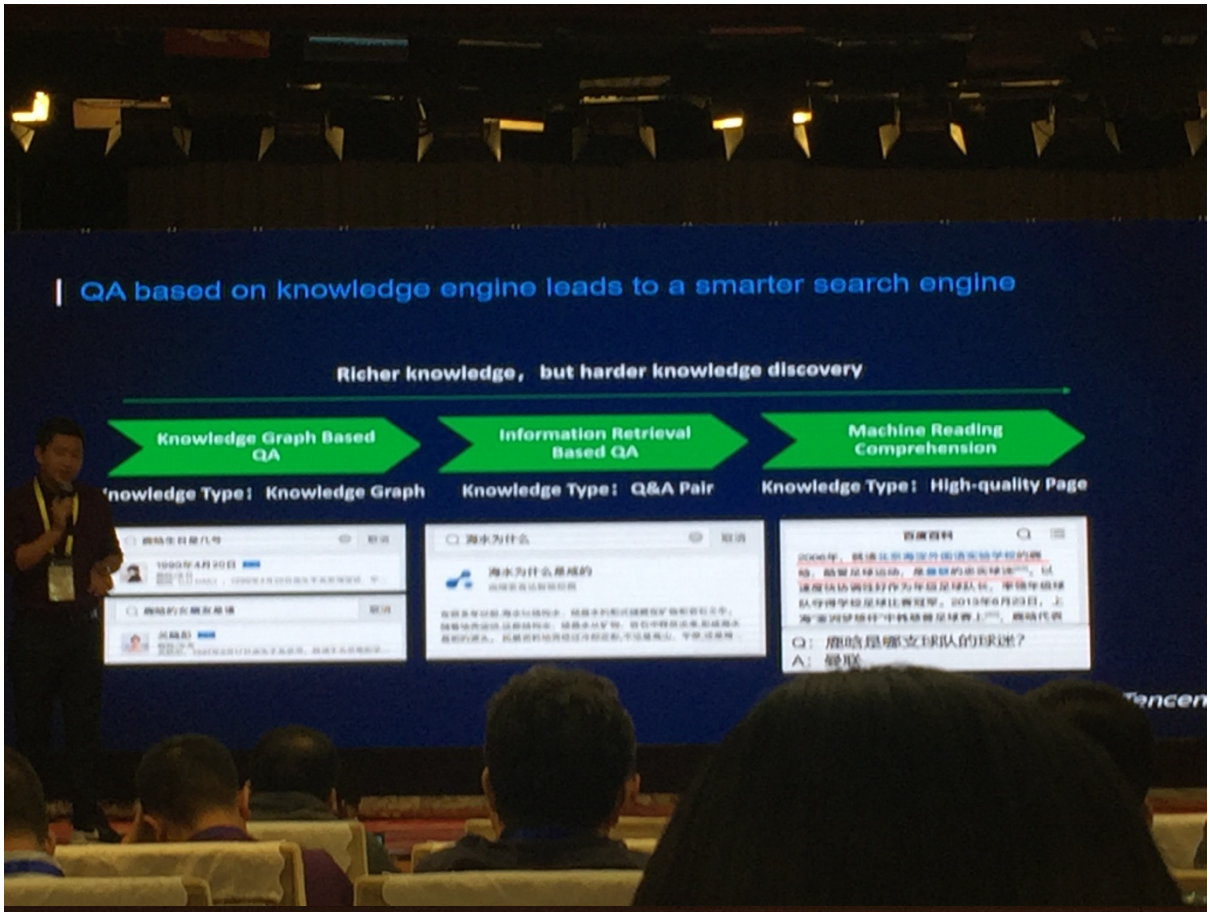
- Use attention as a pointer to select a member of the input sequence as the output

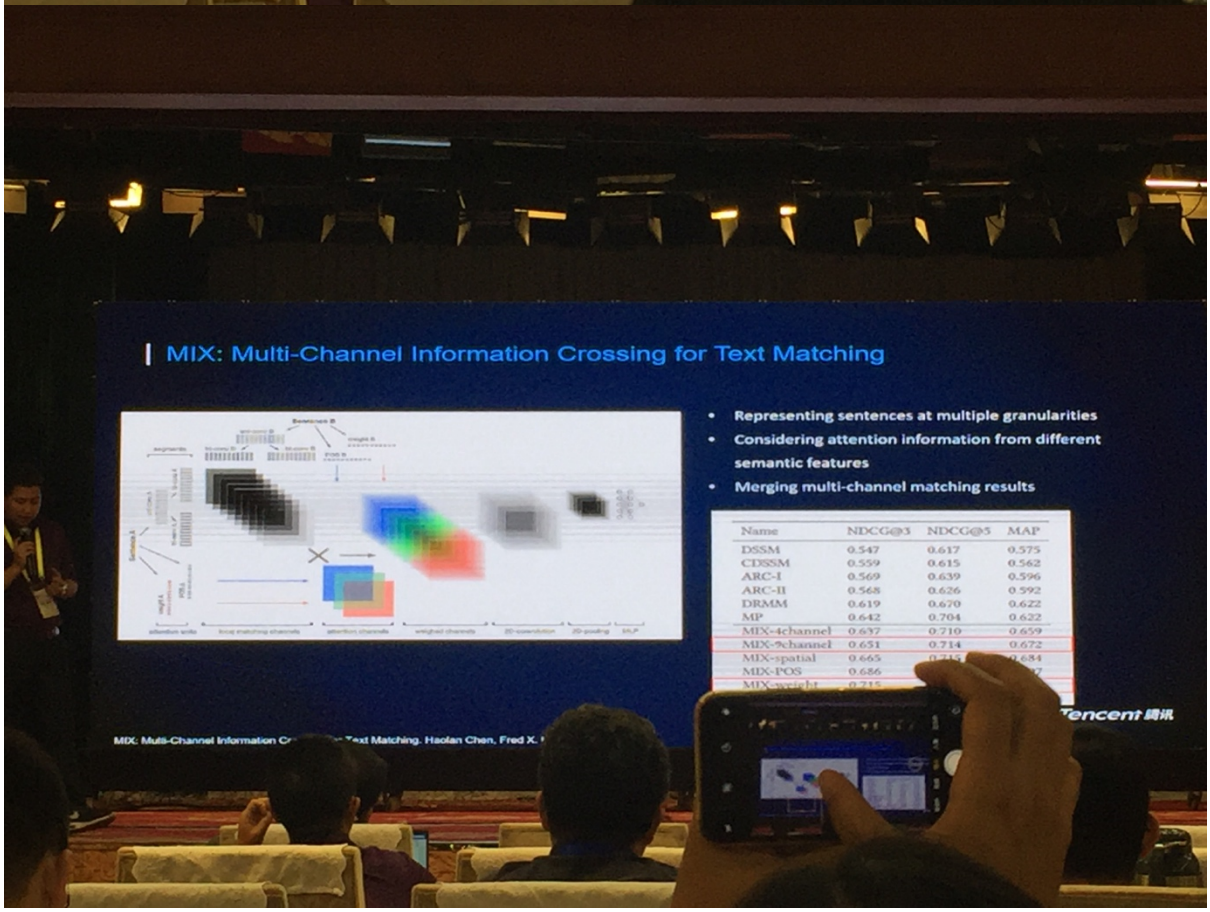


al., 2016)


Knowledge Distillation
Compress the knowledge in an ensemble into a single model
Ground Truth
Beam
Teacher Network
Student Network
Word-Level Knowledge Distillation
Sequence-Level Interpolation
(Kim et al., 2016; Hin 2016)


Knowledge engine leads to better document understanding
User Behavior
User Interest
Recommendation
王宝强离婚案
出轨明星
Type
Value
TAG
离婚案，名誉权，一审宣判
Entity
王宝强(EID:100573)，马蓉(EID:130566)
Category
娱乐
Topic Vec
[2.149060, 0.298554 ..... 1.138769]
Event
王宝强离婚案（ID：61000386）
Concept
出轨明星（30004651），明星离婚（...）
Interested


QA based on knowledge engine leads to a smarter search engine
Richer knowledge， but harder knowledge discovery
Knowledge Graph Based QA
Information Retrieval Based QA
Machine Reading Comprehension
nowledge Type： Knowledge Graph
Knowledge Type： Q&A Pair
Knowledge Type： High-quality Page
Q：鹿晗是哪支球队的球迷？
A：曼联


MIX: Multi-Channel Information Crossing for Text Matching
Representing sentences at multiple granularities
Considering attention information from different semantic features
Merging multi-channel matching results
Name NDCG@3 NDCG@5 MAP
DSSM 0.547 0.617 0.575
CDSSM 0.559 0.615 0.562
ARC-I 0.569 0.639 0.596
ARC-II 0.568 0.626 0.592
DRMM 0.619 0.679 0.622
MP 0.642 0.704 0.622
MIX-4channel 0.637 0.710 0.659
MIX-9channel 0.651 0.714 0.672
MIX-spatial 0.665 0.715 0.684
MIX-POS 0.686
MIX-weight 0.715
MIX: Multi-Channel Information Cr Text Matching. Haolan Chen, Fred X.


Summary
1. Introduction to Tencent Lingo Knowledge Engine
2. Lingo Knowledge Engine: applications in recommendation
• More accurate representation of user interest with knowledge engine
• Better document understanding with knowledge engine
• Explore more user interest with knowledge engine to improve novelty
Lingo Knowledge Engine: applications in information retrieval
• Construct smarter search engines with various QA models (KG-Based, IR-Based, MRC)
• Deep neural semantic matching model: MIX