

Hypernym discovery : Recurrent Mapping Model(2)

RMM 구현 및 실험

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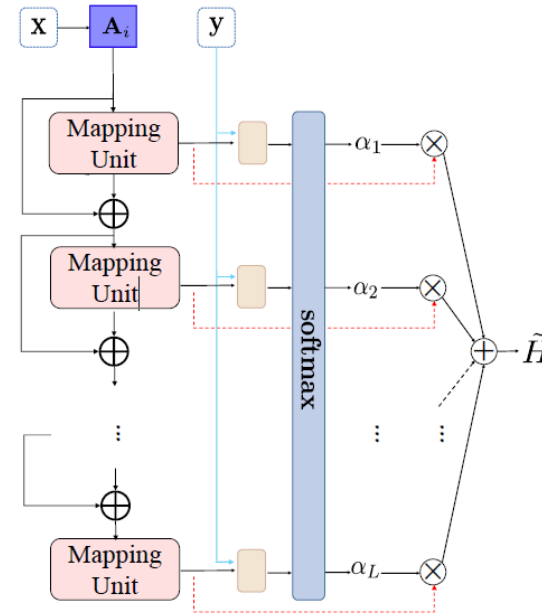
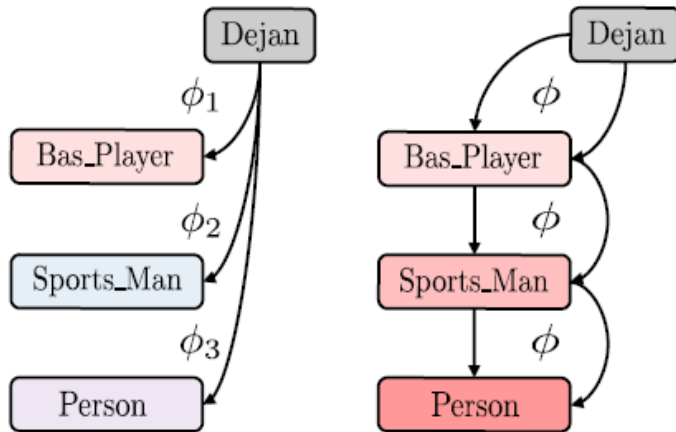


Overview

- **Recurrent Mapping Model – Hypernym discovery**
 - Sample data
 - Loss Function
- **Scene Text**
 - TextFuseNet - FPN
- **S2W lab**
 - SemEval-2018 task9: dataset structure

Recurrent Mapping Models - Hypernym Discovery

- RMM – Recurrent Mapping Models



$$\begin{aligned} \diamond t &= A_i X, t \in \mathbb{R}^{d \times 1}, A \in \mathbb{R}^{d \times d} \\ \diamond \hat{h}_{l+1} &= W_\phi h_l, h_0 = t, W_\phi \in \mathbb{R}^{d \times d} \\ \diamond h_{l+1} &= \hat{h}_{l+1} + h_l \\ \diamond \alpha_l &= \frac{\exp(h_l \cdot y)}{\sum_{k=1}^L \exp(h_k \cdot y)} \\ \diamond \tilde{H} &= \sum_{l=1}^L \alpha_l \cdot h_l \\ \diamond s_y &= \tilde{H} \cdot y \end{aligned}$$

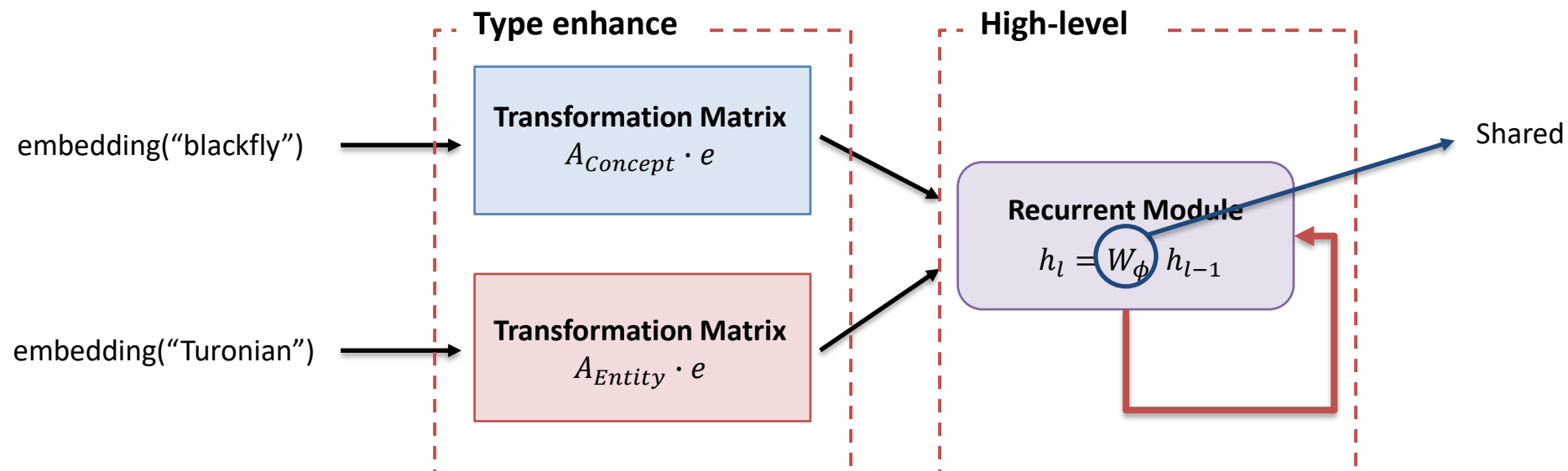
- Assume each 'is-a' relation comes from **different level**.
- Higher-level hypernym transformed from previous-level hypernym.
- X : Embedding of query.
- y : Embedding of hypernym candidate.
- A_i : Transformation matrix ($i=2$, for Concept and Entity).
- Mapping Unit : Mapping terms to higher-level hypernym using projection matrices that share other mapping units.

Recurrent Mapping Models - Hypernym Discovery

- RMM with dataset (SemEval-2018)

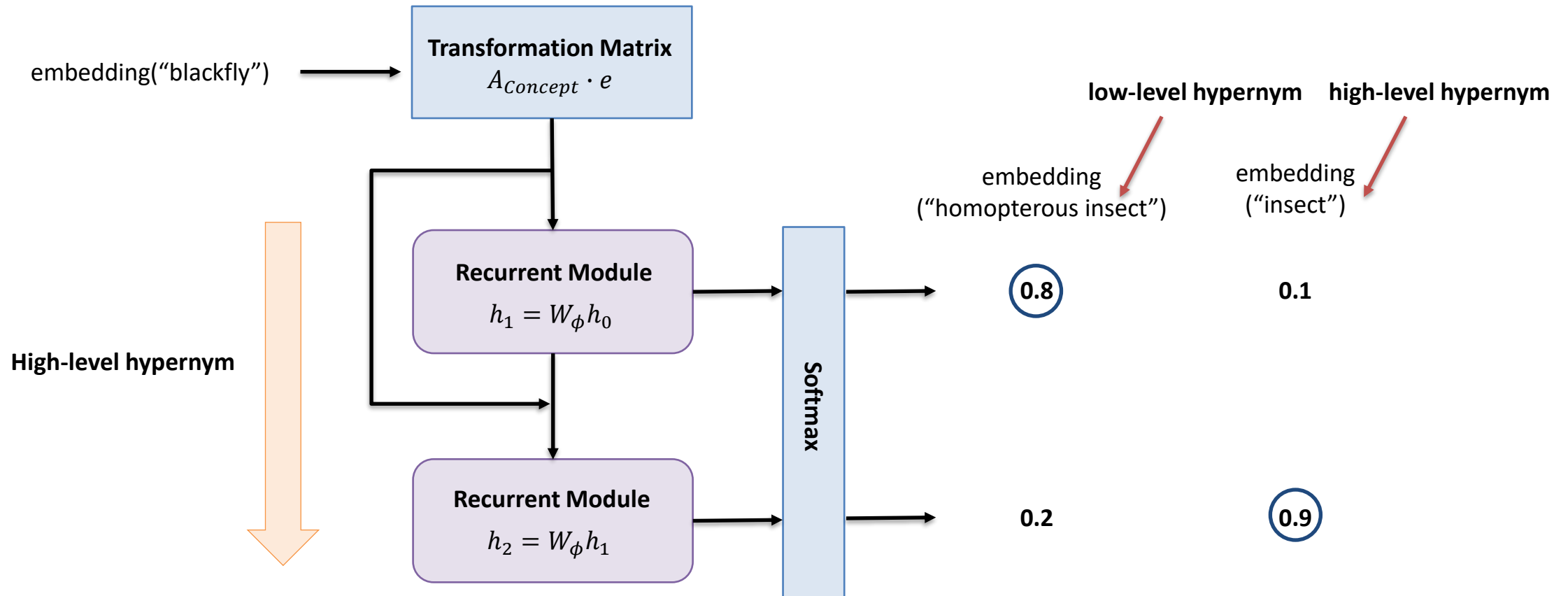
Dataset

Query hyponym(x)		Target hypernym(y)
word	type	
blackfly	Concept	homopterous insect, insect
Turonian	Entity	technical specification, geologic timescale, physical property, geological period, unit of time



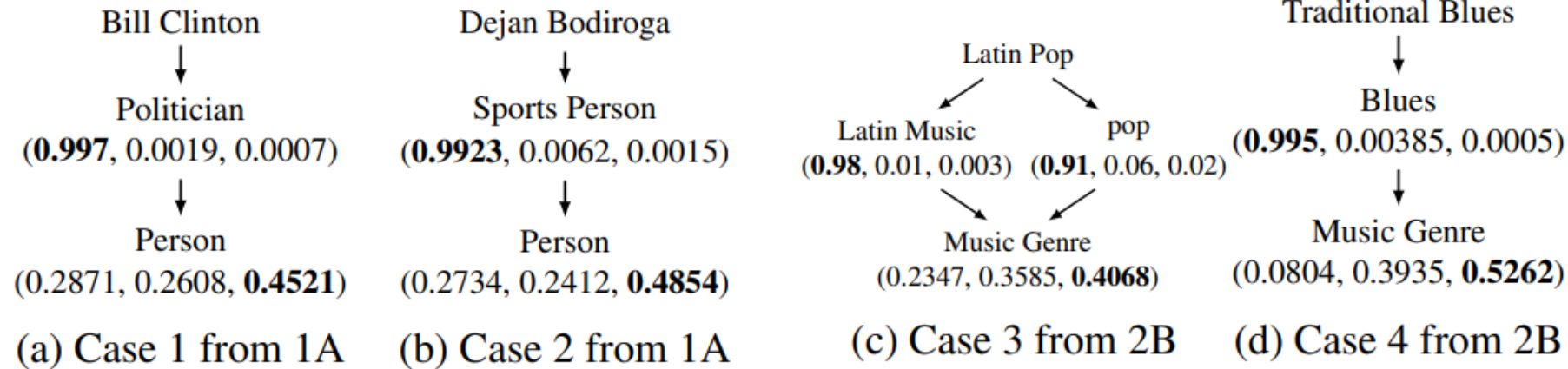
Recurrent Mapping Models - Hypernym Discovery

- RMM with dataset (SemEval-2018)



Recurrent Mapping Models - Hypernym Discovery

- RMM with dataset (SemEval-2018)



- Low-level recurrent mapping module has a larger attention weight for low-level hypernym.
- high-level recurrent mapping module has a larger attention weight for high-level hypernym.

Recurrent Mapping Models - Hypernym Discovery

- Loss Function

$$\diamond \mathcal{L} = - \sum_{x \in \mathcal{X}_{train}} \frac{1}{|Q_x|} \sum_{y \in Q_x} \log \frac{\exp(s_y)}{\sum_{y' \in Q_x \cup C_x} \exp(s_{y'})}$$

- x : hyponym(query), y : hypernym candidates
- Q_x : gold hypernym set of x (positive sample), C_x : negative hyponym set of x

Dataset

Query hyponym(x)		Target hypernym(y)
word	type	
blackfly	Concept	homopterous insect, insect, edit, horse, wait, ...
Turonian	Entity	technical specification, geologic timescale, physical property, geological period, unit of time, city, English, beach, ...

Recurrent Mapping Models - Hypernym Discovery

- Issue
 - Change batch generator to mini-batch x and all **hypernym pair of x**

# batch	before (for CRIM)	change (for RMM)
mini-batch 1	(blackfly , insect), (pollution , uncleanness), (silver , valuable grey)...	(blackfly , insect), (blackfly , homopterous insect), ...
mini-batch 2	(blackfly , homopterous insect), (pollution , dirtying), (silver , base metal)...	(pollution , uncleanness), (pollution , dirtying),
mini-batch 3	...	(silver , base metal), (silver , valuable grey)...

Future

- **Last week**

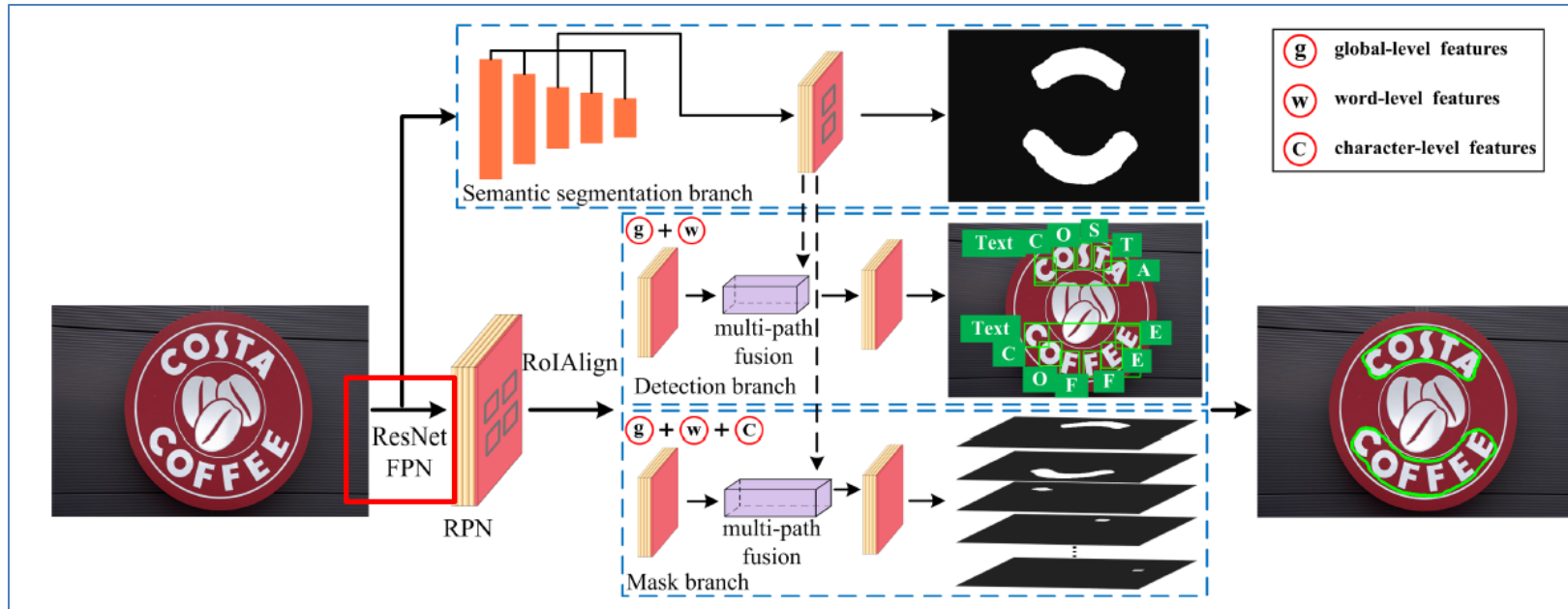
- RMM(Recurrent Mapping Model) - Loss function.
- Use other pre-trained embeddings.
- Other task dataset – hypernym detection (BLESS, EVAL ..)

- **Future works**

- Change batch generator for list-wise loss function
- RMM experiments with embeddings.
- CRIM experiments with embeddings.
- Other task dataset – hypernym detection (BLESS, EVAL ..)

Scene Text

- TextFuseNet - FPN



- ResNet Feature Pyramid Networks.
- Using pre-trained models.

Dataset Structure

- **SemEval-2018 : task9**

- **Corpus for training embeddings**

Subtask	Description
1A : English (general)	3B-word UMBC corpus
1B : Italian (general)	1.3B-word ItWac Corpus
1C : Spanish (general)	1.8B-word corpus(Wikipedia, Europarl, AnCora, etc.)
2A : Medical	130M-word subset of PubMed corpus of biomedical literature from MEDLINE
2B : Music	100M-word corpus Amazon reviews, music biographies and Wikipedia pages about theory and music genres

- **Dataset for training models**

Input data	Output data
Word, Types(Concept or Entity)	Max 15 hypernyms

Input.txt	Output.txt
blackfly Concept	homopterous insect insect
Turonian Entity	technical specification physical property ...
...	...

Thank you