Leveraging Speaker Profile and Knowledge Enrichment for End-to-End Advising Response Ranking

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http://github.com/MiuLab/Spk-ResRank

Summary

➢ **Motivation**

- Metadata in advising data is potentially useful

➢ **Approach:**

- Capture the semantic information in the course name
- Leverage the information of taken or suggested courses

➢ **Contributions**

- The concept about leveraging speaker profiles is flexible, and can be used in diverse tasks
- Outperform baselines (Dual Encoder) on the validation set

Dialogue & Profile

A: Do you have a precise preference as to course selection?
S: I do prefer classes with a **lighter** work load
A: What do you think about **EECS183**, Elementary Programming Concepts?
Correct Response: This class needs to be taken before others.
Student Profile:{
Prior Courses: ENGR101, CHEM130, CEE265...
Suggested Courses: EECS280, EECS203, EECS183
…….}

course-info

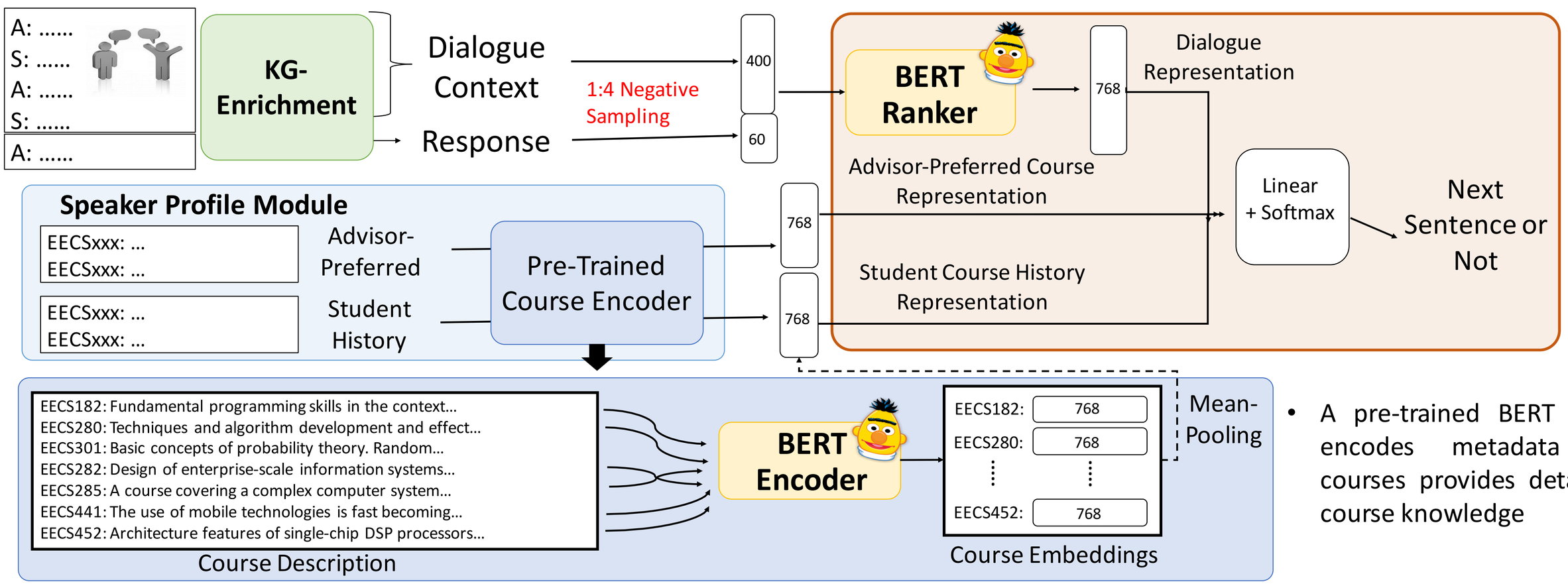
EECS183-FA-2012:{
"CourseTitle":" Elementary Programming Concepts",
"Workload": 1,
"EasinessRating": 3.42,
"ClassSize": 124.0,
"Description": "**Fundamental** concepts and skills of programming in a high-level language……"
}

Proposed Framework

- Add course names when detecting course numbers
- Course number normalization, e.g. adding "EECS"

1. BERT calculates the score of being next sentence among all options

2. Speaker and dialog embeddings are fused for final prediction



- A pre-trained BERT that encodes metadata of courses provides detailed course knowledge

Experiments & Results

- Data: Advising data; scores reported in the dev set

	Model	Course Embeddings	Layers	R@1	R@2	R@5	R@10	MRR
(a)	Baseline	-	-	22.18	33.60	49.31	62.20	35.51
(b)	Proposed	-	-	24.0	35.4	53.0	67.2	37.87
		Suggested	12	**24.0**	**36.6**	54.6	67.8	**38.47**
		Prior	12	23.4	35.4	**55.6**	67.6	37.86
		Suggested + Prior	12	23.4	35.0	55.0	**68.6**	37.82
		Suggested	9~12	**24.6**	36.4	**57.6**	**69.0**	**38.91**
		Prior	9~12	23.8	33.4	54.6	67.4	37.42
		Suggested + Prior	9~12	24.0	35.2	56.0	**69.0**	38.27

Analysis for 3 Types of Course Embeddings

S: I am interested in taking more AI classes because I found computer vision enjoyable last semester.
S: Are there any you would suggest?
Correct Response: EECS545 Machine Learning is one that is in a general sense helpful, on the off chance that you are keen on AI.

BERT: 281 would be my recommendation.
Correct Response Ranking: 13th
+Suggested: Is a large class size okay with you?
Correct Response Ranking: 2nd
+Both: Do you like hard working on hardware or software more?
Correct Response Ranking: 9th

➢ *The proposed model outperforms the baseline on all metrics on the dev set*
➢ Fusing the embeddings of the description of ***suggested courses*** helps the performance
➢ Fusing more layers (9~12 layers) of the ***suggested courses*** description performs better than only fusing the last (12th) layer

Conclusion

- This paper proposes an approach that leverages the speaker profile information for better modeling the response selection task.
- The concept about leveraging speaker profiles is flexible, and can be used in diverse tasks in the future.

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