ADL 2 2020 PROJECT REPORT
GENERATING NATURAL LANGUAGE EXPLANATION
FOR RECOMMENDATION

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ABSTRACT

I have implemented [1]. In this paper, the authors propose a hierarchical sequence-to-sequence model (HSS) with auto-denoising for personalized recommendation and natural language explanation generation. In particular, the paper makes the following contributions: 1. Authors propose a hierarchical generation model, which is able to collaboratively learn over multiple sentences from different users for explanation sentence generation. 2. Based on item feature words extracted from reviews, The authors propose a feature-aware attention model to implicitly select explanation sentences from reviews for model learning, and we further introduce a feature attention model to enhance the feature-level personality of the explanations.

1. INTRODUCTION

The recommender systems are a major part of internet industry, they provide the users with the personalised item recommendation. Though many works have been done in achieving good accuracy in recommendation itself,the explanation for the recommendation has been very limited to template based methods [2] or review retrieval methods [3].

This paper mainly contributes by generating natural language explanation for recommendation, which is not limited to the already present reviews or any template based explanation.

2. TECHNICAL DETAILS

There are two components to the model proposed. The first component takes user and item as an input and outputs a rating in 1 to 5 for the item usefullnes to the user, the other component takes the same input and along with a product feature words set like sound, 2in1, etc, to produce a natural language explanation for the rating.

For rating module, it uses MLP with embedding layer for user and item with mean square error as a loss function. For the natural language generation module, they propose an hierarchical sequence-to-sequence model (HSS), using GRU cell. To ensure that the explanations are dependent on both item

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and the user who may be looking for a particular feature for the item, an attention based module has been used, which identifies the relevant features to be generated.

Also to encourage generation of explanation with greater coverage of feature words, auto-denoising loss function has been used. They basically multiply the loss for each sentence of the review with $\beta = \frac{N_f}{N_w}$, where N_w and N_f are the total number of words and the numbers product feature words in the given sentence, respectively.

3. RESULTS

Model	RMSE
BiasedMF	1.030
SVD++	1.034
DeepCoNN	1.028
HSS	1.027
My model	**1.118**

Table 1. Rating Regression Task

Model	Bleu-1
HSS	9.55
My model	**8.49**

Table 2. Language Generation Task

4. CONTRIBUTIONS

I have re-implemented the code for the paper [1] from scratch replicating every mathematical formulations in the paper. Also note, there is no official/unofficial code, in any deep learning framework, available for the paper in any online forum I am aware of.

5. RESOURCES

Toolkit for feature word extraction:
`https://github.com/evison/Sentires`

6. REFERENCES

[1] Shaoyun Shi Hanxiong Chen, Xu Chen and Yongfeng Zhang. 2019., "Generate natural language explanations for recommendation.," in *Proceedings of SIGIR 2019 Workshop on ExplainAble Recommendation and Search, July 25, 2019 (EARS'19)*, Paris,France, 2019, EARS'19.

[2] Xiangnan He, Tao Chen, Min-Yen Kan, and Xiao Chen, "Trirank: Review-aware explainable recommendation by modeling aspects," in *Proceedings of the 24th ACM International on Conference on Information and Knowledge Management*, New York, NY, USA, 2015, CIKM '15, p. 1661–1670, Association for Computing Machinery.

[3] Chong Chen, Min Zhang, Yiqun Liu, and Shaoping Ma, "Neural attentional rating regression with review-level explanations," in *Proceedings of the 2018 World Wide Web Conference*, Republic and Canton of Geneva, CHE, 2018, WWW '18, p. 1583–1592, International World Wide Web Conferences Steering Committee.