Using Large Language Models to Justify Product Recommendations

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Abstract

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# Using Large Language Models to Justify Product Recommendations

Large Language Models (LLMs) have transformed the field of computer science, and indeed the wider world, since the introduction of Generative Pre-trained Transformers (GPTs) (Radford et al., 2018) precipitated a revolution in natural language understanding and generation. Network analysis is no exception, with researchers leveraging LLMs to improve graph-based classification (He et al., 2024), **[further citations and examples would be useful here]**

This paper explores possibilities for the use of LLMs in generating customized user *justifications* for recommendation systems. We integrate LLMs into the architecture of a traditional recommendation system by collating information most relevant to the recommendation and using it to prompt an LLM to generate a tip that specifically addresses *why a particular user* is recommended a *particular product.*

# Previous Work

Ni, Li & McAuley (2019) used *Language Models* (LMs) to generate *recommendation justifications* by extracting “review segments which justify users’ intentions”. They distinguished recommendation *justifications* from *tips,* “a form of *explanation* as to why a recommendation might match a user’s interests” (p.1), which had been the focus of earlier work. This work was published before LLMs had become widely available for practical use, which motivated us to explore whether richer justifications could be generated by the current generation of freely available LLMs.

He et al. (2024) used LLMs to generate text attributes that could enrich the feature sets of Text-Attributed Graphs (TAGs) and thereby improve the performance of graph-based models like Graph Neural Networks (GNNs). The authors prompted LLMs to classify academic papers in citation network datasets. They then encoded the LLMs’ classifications and their *explanations* of their classifications into features that could be combined with other structural network features as inputs for a GNN. This combined approach proved more powerful than either classification with LLMs alone or GNN classification.

# Methodology

## Data

Our data is taken from *Amazon Review Data (2018)* (Ni et al., 2019). We selected a relatively small sub-set of the overall database, limited to reviews of Musical Instruments, reduced to 5-cores, that is, users and items who have at least 5 reviews each. This leaves 231, 392 reviews in total. The reviews are structured as loose JSONs, with the following possible fields:

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Data Type | Description | Example |
| reviewerID | String | Unique identifier of reviewer |  |
| reviewerName | String | Name of reviewer |  |
| asin | String | Unique identifier of product |  |
|  |  |  |  |
|  |  |  |  |

References

Ni, J., Li, J., McAuley, J. (2019). ‘Justifying recommendations using distantly-labeled reviews and fine-grained aspects’*. EMNLP,* 2019.

Last Name, A. B. (Year). Article Title. Journal Title, Pages #-#. URL. URL.

Last Name, C. D. (Year). Book TitleBook Title URL.

Last Name, D. E., Last Name, F. G. (Year). Report TitleReport Title URL.

Last Name, H. I. (Year, Month Day). Article Title/Headline. Periodical.Periodical.

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