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Reviewer's opinion on Ph.D. dissertation authored by

Michal Ciesielczyk

entitled:

Scalable Dimensionality Reduction Methods for Recommender Systems

1. Problem and its impact

The most important problem discussed in the dissertation is the management of (big) data in the presence of high sparsity. Definitely, it is a scientific problem with an important practical meaning since, nowadays, there are huge volumes of data with such a characteristic. E-commerce data used for recommendation is a classic example.

2. Contribution

The main contribution of the dissertation is the projection of higher order data of a vector space model into a randomly selected sub-space of lower dimensionality. Thus, only the most important/influential features are kept and simultaneously the data sparsity problem is downsized. In addition, it is noticed that the quality of publications (8 papers in journals, conferences/workshops and book chapters) by the candidate is of a satisfactory level.

3. Correctness

Yes, we can trust the claims and the arguments of the author. There is a running toy example that helps the reader to understand the methods provided. However, a remark is that in Section 4, the author should compare the SECF-RSVD also with the SVD++ method, which is the state-of-the-art method of SVD after the 1 Million Netflix Prize. Lastly, the manuscript is absolutely acceptable in terms of edition (style, language, and structure).

4. Knowledge of the candidate

The chapters resemble a tutorial. However, there are some issues that should be strengthened/ corrected to prove a better overall knowledge of the field. For example, in the last paragraph of Section 5.2.5, the recommendation list is constructed only by sorting the rows of matrix A'. However, this is very simplistic and other choices should be also tested (e.g., the majority vote of the user's neighborhood, etc.) which is more known in recommender systems. This means, that important steps of recommendation CF algorithms have been missed (e.g. the creation of the target user's neighborhood) at least in the toy example.

5. Other remarks

The related work for each method (i.e, SECR-RSVD, RI, PRI, etc.) in chapters could be further extended to give a better knowledge of the related work by the candidate. For example, there is no information in Chapter 6 about prior works with respect to the PRI method. In general, Chapters 6 and 7 are not very smoothly connected with the previous chapters. Moreover, in the running example of Section 7.2.3 (and other running examples as well), the corresponding equations should be also provided step by step to enhance readability. The overall contribution of the dissertation should be also become more coherent between different methods/chapters in Chapter 8. The above critique is only some remarks which could better designate the strong points of the dissertation.

6. Conclusion

Taking into account what I have presented above and the requirements imposed by Article 13 of *the Act of 14 March 2003 of the Polish Parliament on the Academic Degrees and the Academic Title* (with amendments)¹, my evaluation of the dissertation according to the three basic criteria is the following:

A. Does the dissertation present an original solution to a scientific problem? (the selected option is



B. After reading the dissertation, would you agree that the candidate has general theoretical knowledge and understanding of the discipline of **Computing**, and particularly the area of **Software**



Summarizing, the present Ph.D. thesis contains original contribution in the specific field of Recommendation Systems. In my opinion the reviewed thesis fulfills the requirement imposed by the above Article 13 and I recommend to distinguish the dissertation for its quality.

Signature

¹ http://www.nauka.gov.pl/g2/oryginal/2013_05/b26ba540a5785d48bee41aec63403b2c.pdf