



Subject Section

Supplementary Material for GIFT

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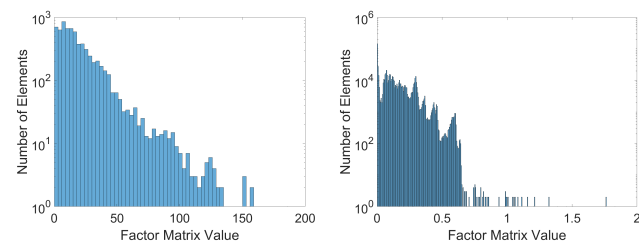
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Abstract

In this document, we introduce supplemental experimental results of GIFT and other methods. Specifically, we suggest various value distributions derived by GIFT and other methods. Moreover, we offer scalability of P-Tucker and Silenced-TF with respect to the number of observable entries of a tensor.



(a) Value distribution of intended entries derived by GIFT (b) Value distribution of unintended entries derived by GIFT

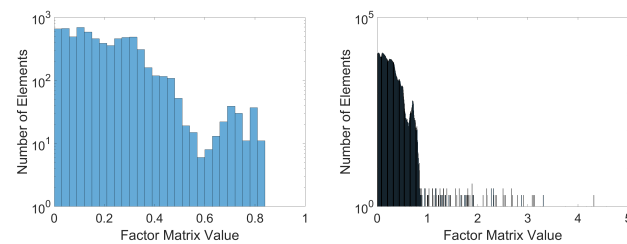
Fig. 1. Distributions of values in a gene-factor matrix derived by GIFT ($\lambda = 100$). The values of intended entries are much larger than that of unintended ones, which are regarded as interpretable results.

1 Experiment

In this section, we offer additional experimental results of GIFT and other methods. In detail, we first introduce several value distributions of intended and unintended entries derived by three methods and describe scalability of the algorithms with respect to the number of observed entries in a tensor.

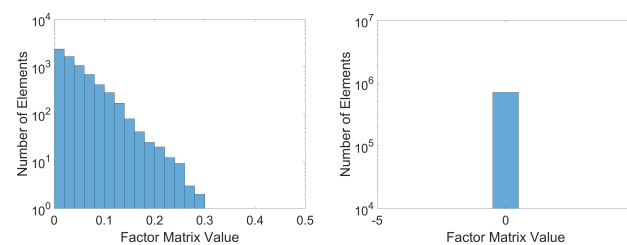
1.1 Interpretability

Figure 1 illustrates value distributions of intended and unintended entries derived by GIFT ($\lambda = 100$). Compared to the result offered by the main paper ($\lambda = 10$), the gap between intended and unintended ones becomes much larger. Although it provides more interpretable results, its accuracy is lower than that of the case when $\lambda = 10$. Moreover, it is hard to reveal important unintended entries when $\lambda = 100$. Thus, we use $\lambda = 10$ in the discovery section.



(a) Value distribution of intended entries derived by P-Tucker (b) Value distribution of unintended entries derived by P-Tucker

Fig. 2. Distributions of values in a gene-factor matrix derived by P-Tucker ($\lambda = 10$). There are no clear distinctions between intended and unintended entries, which are considered uninterpretable.



(a) Value distribution of intended entries derived by Silenced-TF (b) Value distribution of unintended entries derived by Silenced-TF

Fig. 3. Distributions of values in a gene-factor matrix derived by Silenced-TF ($\lambda = 10$). The values of unintended entries are set to zeros, while the values of intended entries are varying from 0 to 0.3.

However, P-Tucker fails to make a distinction between intended and unintended entries, as shown in Figure 2. The results are easily expected

since P-Tucker does not differentiate the intended and unintended ones when it updates factor matrices.

On the other hand, Silenced-TF produces interpretable results, as presented in Figure 3. The values of unintended entries are fixed to zeros, while the values of intended entries are varying from 0 to 0.3. Although Silenced-TF provides interpretable results, it cannot retrieve important unintended entries as the values of them are set to zeros.

1.2 Scalability

We vary the number of observable entries by randomly sampling 20%, 40%, 60%, 80%, and 100% from the PANCAN12 tensor. As shown in Figures 4 and 5, P-Tucker and Silenced-TF scale near linearly in terms of the number of observable entries.

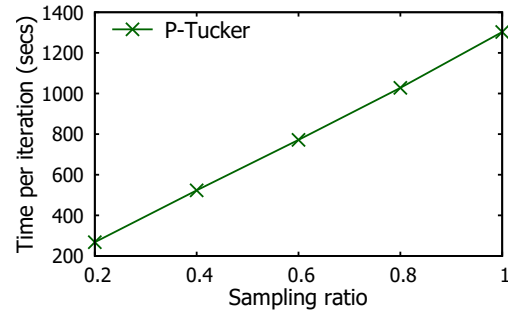


Fig. 4. Scalability of P-Tucker with respect to the number of observable entries in the tensor. As the number of observed entries increases, a running time of P-Tucker increases proportionally.

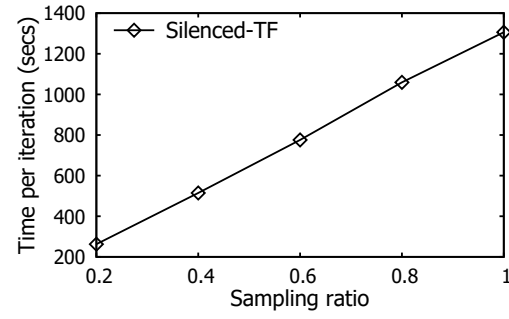


Fig. 5. Scalability of Silenced-TF with respect to the number of observable entries in the tensor. As the number of observed entries increases, a running time of Silenced-TF increases proportionally.