Implementation of deep matrix factorization for product recommendation.

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Source paper: Deep Matrix Factorization Models for Recommender Systems - Baolin Yi

1. Introduction

The purpose of this project is to introduce a new technique for product recommendation, and to compare performance of this technique with existing technique or method. In this report, we will discuss product recommendation using collaborative filtering based on customers purchase behavior. Specifically, we will attemp to use **deep matrix factorization** to learn the representation of each product (p) and customer (q) from dataset of last 3 months purchases. By doing so we will be able to rank the relevance of each product to a customer by cosine similarity metric.For user u and product i, relevance is denoted as s_{ui}:

$$s_{ui} = \frac{p_u^T q_i}{||p_u|| * ||q_i||}$$

In which, $p_u, q_i \subset R^N$ are representation vectors of user u^{th} and product i^{th}. N is called number of latent components.

2. Implementation

2.1 Data

Dataset is extract from `Magento` database using this

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```
SELECT
    so.customer_id,
    soi.sku,
```

```
    SUM(qty_ordered) AS qty,
    SUM(row_total) AS amt
FROM
    magento.sales_order so

LEFT JOIN
    magento.sales_order_items soi
    ON soi.order_id = so.entity_id
WHERE
    so.created_at >= current_date - interval '3 month'
    AND soi.product_type = 'simple'

GROUP BY 1, 2
```

2.1 Model architecture

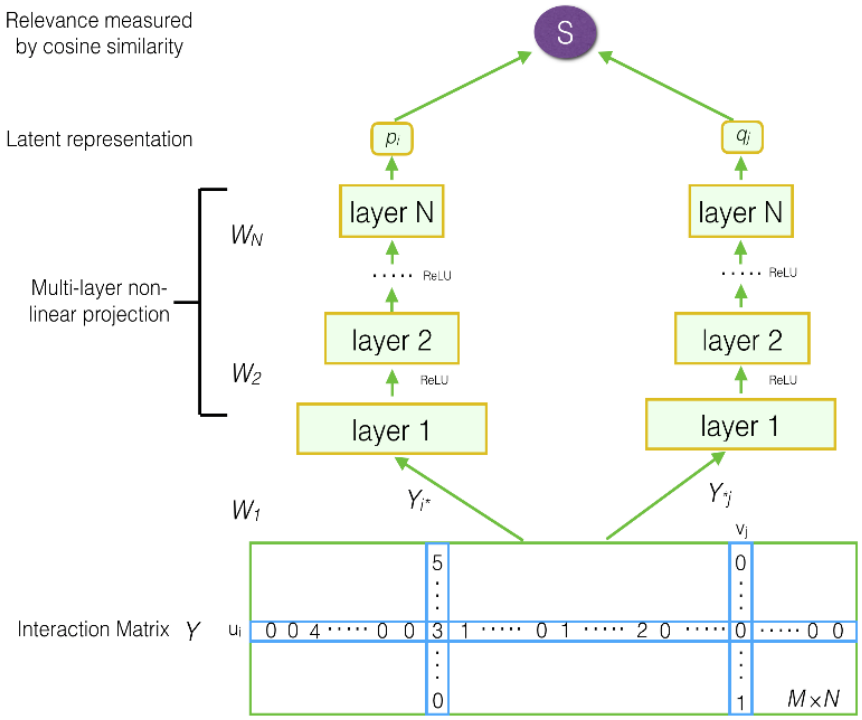

Figure 1: Fig1