Motivation & Intuition behind Matrix Factorisation for recommendations

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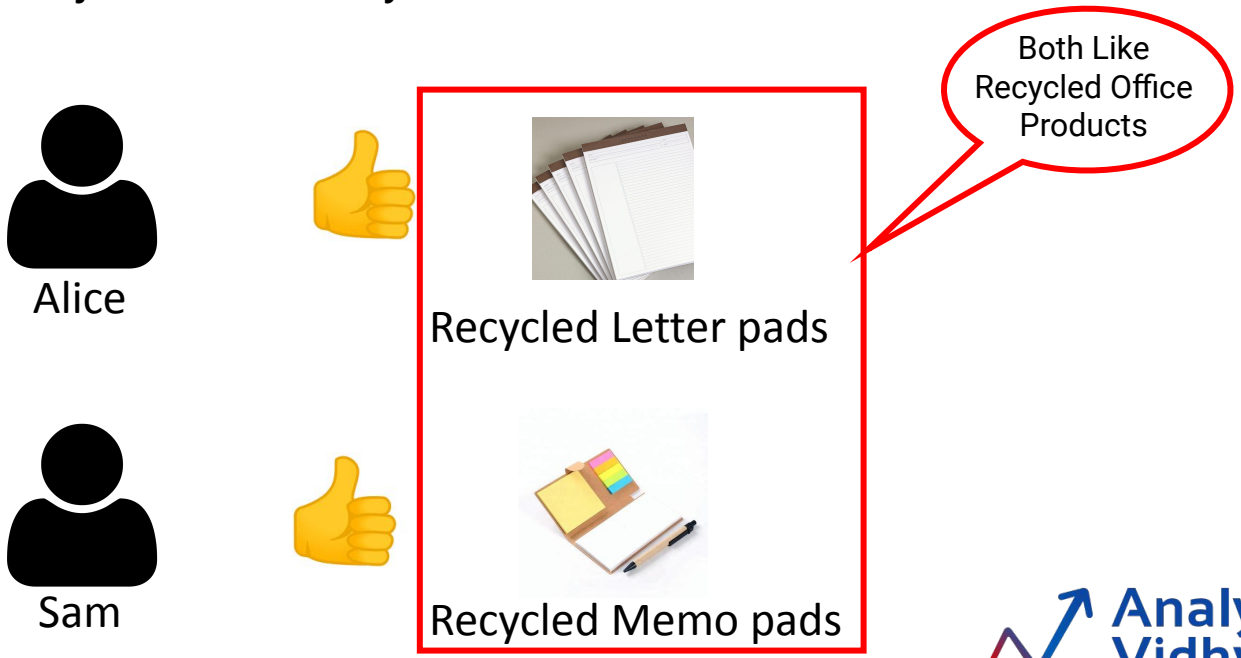
Challenges for Neighbourhood Based Methods

- Synonymy: In real life, different product names can refer to similar objects
  - Similarity based recommender system can't find this hidden association and might treat these objects differently
- Example:



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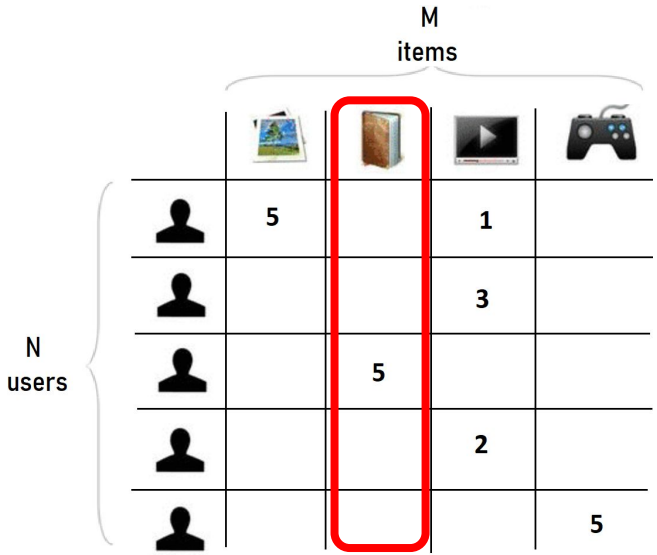
Challenges for Neighbourhood Based Methods

- Sparsity: Due to lack of pair of users and items with common ratings, often neighbourhood based methods fail to recommend any item or make predictions



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Matrix Factorization

- Objective is to represent user preferences as a combination of
  - User's interest in an item attribute (e.g. movie genre) and
  - Extent to which the given item is relevant to that attribute

- So using the rating matrix, we want to first calculate the strength of user interest for each user for let's say a genre
  - Let's say User Alice is interested in Sci-fi movies
  - Now For a movie 'Interstellar' We would find out 'how sci-fi is this movie'
  - Finally predict rating for interstellar given by Alice by multiplying these 2 values
  - But how do we achieve this mathematically?