Recommender Systems:

The Problem:

* To recommend new products to a user based on prior data about the user

Eg:

Predicting product ratings

Notation:

Content based recommendation:

Given a dataset of ratings:

For each user j, learn a param predicts user j as rating new movie i with stars.

For each :

Hence we learn . Much like a Linear regression model

However, we do not always have such data on hand.

Alternatively:

Using User preferences to predict theta values:

Given , learn :

For each

A key observation to make is that the first term for both is the same!

Also, this algorithm along with the previous one can already cycle to convergence given random initialization of theta values.

However, there is a way to combine the 2 approaches:

Use as such to compute gradient for both

Use Gradient descent or an advanced optimization algorithm to reach convergence of x and

Vectorisation Approach:

A screenshot of a cell phone

Description automatically generated

How the algorithm learns each feature is for each

The algorithm learns some meaningful feature.

However, this feature may be hard for us to convert into a intuition for humans to understand.

How to find movies j related to movies i?

* Small meaning movies j and i are “similar”

Mean Normalisation:

Initialising a Theta and x value for a new user who has not rated anything:

A close up of text on a white background

Description automatically generated