***in-items*** – rated by users

***cold-items*** – not rated by any user

– where is the number of correct items that appear in Top-M recommendation for user u, is the number items that user u had rated positive.

– where is the number of correct items that appear in Top-M recommendation for user u, is the Top-M number.

**in-matrix prediction**

TOP-M recommendations only contain in-items (noncold).

**Recall:**

* is number of in-items that appear in Top-M which are actually like by user u.
* is number of in-items that user u had rated positive. They are all in-items, because if user u had rated them, they are automatically in-items because they have rating information.

**Precision**

* is number of in-items that appear in Top-M which are actually like by user u.
* is the Top-M number.

**out-of-matrix predicition**

TOP-M recommendations contains both in-items and cold-items.

**Recall:**

* is always in-items that appear in Top-M which are actually like by user u + cold-items that appear in Top-M ???
* is same as in-matrix prediction.

**Precision**

* is always in-items that appear in Top-M which are actually like by user u + cold-items that appear in Top-M ???
* is the Top-M number.

Question 1) Do we count cold items in calculations above?

Question 2) Cross-validation how? What is training data and testing data?