Scalar Response Measurement

To predicts the rating $f(u,\, i)$ of a user u for a new item i, a function $f : U \times I \rightarrow S$ is learned, and then this function is used to recommend to the active user u_a an item i^* for which the estimated rating has the highest value

$$i^* = \underset{j \in I \setminus I_u}{\arg\max} f(u_a, j)$$

Accuracy is commonly used to evaluate the performance of the recommendation method. Typically, the ratings R are divided into a training set R_{train} used to learn f , and a test set R_{test} used to evaluate the prediction accuracy. Two popular measures of accuracy are the *Mean Absolute Error* (MAE):

$$\mathrm{MAE}(f) = \frac{1}{|R_{test}|} \sum |f(u,\, i) - r_{ui}|$$

and the *Root Mean Squared Error* (RMSE):

$$\mathrm{RMSE}(f) = \sqrt{\frac{1}{|R_{test}|} \sum [f(u,\, i) - r_{ui}]^2}$$