In this problem, we first convert R to a matrix where the entries are 1 for available data points and 0 for the missing ones. Then we perform a 10 cross validation on R, then we sort the ratings for each users in a descending order to get the top L movies recommendations. In this case, L = 5.

On calculation to average precision, we first set a threshold to make a correct decision. We count the number of movies we consider in each fold, and compute the number of select movies recommendations. The average precision in our case is 0.94 given L = 5. The table below shows the different precision given different L values.

|  |  |
| --- | --- |
| L: | Precision: (%) |
| 1 | 95.59 |
| 2 | 95.64 |
| 3 | 95.45 |
| 4 | 96.55 |
| 5 | 96.45 |

According to the requirements, we also need to find hit rate and false rate of our algorithm. Hit rate represents what fraction of the test movies liked by the users are suggested by our system, and the false rate represents the opposite. We set L starting from 1 to 5, and plot these values as points in a two-dimensional space with hit rate on the y axis and false rate on the x axis. The plot is given as follows.

