## User-based Classification

Neighborhood-based classification, on the other hand, finds the most likely rating given by a user $u$ to an item $i$, by having the nearest-neighbors of $u$ vote on this value. The vote $v_{ir}$ given by the k-NN of $u$ for the rating $r \in S$ can be obtained as the sum of the similarity weights of neighbors that have given this rating to $i$:

$$v_{ir} = \sum \delta \left( r_{vi} - r \right) w_{uv}$$

where $\delta(r_{vi} - r)$ is 1 if $r_{vi} = r$, and 0 otherwise. Once this has been computed for every possible rating value, the predicted rating is simply the value $r$ for which $v_{ir}$ is the greatest.

A classification method that considers normalized ratings can also be defined. Let $S\prime$ be the set of possible normalized values (that may require discretization), the predicted rating is obtained as:

$$\hat{r}_{ui} = h^{-1} \left\{ \arg\max_{r} \sum_{v} \delta \left[ h \left( r_{vi} \right) - r \right] w_{uv} \right\}$$