

# Improving Reliability of Web 2.0-based Rating Systems Using Per-user Trustiness

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## Motivation

The reliability of Web 2.0-based rating system is vulnerable when there are uncooperative users in the system (e. g., bad mouthing or ballot stuffing). Tackling this issue, we propose a simple yet practical solution. In addition to aggregating rating results from all reviewers, the proposed scheme also takes into account the trustiness of each user while aggregating.

## Proposed solution

We assume that if a reviewer's opinions are more similar to the general public, we might have more confidence on him!

In this system

- There are  $X$  reviewers and  $Y$  items
- Reviewer  $x$  give item  $y$  a rating  $g_{x,y}$
- The rating value  $g_{x,y}$  is an integer between the range 1 and  $G_{max}$
- Each reviewer has a trustiness value to identify his reliability while each item's current score is  $G'$

$$C(x, y) = \begin{cases} 0, & \text{reviewer } x \text{ has not rated item } y \\ 1, & \text{reviewer } x \text{ has rated item } y \end{cases} \quad (1)$$

**The trustiness value of reviewer  $i$  is**

$$T(i) = \frac{\sum_{k=1}^Y C(i, k) \left( 1 - \frac{|g_{i,k} - G'_k|}{G_{max}} \right)}{\sum_{k=1}^Y C(i, k)} \quad (2)$$

$$\delta_{m,j,g} = \begin{cases} 0, & \text{the rating from reviewer } m \text{ on item } j \text{ is not } g \\ 1, & \text{the rating from reviewer } m \text{ on item } j \text{ is } g \end{cases} \quad (3)$$

**The score of item  $j$  is**

$$G'_j = \arg \max_g \sum_{m=1}^X C(m, j) T(m) \delta_{m,j,g} \quad (4)$$

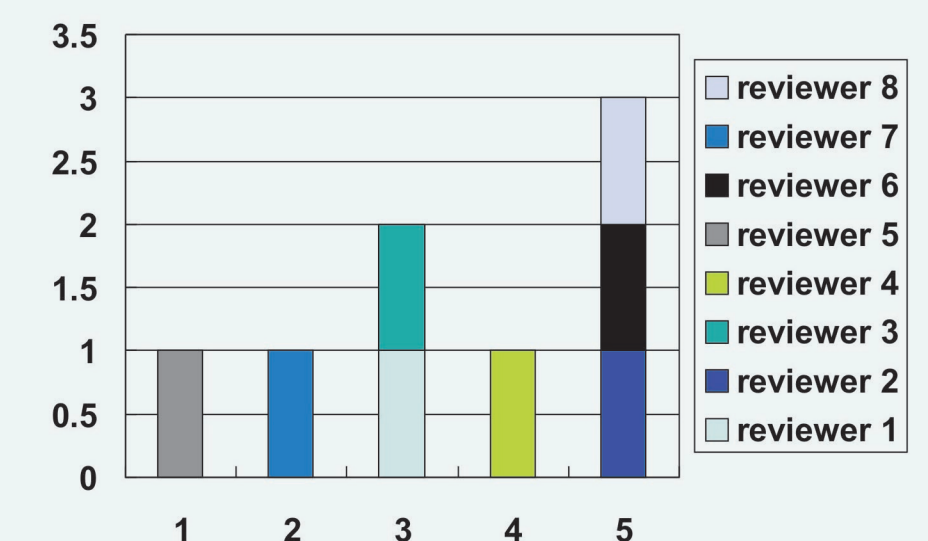
where  $g=1, 2, \dots, G_{max}$

## Example

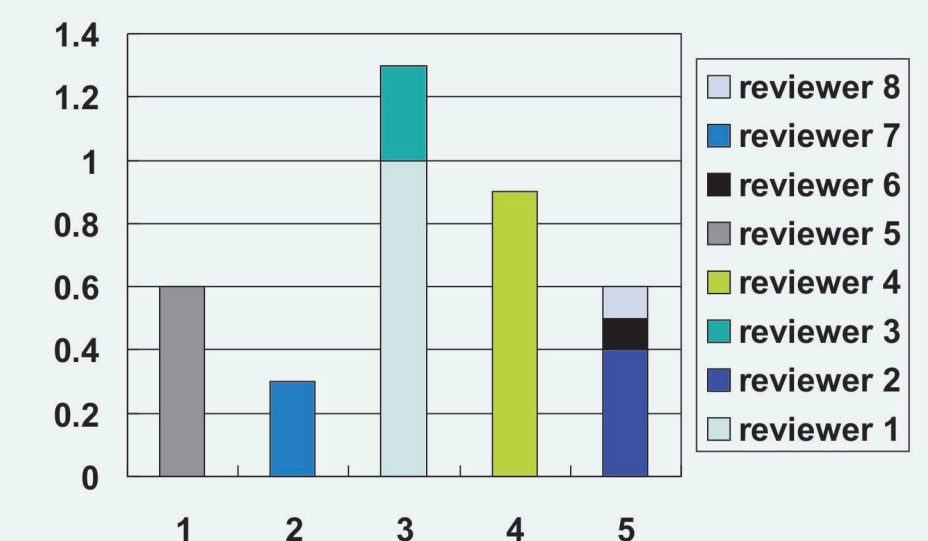
Comparison between Majority Voting model and Trustiness-Based model

	T(i)	rating		T(i)	rating
$g_{1,j}$	1	3	$g_{5,j}$	0.6	1
$g_{2,j}$	0.4	5	$g_{6,j}$	0.1	5
$g_{3,j}$	0.3	3	$g_{7,j}$	0.3	2
$g_{4,j}$	0.9	4	$g_{8,j}$	0.1	5

Table 1. A rating example



In Majority Voting model, article  $j$ 's final score is 5 !



In Trustiness-Based model, article  $j$ 's final score is 3 !