Wize.com White Paper: The Wize Rank Algorithm

Wize.com uses its proprietary Wize Rank algorithm to measure user sentiment on the web in order to help people decide what products to buy. This white paper details the fundamental principles behind Wize Rank, its meaning, and its statistical relevance in order to establish Wize Rank as the best measure of "what to buy" on the web. It has been authored by Wize.com in conjunction with Kevin Lattery, PhD.

What is Wize Rank?
Wize Rank seeks to compile product reviews from users and experts across a range of sources, distilling them into a single, easy-to-understand number. Developed by a professional PhD statistician and several advisors, Wize Rank is the most statistically rigorous representation of expert and consumer ratings available.

Wize Rank is a measure of product quality as well as what to buy. A high Wize Rank means that users and experts agree that a product is a top performer, and you can buy it with confidence. Products with low Wize Ranks fall into one of 2 categories:

1. Users and experts don't like it
2. There is not enough information on the web to feel confident that the product is a good one

Although products with lower Wize ranks may be good for some consumers, Wize Rank has been engineered to help consumers find and select products with confidence. Products with the highest Wize Ranks are the most well-liked and trusted.

Because the sources that constitute Wize Rank differ in many ways, including the scales they use, their test criteria, and the extent to which they are "easy" or "hard" graders, the details of the algorithm are statistically complex. Nevertheless, the factors in the algorithm are outlined below.

What factors does the Wize Rank algorithm account for?
The Wize Rank algorithm accounts for the following factors:

1. **Differences in scale and type of reviewer**
2. **Statistical uncertainty of user ratings (margin of error)**
3. **Reliability of expert reviewers**
4. **Statistical confidence in expert and user ratings**

1. **Differences in scale and type of reviewer**
   Product experts use different scales to rate products. Some use a scale of 1 – 100, or from 1 – 5, and so on. Additionally, within each review scale, there are inconsistencies amongst reviewers: for some reviewers, a score of 82 out of 100 is good; for others, it is simply average. Wize Rank accounts for differences in scale *and* for differences in reviewers. To do this, we standardize the ratings for each source, and then compare the standardized scores across reviewers considering all the products in a category. This enables us to determine the differences between experts' scoring methods, and to adjust their scores appropriately. Simply put, if an expert is an easy grader, the score is adjusted downward. If the expert is a more demanding grader, the score is adjusted upward.

Standardizing the scores across reviewers, sources, and categories allows us to determine the true relative rating of a product. Proven statistical techniques allow us to compare each reviewer to other reviewers in a given category without personal input or bias.

It is important to note that each source is evaluated independently in each category. This means that Wize Rank also takes into account reviewers and sources that use different scales for different categories.

2. Statistical uncertainty of user ratings (margin of error)

To calculate the lower bound, Wize Rank subtracts the margin of error from the raw score. Wize Rank uses the lower bound estimate for each user rating; we are confident the user rating will be *at least* this value if everyone rates the product. Wize Rank also adjusts for margin of error, meaning that higher rankings indicate confidence in the data set. Products with the highest Wize Ranks have the most statistically reliable data; while not every product with a high Wize Rank is right for everyone, these products are often the most proven on the market.

The Wize Rank margin of error is impacted by two factors:

- Number of reviews
- Variance in ratings

Using the number of reviews and the variance of the ratings, we can use sound statistical inference to estimate the lower bound of the user rating to create a Wize Rank with confidence.

Number of reviews

The more reviews a product has, the more certainty we have about that product. For example, if product A and product B have the same score, but product A has 100 ratings and product B has only 10, product A will have a higher Wize Rank.

Given the nature of statistical inference, products with only 10 user ratings are penalized because we cannot be confident that the 10 ratings represent everyone's opinion. This does not mean that a product with only 10 reviews is not great – as additional reviews are tallied, products with an increasing number of positive reviews will win higher ratings.

This measure is intended to protect consumers from a buying product whose early buzz is strong, but is later proven to be a poor performer.

Variance in ratings

Variance measures the amount of disagreement among people, and penalizes products that receive inconsistent reviews and ratings (some high, some low). Variances affect our ability to provide a high Wize Rank with confidence because they suggest that there is uncertainty about a product.

3. **Reliability of expert reviewers**
   The best, most reliable expert reviewers have a keen understanding of which products consumers will like. Wize Rank leverages these top reviewers by weighing each review source based on its ability to predict consumer ratings in a given category. For example, if source A is known to correlate closely with consumer sentiment and source B is not, source A will be weighed more heavily in the Wize Rank.

   This weighting is done within each category to account for reviewers who are good predictors of consumer sentiment in one category (such as MP3 players) but not others.

4. **Statistical confidence in expert and user ratings**
   Wize Rank is a weighted average of the overall user score and the overall expert score, which means it will fall between the user and expert scores. The weight that is assigned to experts and users (e.g., which is weighed more heavily) is determined by statistical confidence in the scores. Specifically, user and expert weights are inversely proportional to their margin of error.

   If a product has hundreds of user ratings, Wize Rank weighs user ratings more heavily; if it has fewer user ratings, expert reviews are weighed more heavily.

Summary

This high level overview of Wize Rank covers some of the major points and philosophies behind the algorithm.

We at Wize have been deliberately cautious in establishing this algorithm in order to ensure that it is both statistically relevant and a useful indicator of quality products. Wize Rank collects expert and user reviews from, all over the internet to help customers decide what to buy by presenting a score they can trust.