

Page Rank

What is a Page Rank, and how is it calculated?

A Page Rank is a numeric value from 1 to 10 that represents how important a page is on the internet according to Google. We use Google as our example because they are the number one search engine in terms of market share, and openly share Page Rank numbers. Other search engines probably have similar Page Rank systems but this is solely based on Google's Page Rank formula.

Now the actual mathematics behind a Page Rank is a closely guarded secret within the walls of Google but based on their original million-dollar idea, we can draw a lot of conclusions on how they assign a Page Rank to a particular page. Here is the original Google Page Rank equation: $PR(A) = (1-d) + d(PR(t1)/C(t1) + \dots + PR(tn)/C(tn))$

In the equation 't1 - tn' are pages linking to page A, 'C' is the number of outbound links that a page has and 'd' is a damping factor, usually set to 0.85.

A simpler way to view this is: $Page Rank = 0.15 + 0.85 * (\text{a "portion" of the Page Rank of every other page that links to it})$

"Portion" = the linking page's Page Rank divided by the number of outbound links on the page.

A page "votes" an amount of Page Rank onto each page that it links to. The amount of Page Rank that it has to vote with is a little less than its own Page Rank value (its own value * 0.85). This value is shared equally between all the pages that it links to.

From this, we could conclude that a link from a page with Page Rank of 4 and 5 outbound links is worth more than a link from a page with a Page Rank of 8 and 100 outbound links. The Page Rank of a page that links to yours is important but the number of links on that page is also important. The more links there are on a page, the less Page Rank value your page will receive from it.

If the Page Rank value differences between Page Rank 1, Page Rank 2,.....Page Rank 10 were equal then that conclusion would hold up, but many people believe that the values between Page Rank 1 and Page Rank 10 (the maximum) are set on a logarithmic scale, and there is very good reason for believing it. Nobody outside Google knows for sure one way or the other, but the chances are high that the scale is logarithmic, or similar. If so, it means that it takes a lot more additional Page Rank for a page to move up to the next Page Rank level than it did to move up from the previous Page Rank level. The result is that it reverses the previous conclusion, so that a link from a Page Rank 8 page that has lots of outbound links is worth more than a link from a Page Rank 4 page that has only a few outbound links.

Whichever scale Google uses, we can be sure of one thing...a link from another site increases a site's Page Rank. Just remember to avoid links from link farms.

Note that when a page votes its Page Rank value to other pages, its own Page Rank is not reduced by the value that it is voting. The page doing the voting doesn't give away its Page Rank and end up with nothing. It isn't a transfer of Page Rank. It is simply a vote according to the page's Page Rank value. It's like a shareholders meeting where each shareholder votes according to the number of shares held, but the shares themselves aren't given away. Even so, pages do lose some Page Rank indirectly, as we'll see later.

Ok so far? Good. Now we'll look at how the calculations are actually done.

For a page's calculation, its existing Page Rank (if it has any) is abandoned completely and a fresh calculation is done where the page relies solely on the Page Rank "voted" for it by its current inbound links, which may have changed since the last time the page's Page Rank was calculated.

The equation shows clearly how a page's Page Rank is arrived at. But what isn't immediately obvious is that it can't work if the calculation is done just once. Suppose we have 2 pages, A and B, which link to each other, and neither have any other links of any kind. This is what happens: Calculate page A's Page Rank from the value of its inbound links

Page A now has a new Page Rank value. The calculation used the value of the inbound link from page B. But page B has an inbound link (from page A) and its new Page Rank value hasn't been worked out yet, so page A's new Page Rank value is based on inaccurate data and can't be accurate. Calculate page B's Page Rank from the value of its inbound links

Page B now has a new Page Rank value, but it can't be accurate because the calculation used the new Page Rank value of the inbound link from page A, which is inaccurate.

It's a Catch 22 situation. We can't work out A's Page Rank until we know B's Page Rank, and we can't work out B's Page Rank until we know A's Page Rank.

Now that both pages have newly calculated Page Rank values, can't we just run the calculations again to arrive at accurate values? No. We can run the calculations again using the new values and the results will be more accurate, but we will always be using inaccurate values for the calculations, so the results will always be inaccurate.

The problem is overcome by repeating the calculations many times. Each time produces slightly more accurate values. In fact, total accuracy can never be achieved because the calculations are always based on inaccurate values. 40 to 50 iterations are sufficient to reach a point where any further iteration wouldn't produce enough of a change to the values to matter. This is precisely what Google does at each update, and it's the reason why the updates take so long.

One thing to bear in mind is that the results we get from the calculations are proportions. The figures must then be set against a scale (known only to Google) to arrive at each page's actual Page Rank. Even so, we can use the calculations to channel the Page Rank within a site around its pages so that certain pages receive a higher proportion of it than others.

Why does this matter to you? Because you want Google to rank your web site pages higher than your competition. If Google thinks your site is more important, then it will rank higher in searches than your competitors. We can help build a solid search engine conscious site that, by design, should result in a better ranking than your competition. That means higher search results, more clicks, and better conversion rates. That is why all of this is important!