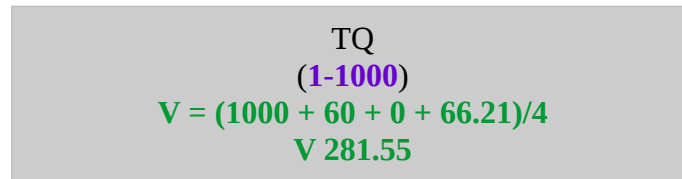


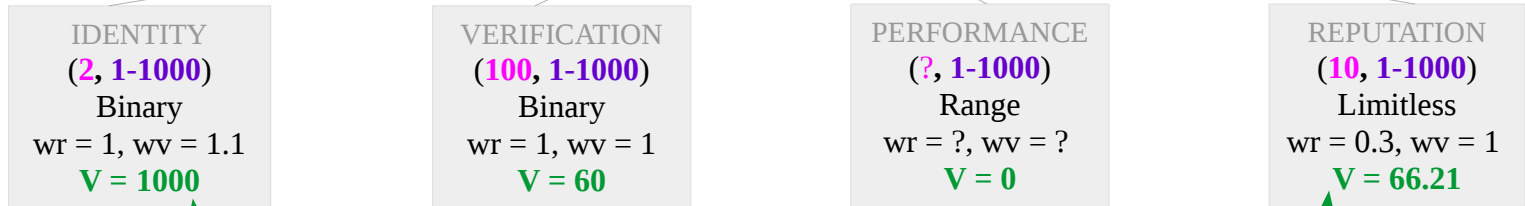
TiiQu – Full Trust Quotient

STEM Expert Example

weight (fixed or dynamically computed)
sample (fixed)
child node normalization
range (fixed)
value (variable)
set in child node, computed in node



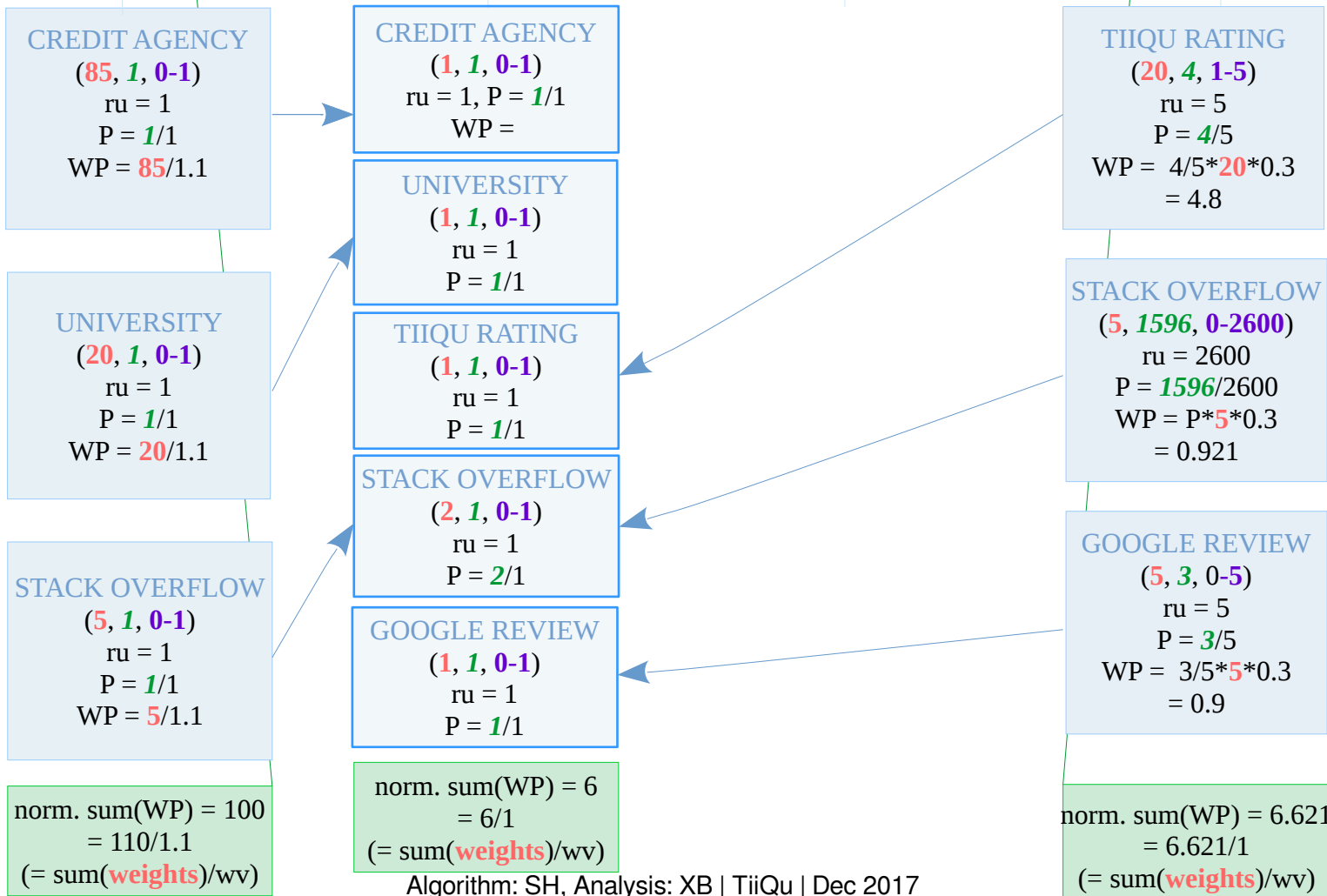
NODES



CHILD NODES

categories:

1. no weight
2. fixed weight
3. dynamically computed weight



Algorithm: SH, Analysis: XB | TiiQu | Dec 2017

Analysis and Propositions

1) Nodes

The value of 66.2 is very small compared to the impact of the value 1000 of the identity node, even though the values on the reputation node are not as bad (4 from 5 and 1596 from 260). The idea behind this is:

➤ Identity Node

The identity node delivers a 100% contribution if at least two verifiers with a weight sum of at least 100 are confirmed. For example if the university and the credit agency confirmed the identity, TiiQu accepts the member's identity as confirmed.

➤ Verification Node

The verification node counts the verifications from all other child nodes and adds them to the trust quotient. It does not distinguish between the kinds of sources. Each verification has the same impact. It should take a lot of sources to reach a full contribution from the verification node, because a 100% contribution from this node should hardly be reached. Weights only count multiple kinds of verifications from the same source, like Stack Overflow in the above example.

➤ Performance Node

➤ Reputation Node

We expect much more reputation sources to reach a full contribution from the reputation node. In fact, a 100% contribution from the reputation node can hardly be reached.

2) Sample

A fixed value representing with how many child nodes a TiiQu member can achieve full trust from a node.

For the verification node I propose a high sample e.g. **100** value because

- its child nodes are weightless, respectively the weight only represents the number of verifications from a source.
- its child nodes values are binary and 1 with each verification from other nodes
- a full contribution from it should hardly be reached

3) Weights

Weights have an impact on the contribution of the child node's value to the value of the node. It represents how much impact a source is allowed to have on the trust quotient.

- Node weights are fixed.
- Child node weights are fixed if their values are within a likewise fixed range.

- Child node weights are dynamically computed if their value range is limitless.

Some child node weights will become smaller if their ratings become older. This rule will apply to both dynamically computed and fixed weights.

4) **Weighting Ratio**

The weighting ratio wr does have a normalizing impact according to the number of child nodes. If the number of child nodes exceeds the nodes's fixed sample value, more child nodes won't have an additional impact on the node's value anymore.

Definition:

$wr = 1$ if # child nodes \geq sample or sample $= 0$
 else $wr = \# \text{ child nodes} / \text{sample}$

5) **Weight Value**

The weight value wv does have a quadratic impact to a node's value. This means in the case of the sum of weights being smaller than or equal 100 it has no impact.

Definition:

$wv = 1$ if $\text{sum}(\text{weights}) < 100$ else $wv = \text{sum}(\text{weights}/100)$

$$\begin{aligned} \text{sum}(WP)/wv &= ((P_0 * \text{weight}_0 * (wr/wv)) + \dots + (P_n * \text{weight}_n * (wr/wv))) / wv \\ \Leftrightarrow \text{sum}(WP)/wv &= (P_0 * \text{weight}_0 * wr + \dots + P_n * \text{weight}_n * wr) * 1/wv / wv \\ \Leftrightarrow \text{sum}(WP)/wv &= (P_0 * \text{weight}_0 * wr + \dots + P_n * \text{weight}_n * wr) / wv^2 \end{aligned}$$

6) **Weighted Percentage**

WP on a child node has the following impact:

- More child nodes have a positive impact on a single child node because of

$$\begin{aligned} WP &= P * \text{weight} * (wr / wv) \\ \Leftrightarrow WP &= P * \text{weight} * (\# \text{ child nodes} / \text{sample} / wv) \end{aligned}$$

E.g. the reputation node delivered

- a value of 38.14 with 2 child nodes
- a value of 66.21 with 3 child nodes (+ 73 %)

even though the third child node's contribution to the sum of WP is only

$$(((4.8 + 0.921 + 0.9) / (4.8 + 0.921)) - 1)\% = 15,7 \%$$

- If the number of child nodes has reached the sample value, this impact stays constant.
 - If the sum of the weights reaches and exceeds 100, the impact ...
- $$\begin{aligned} WP &= P * \text{weight} * (wr / wv) \\ \Leftrightarrow WP &= P * \text{weight} * (wr / \text{sum}(\text{weights})/100) \end{aligned}$$

- 7) Limitless scores from reputation trust sources and dynamically generated child node weights:
...
- 8) ...