

Mathematical foundation of Vigyanam

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We start by introducing the notations that are used in order to devise the calculation algorithm. After that, we specify the algorithm which governs the score (scientific temper of an individual) of an individual. Towards the end of the document, we define the function which calculates the user score with respect to individual responses.

1 Notations:

- C_i - A particular category ($i = 1, 2, 3, 4$)
 - 1 -> Scientific Information
 - 2 -> Spirit of Enquiry
 - 3 -> Cause-Effect Relationship
 - 4 -> Rational Thinking
- q - Question belonging to a particular C_i
- a_i - Options belonging to a particular question where $i \in [1, 4]$

2 Algorithm:

- Step 1 -> Initialize variable named **score** to 0
 - Step 2 -> Fetch a category C_i
 - Step 3 -> For the fetched category C_i :
 - 3.1 Fetch all the question (q) and options ($a[i]$) pairs
 - Step 4 -> Repeat steps from 2 to 3 for *four* times
 - Step 5 -> For each user response:
 - 5.1 Calculate the response's score w.r.t $f(x)$ and assign it to a variable `per_response_score`
 - 5.2 `score += per_response_score`
 - Step 6 -> if `score <= 0`:
 - 6.1 `score = 0`
 - 6.2 return score
- else return score

3 Defining f(x):

$f(x)^*$ can have four variants which are calculated as below -

$$f(x) = \begin{cases} 1, & \text{if correct} \\ 0.5, & \text{if partially correct} \\ -0.5, & \text{if partially incorrect} \\ -1, & \text{if incorrect} \end{cases} \quad (1)$$

$$f(x) = \begin{cases} 1, & \text{if level of relevance is 100\%} \\ 0.75, & \text{if level of relevance is 75\%} \\ 0.5, & \text{if level of relevance is 50\%} \\ 0.25, & \text{if level of relevance is 25\%} \end{cases} \quad (2)$$

$$f(x) = \begin{cases} 1, & \text{if correct} \\ 0, & \text{if neither correct nor incorrect} \\ -1, & \text{if incorrect} \end{cases} \quad (3)$$

$$f(x) = \begin{cases} 1, & \text{if strictly correct} \\ -1, & \text{if strictly incorrect} \end{cases} \quad (4)$$

*where the number of variants are dependent on the number of unique options to that particular question.