Intensity of Contribution

Intensity of contribution (Contribution) is a value obtained as the image of a contribution function. A contribution function is a function that returns the contribution for any value in the domain of definition of an arbitrary function. The definition of the contribution function $c_f(x)$ obtained from an arbitrary function $f(x)$ is shown in (1) below.

$$c_f(x) := \frac{f(x)}{\int_{x_{min}}^{x_{max}} f(x)dx} \qquad (1)$$

The purpose of using contribution functions is to standardize and compare the images of each function. Therefore, a contribution function is required to have the trait that the image is determined only by the given function and the element, and that the total amount of images of the contribution function obtained from any function shows a constant value. If the total amount of the image of the contribution function is defined as $\int_{x_{min}}^{x_{max}} c_f(x)dx$, the following equation (2) is obtained, and we can say that the contribution function satisfies the above function.

$$\forall f, \int_{x_{min}}^{x_{max}} c_f(x)dx = 1 \qquad (2)$$

For example, if $c_f(a) > c_g(a)$ for two functions $f(x)$ and $g(x)$ whose domains are both $[\alpha, \beta]$ and the number a exists in the domain, we can say that $f(x)$ shows higher contribution than $g(x)$ at $x = a$. Since $\int_{x_{min}}^{x_{max}} c_f(x)dx = 1$ and $\int_{x_{min}}^{x_{max}} c_g(x)dx = 1$, the following equation (3) is valid.

$$\int_{x_{min}}^{x_{max}} \Big(c_f(x) - c_g(x) \Big) dx = 0 \qquad (3)$$