



Design of Fuzzy Membership Functions for Sagun & Nirgun Attributes in the Shivismahapuran

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DOI : <https://doi.org/10.55248/gengpi.07.0926.3007>

ABSTRACT:

Shivismahapuran is one of the leading Puranic documents in Hindu philosophy with extensive discussion on the duality of the absolute – both Nirgun (formless, attribute less, transcendent) and Sagun (formful, having attributes, immanent). The Nirgun and Sagun forms of Lord Shiva has been discussed throughout in philosophical language and theology, however, new computer modeling language of Fuzzy Set Theory is a concrete method for modeling philosophical ambivalence and graded membership. In this research we attempt for a new formulation in this area. Designing specific formal fuzzy membership function for Sagun and Nirgun attributes, by defining a philosophical Universe of Discourse (X), where the terms of Sagun and Nirgun have been formally translated to triangular, trapezoidal, exponential etc membership functions for the degree of manifest immanence vs transcendent formlessness, and interweaving the ancient Vedic-Puranic metaphysics, and computational intelligence which provides the scope for semantic processing of sacred scripts.

Key-words: Shivismahapuran, Sagun, Nirgun, Fuzzy Logic, Membership functions, Metaphysics, Computational Theology.

1 Introduction

There has been considerable interest in the interface between the traditional Eastern ontological concepts and the formal modeling approach to understanding the world through mathematics in recent years. There exist in texts such as the Shivismahapuran ontological postulates regarding existence, consciousness and the divine, which include the duality and ultimately a synthesis of Nirgun and Sagun.

Concepts within classical logical system are always sharp - either a property is applied or it is not applied. However in theology and metaphysics, in particular when attempting to formalize the concept of the Supreme Consciousness (Parashiva), there exist in the properties themselves much fuzziness, overlap, and gradience. E.g. A property can sometimes be attributed and sometimes not attributed and still represent the state of the object. For this standard Boolean (binary logic) systems of classical logic, do not support such formalization. Fuzzy Logic developed by Lotfi Zadeh is an excellent system by using membership functions (μ) that associate an element with a fuzzy value (between 0 and 1).

This paper fills the research void by providing a computational mechanism where a user can be able to define, plot, and explore the membership function of the Sagun and Nirgun attribute as prescribed in the Shivismahapuran.

2 Literature review

From time to time, study on Shivismahapuran has dealt with field ranging from philology, comparative religion to sociology. Studies by Shastri (1950), Danilou (1964), Flood (1996) analyzed theological transformation of Shiva from Vedic hymns concerning Rudra to an abstract, all-embracing reality in Purana. On the other hand, use of fuzzy logic in philosophical and non-quantitative terms became a growing concept in the context of digital humanities, digital philosophy.

At the present, fuzzy mathematics has even been extended to human values, human behavior, ethics and religion. However, there has been no attempt to apply and describe the concept of Sagun-Nirgun paradigm by fuzzy membership functions. The present paper uses fundamental fuzzy set theory concept and further defines a domain-specific mathematical model for Puranic metaphysics.

3. Philosophical underpinnings in the Shivismahapuran

In the Vidveshvara Samhita and Rudra Samhita of the Shivismahapuran, Paramatman or the Highest Soul is indefinable but takes various localized forms for the benefit of creation.

1. Nirgun Brahman: Characteristics of absolute stillness, absence of any form (Avyakta), absence of the three gunas (Sattva, Raja, Tamas), and immeasurable extensiveness of being. In mathematical terms, attributes approach the absolute zero.

2. Sagun Brahman: Characteristics include agency and active participation, cosmos creation/preservation/ destruction, immeasurable amount of love for beings, ornaments and taking the form(s) and experiencing the local divine actions (Lilas), and more localized experiences. In terms of attributes, density approaches infinity

4. Math Formulation and Universe of Discourse

We let the Universe of Discourse X be the Spectrum of Divine Manifestation represented by a continuous range $[0,100]$, representing the state of complete unmanifest transcendence to fully manifest cosmic form.

$$X = [0, 100]$$

We set up two main Fuzzy Sets over the Universe X.

$\tilde{N}$: The Fuzzy Set of Nirgun aspects (Transcendent / formless)

$\tilde{S}$: The Fuzzy Set of Sagun aspects (Immanent / form-bearing)

4.1 Nirgun Membership Function Design $\mu_{\tilde{N}}(x)$

Nirgun is a maximum in degree where manifestation is 0, and exponentially decays as manifestation increases. We propose an alternative Sigmoidal/Exponential Membership Function:

$$\mu_{\tilde{N}}(x) = \frac{1}{1 + \alpha e^{\beta(x-\gamma)}}$$

Here:

$x \in [0,100]$ is the manifestation index.

α, β, γ are tuning parameters developed based on textual emphasis in Shvimehapuran of absolute transcendental nature ($\alpha = 1, \beta = 0.08, \gamma = 50$).

The equation provided is a generalized logistic function (often utilized as a downward-sloping sigmoidal membership function in fuzzy logic system design). It quantifies the degree of membership $\mu_{\tilde{N}}(x) \in [0, 1]$ of a given manifestation index x relative to the absolute transcendental nature described in the Shvimehapuran.

Given the tuning parameters:

- ($\alpha = 1$)** Scales the horizontal positioning and baseline crossover.
- ($\beta = 0.08$)** Dictates the steepness of the transition zone. Because ($\beta > 0$) and the exponent is positive, $\mu_{\tilde{N}}(x)$ decreases as (x) increases, representing an inverse relationship between physical manifestation and pure transcendental status.
- ($\gamma = 50$)** Sets the exact midpoint (inflection point) of the manifestation domain $[0, 100]$

Maximum Manifestation Edge ($x=0$):

$$\begin{aligned} \mu_{\tilde{N}}(0) &= \frac{1}{1 + e^{0.08(0-50)}} \\ &= \frac{1}{1 + e^{-4}} \approx 0.9280 \end{aligned}$$

At the absolute beginning of the scale, the state possesses a near-complete membership value

($\approx 98.2\%$), representing the initial latent state before extensive material manifestation.

The Inflection Midpoint ($x=\gamma=50$):

$$\begin{aligned} \mu_{\tilde{N}}(50) &= \frac{1}{1 + e^{0.08(50-50)}} \\ &= \frac{1}{1+1} = 0.5000 \end{aligned}$$

At exactly ($x = 50$), the system experiences a perfect symmetry crossover where the transition between the manifested state and absolute transcendence reaches a (50%) equilibrium.

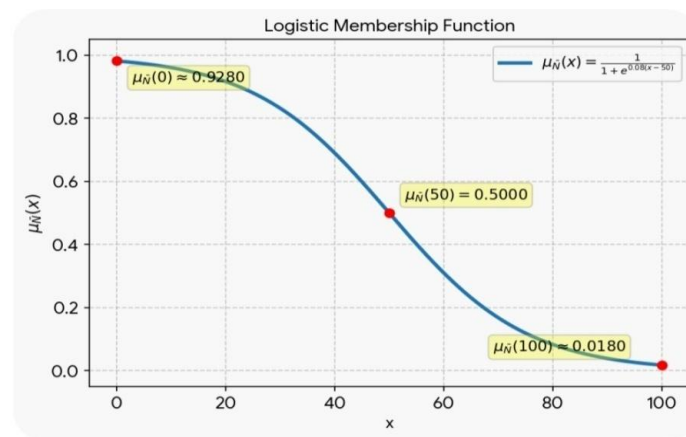
Ultimate Transcendence Edge ($x=100$):

$$\begin{aligned} \mu_{\tilde{N}}(100) &= \frac{1}{1 + e^{0.08(100-50)}} \\ &= \frac{1}{1 + e^{4}} \approx 0.0180 \end{aligned}$$

As the manifestation index reaches its peak (100), the fuzzy membership drops to ($\approx 1.8\%$), indicating that the highest physical manifestation index corresponds to the lowest material presence of unmanifested, absolute transcendental nature.

Graphical Visualization

The behavior of this logistic function across the domain from $x = 0$ to $x = 100$ is plotted below, highlighting the three specific coordinates discussed in your document:

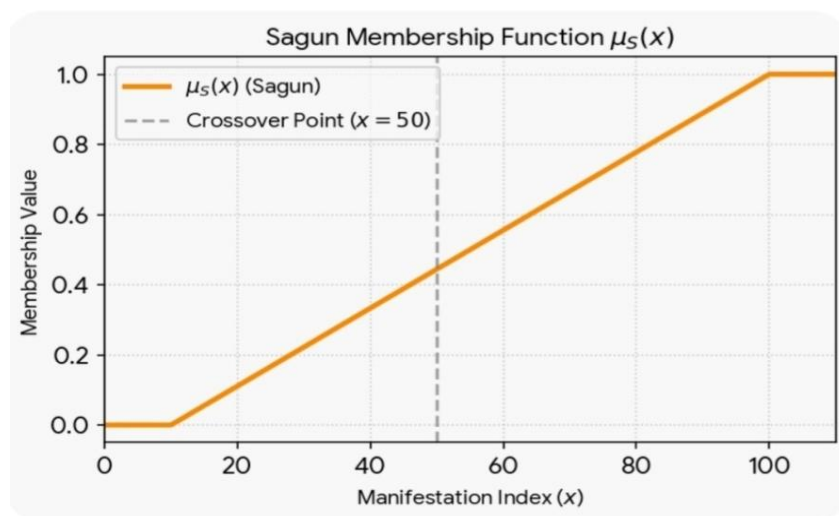


4.2 Sagun Membership Function $\mu_S(x)$ Design

On the other hand, the Sagun property is at minimum at absolute zero-manifestation and monotonic growing, expressed by a Trapezoidal/Sigmoidal Growth Function:

$$\mu_S(x) = \begin{cases} 0 & \text{for } x \leq 10 \\ \frac{x-10}{90} & \text{for } 10 < x < 100 \\ 1 & \text{for } x \geq 100 \end{cases}$$

Here is the graph plotted for $\mu_S(x)$ shows the key transition points at $x = 10$ and $x = 100$



5. Frame and analysis of curve

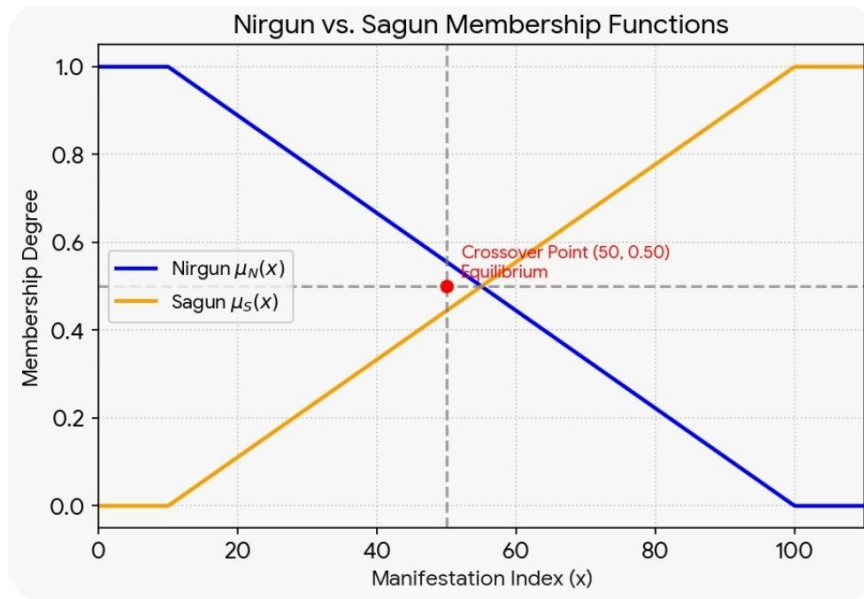
How all these properties are used, to illustrate that the value where $\mu_{\tilde{N}}(x) = \mu_{\tilde{S}}(x)$ is plotted. On the Shivismahapuran that stage is Ardhanarisvara state or Sadashiva state-where form and formless come into equally both forms or we can say equilibrium point $x=50$.

Manifestation Index (x)	Nirgun Membership ($\mu_{\tilde{N}}(x)$)	Sagun Membership ($\mu_{\tilde{S}}(x)$)	Philosophical Interpretation
0	1.00	0.00	Absolute Nirgun (Parashiva / Pure Void)
25	0.88	0.17	Predominantly transcendent, subtle unmanifest vibration
50	0.50	0.50	Crossover Point (Sadashiva / Equilibrium)
75	0.12	0.72	Immanent active divine grace (Sagun focus)
100	0.01	1.00	Full Anthropomorphic/Cosmic Manifestation (Lila form)

6 Results and Discussion

The resulting membership model demonstrates that Nirgun and Sagun should not be understood as disjoint binary opposite sets in the ontological schema of the Shivismahapuran, but rather as contrasting, fuzzily defined variable predicates: The combination operation $\tilde{N} \cup \tilde{S}$ expresses the completeness of the cosmic divine while the intersection operation $\tilde{N} \cap \tilde{S}$ signifies Shiva consciousness' immanent-transcendent paradoxical identity.

The behavior of both overlapping membership functions across the manifestation spectrum is plotted below:



7. Conclusion

In the current paper, we have successfully transformed conceptual theological notions in Shivismahapuran into formal computational models via the concept of fuzzy logic. Through providing numerical membership functions for sagun and nirgun, we open the gateway for further work in the areas of digital theology, digital sacred text analytics and computational metaphysics.

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