

Aesthetics of Sanskrit Poetry from the Perspective of Computational Linguistics: A Case Study Analysis on *Śikṣāṣṭaka*

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Abstract

Sanskrit poetry has played a significant role in shaping the literary and cultural landscape of the Indian subcontinent for centuries. However, not much attention has been devoted to uncovering the hidden beauty of Sanskrit poetry in computational linguistics. This article explores the intersection of Sanskrit poetry and computational linguistics by proposing a roadmap of an interpretable framework to analyze and classify the qualities and characteristics of fine Sanskrit poetry. We discuss the rich tradition of Sanskrit poetry and the significance of computational linguistics in automatically identifying the characteristics of fine poetry. We also identify various computational challenges involved in this process, including subjectivity, cultural context and lack of large labeled datasets. The proposed framework involves a human-in-the-loop approach that combines deterministic aspects delegated to machines and deep semantics left to human experts.

We provide a human annotated analysis of *Śikṣāṣṭaka*, a Sanskrit poem, from the perspective of 6 prominent *kāvyaśāstric* schools, to illustrate the proposed framework. Additionally, we provide compound, dependency, *anvaya* (prose order linearised form), meter, *rasa* (mood), *alaṅkāra* (figure of speech), and *rīti* (writing style) annotations for *Śikṣāṣṭaka* and a web application to illustrate the poem’s analysis and annotations. Our key contributions include the proposed framework, the analysis of *Śikṣāṣṭaka*, the annotations and the web application¹ for future research. We aim to bridge the gap between *kāvyaśāstra* and computational methods and pave the way for future research.

1 Introduction

Sanskrit literature has a rich and diverse tradition that has played a significant role in shaping the literary and cultural landscape of the Indian subcontinent for centuries (Pollock, 2006; Jamison and Brereton, 2014). With its complex grammatical rules and nuanced vocabulary, the Sanskrit language has provided a fertile ground for poets to craft intricate and evocative stanzas that capture the key elements of human experience (Pollock, 1996). From the ancient epics like the *Rāmāyaṇa* and the *Mahābhārata*, to the lyrical works of Kālidasa and Bhartṛhari etc. Sanskrit poetry has embodied the key elements of Indian thought and culture, providing inspiration and contemplation for generations of readers and scholars. However, the researchers in the computational linguistics community have not devoted much attention to uncovering the hidden beauty in Sanskrit poetry (Scharf et al., 2015).

The computational linguistic research community could be interested in identifying fine poetry for various reasons, including the need to evaluate machine-generated poetry (Agarwal and Kann, 2020; Van de Cruys, 2020; Li et al., 2020; Hopkins and Kiela, 2017), translating poetry (Yang et al., 2019; Ghazvininejad et al., 2018; Krishna et al., 2019), to gain a deeper understanding of poetic language (Haider, 2021; Hämmäläinen and Alnajjar, 2019; Waltz, 1975), and to

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¹Link for interactive analysis of *Śikṣāṣṭaka*: <https://sanskritshala.github.io/shikshastakam/>

develop recommender systems (Zhang et al., 2020; Foley IV, 2019) for readers interested in poetry. By analyzing large corpora of poetry (Haider, 2021; Haider et al., 2020; Gopidi and Alam, 2019; Fairley, 1969) and identifying the most outstanding examples, researchers can improve evaluation metrics for machine-generated poetry (Yi et al., 2018; Liu et al., 2019; Ghazvininejad et al., 2017; Gonalo Oliveira, 2017), develop new models and techniques for natural language processing (Hu and Sun, 2020), and promote and preserve cultural heritage. Furthermore, personalized recommendations for readers can be developed based on their preferences.

Analyzing and identifying the characteristics of fine poetry automatically presents several computational challenges, including: (1) Subjectivity: The perception of what makes a poem “good” is subjective and can vary widely among individuals and cultures (Sheng and Uthus, 2020). Developing a computational model that can accurately capture and evaluate the aesthetic qualities of a poem is therefore challenging. (2) Rich language use: Poetry often employs complex language use, including metaphors, similes, allusions, and wordplay, which can be difficult for computational models to understand and generate (Chakrabarty et al., 2021). (3) Cultural context: Poetry is often deeply rooted in cultural and historical contexts (Gopidi and Alam, 2019), which can be challenging for automated systems to comprehend and incorporate. (4) Lack of large labeled datasets: The development of automated systems to identify the characteristics of fine poetry relies on large, labeled datasets, which can be difficult to create due to the subjective nature of poetry and the diversity of cultural and linguistic contexts (Al-Ghamdi et al., 2021; Horvath et al., 2022). Overall, the computational challenges of identifying the characteristics of fine poetry automatically include the development of sophisticated algorithms that can account for the subjective nature of poetry, understand complex language use, incorporate cultural context and work with limited labeled data.

In this article, we aim to address the question of whether we can build an automated and interpretable framework to analyze and classify Sanskrit poetry (*kāvya*) (Kesarwani et al., 2017) into levels of the characteristics of fine composition. This framework has the potential to answer interesting questions such as given two *kāvya*s, which one is more beautiful and why. It could also serve as a valuable tool for pedagogical purposes. The *kāvyaśāstra* provides various perspectives for the analysis of poetry, and we select a *Śikṣāṣṭaka* composition² to analyze from these different perspectives. We also aim to discuss whether computational methods can aid in similar analysis and the limitations of existing state-of-the-art methods. Our proposed framework involves a human-in-the-loop approach (Zhipeng et al., 2019; Ghazvininejad et al., 2017), where deterministic aspects are delegated to machines, and deep semantics are left to human experts. We hope that with further development, this framework can eventually become fully automated, enhancing the appreciation of Sanskrit poetry’s inner beauty for neophytes and Sanskrit enthusiasts alike. We believe that this work can serve as a stepping stone, bridging the gap between the tradition of *kāvyaśāstra* and computational methods, and paving the way for future research in this area.

Our key contributions are as follows:

1. We propose a roadmap of human-in-loop and interpretable framework to classify Sanskrit poetry into levels of the characteristics of fine composition (§4).
2. We illustrate the proposed framework by providing a human annotated analysis of *Śikṣāṣṭaka* from the perspective of 6 prominent *kāvyaśāstra* schools (§6).
3. We provide compound, dependency, *anvaya*, meter, *rasa*, alaṅkāra, *rīti* annotations for *Śikṣāṣṭaka* (§5).
4. We also provide web application³ to illustrate our *Śikṣāṣṭaka* analysis and annotations (§5).

²Refer to the actual piece and its translation in Appendix A.

³Link for interactive analysis of *Śikṣāṣṭaka*: <https://sanskritshala.github.io/shikshastakam/>

5. We publicly release our codebase of framework and web-application for future research⁴

2 Background

The 6 main schools of *kāvyaśāstra* (Poetics): *kāvyaśāstra* is the traditional Indian science of poetics and literary criticism, which has played a significant role in shaping the development of literature and aesthetics in the Indian subcontinent for over two thousand years. The term “*kāvya*” refers to poetry or literature, while “*Śāstra*” means science or knowledge, and *kāvyaśāstra* is thus the systematic study of the nature, forms, and principles of poetry and literature. The roots of *kāvyaśāstra* can be traced back to ancient India, where it developed alongside other branches of learning such as philosophy, grammar, and rhetoric. Over time, *kāvyaśāstra* evolved into a complex and sophisticated system of poetics, encompassing a wide range of concepts and techniques for analyzing and appreciating poetry, such as *rasa* (mood of poetry), *alaṅkāra* (the use of rhetorical and figurative devices), *dhvani* (superiority of suggestive meaning), *vakrokti* (oblique), *aucitya* (appropriateness) and *rīti* (style of writing).

Efforts put in Computational Linguistics: In the field of computational poetry, researchers have tackled various problems using algorithms and computational methods, such as generating new poetry (Agarwal and Kann, 2020; Van de Cruys, 2020; Li et al., 2020; Hopkins and Kiela, 2017; Krishna et al., 2020), translating poetry (Yang et al., 2019; Ghazvininejad et al., 2018) analyzing emotional tone, analyzing rhyme and meter patterns (Kao and Jurafsky, 2012; Greene et al., 2010; Fang et al., 2009), classifying poetry (Baumann et al., 2018; Kesarwani et al., 2017), and recommending poetry (Zhang et al., 2020; Foley IV, 2019). In addition, several studies have specifically examined Sanskrit poetry: Pollock (1977) focused on the technical aspects and structure of Sanskrit poetry, Pollock (2016) offered a comprehensive anthology of classical Indian aesthetics—featuring translations of primary texts by significant thinkers and capturing the intellectual dynamism of the debate on *rasa* theory, Bronner et al. (2014) explored the historical development and significance of *kāvya*, and Kulkarni et al. (2025) conducted a recent study applying mathematical analysis to examine symmetrical patterns in Bharata’s concept of *yamaka*, a poetic device in Sanskrit literature. However, existing work does not focus much on analyzing the characteristics of fine poetry, which is crucial for improving the generation, translation, and recommendation applications. This gap motivates our work, which proposes an interpretable framework to classify Sanskrit poetry into different levels of composition using computational linguistics. We demonstrate the proposed framework by conducting a deep analysis of *Śikṣāṣṭaka*, a Sanskrit poem, from the perspective of 6 well-known *kāvyaśāstric* schools. The key contributions of our article include the proposed framework, the analysis of *Śikṣāṣṭaka*, the annotations, the web application, and the publicly released codebase for future research.

3 Basics of schools, Computational Aspect, Open Issues and Analysis

This section presents the basics of the 7 schools of *kāvyaśāstra* and *chandaśśāstra* (Versification). Each subsection provides a comprehensive overview of the respective school’s fundamentals, the feasibility of developing a computational system, open issues and future directions.

3.1 Metrical analysis

Basics: The bulk of Sanskrit literature consists of poetic works that conform to the conventions of Sanskrit prosody, or *chandaśśāstra*, which involves the study of Sanskrit meters, or *chandas*. The primary objective of utilizing *chandas* is to infuse rhythm into the text to facilitate memorization, while also aiding in the preservation of accuracy to some degree (DEO, 2007; Melnad et al., 2015). Piṅgala is considered to be the father of *chandaśśāstra*. Prominent scholars and their work in this field include Piṅgala (*Chandaśśūtra*), Bharata Munī (*nāṭyaśāstra*), Piṅgala Bhaṭṭa (*Chandomanjari*), Vṛttanātha (*Vṛttaratnākara*), Jagannātha Paṇḍita (*rasagaṅgādhara*),

⁴<https://github.com/sanskritshala/shikshastakam>

etc. Although approximately 1,398 meters are described in Vṛttaratnākara (Rajagopalan, 2018), not all are widely used.

Computational aspect: In *chandaśśāstra*, the classification of each syllable (*akṣara*) in Sanskrit as either *laghu* (short) or *guru* (long) enables the representation of every line of Sanskrit text as a binary sequence comprised of *laghu* and *guru* markers. The identification of specific patterns within these sequences leads to the recognition of various types of *chandas*, thus enabling the deterministic identification of a meter. In recent years, commendable efforts have been made by the computational community to develop user-friendly toolkits for meter identification (Neill, 2023; Rajagopalan, 2018; Terdalkar and Bhattacharya, 2023).

Open issues and future direction: It would be interesting to explore the correlation between the intrinsic mood of the meter and the mood of the poetry. It would also be worthwhile to investigate the relationship between poets and the meters they have employed. This could involve examining patterns in their favorite choices and attempting to identify the poet based on the composition itself. Additionally, there is potential for exploring whether the occurrence of *rasadoṣa* (obstruction in the enjoyment of *rasa*) can be predicted through automatic identification of the composition's *chandas*. These investigations could contribute to a deeper understanding of the relationship between meters, poetry, and emotion in Sanskrit literature.

3.2 *alaṅkāra* school

Basics: This school focuses on the use of figurative language or literary devices to enhance the beauty and aesthetic appeal of poetry. It includes the study of metaphors, similes, personification, hyperbole, and other literary devices. The most important exponent of this school is Bhāmaha, who wrote the *kāvyaśāstra*, one of the earliest treatises on poetic embellishments. Other notable figures associated with this school include Daṇḍin, Udbhaṭa, Rudraṭa and so on. There are two broad categories of *alaṅkāras*: (1) *śabdālaṅkāra*: refers to the figure of sound that relies on the pleasing sound or choice of words, which loses its effect when the words are substituted with others of similar meaning. (2) *arthālaṅkāra*: is the figure of speech that is based on the meaning of words and is not affected by sound.

Computational aspect: The process of identifying *śabdālaṅkāra* is considered deterministic and involves verifying the occurrence of specific patterns of syllables or words. In contrast, the identification of *arthālaṅkāra* presents a significant semantic challenge, even for experienced annotators. The feasibility and difficulty of developing supervised systems for this purpose can be better understood through empirical investigations. There is no system currently available for automated *alaṅkāra* analysis for Sanskrit. To develop a supervised data-driven system, several important questions must be addressed. For instance, it is crucial to determine the amount of data that needs to be annotated, as well as the appropriate methods for marking *alaṅkāra* annotations, such as whether they should be marked at the level of a complete śloka and a phrase. To address these concerns, it is necessary to develop a standardized scheme for *alaṅkāra* annotation. This would enable researchers to collect and analyze annotated data consistently and systematically, which would facilitate the development of accurate and reliable automated systems for *alaṅkāra* analysis.

Open issues and future direction: Moving forward, several directions for research on *alaṅkāras* can be explored. One crucial area is the formulation of the problem of identifying *alaṅkāras*. Since *alaṅkāras* can be assigned to complete or partial stanzas, or sequences of syllables or pairs of words, determining the appropriate approach for identifying them is non-trivial. Different formulations, such as sentence classification, sequence labeling, or structured prediction, can be employed. Another interesting direction for research is to investigate which *alaṅkāras* are more beautiful and how we can compare two compositions based solely on their use of *alaṅkāras*. Defining a basis for evaluating beauty in poetry is a challenging problem in itself. However, understanding which *alaṅkāras* contribute more to the aesthetic appeal of a poem and how to measure this appeal can be valuable for poets and scholars alike. Finally, exploring the correlation of *alaṅkāra* school with other schools of *kāvyaśāstra*, such as *rasa* and *dhvani*, is a

promising area for future research. Understanding how these different aspects of poetry interact can provide insight into the complex mechanisms of poetic expression and perception. Overall, these future directions offer exciting opportunities to deepen our understanding of *alaṅkāras* and their role in poetry.

3.3 *rasa* school

Basics: The *rasa* school of Indian aesthetics places significant emphasis on the emotional impact of poetry on the reader or audience. Bharata muni, the author of the *nāṭyaśāstra*, is considered the most influential thinker associated with this school. His treatise on Indian performing arts includes a detailed discussion of *rasa* theory, which posits that *rasa* is the soul of poetry. According to Bharata, *rasa* is the ultimate emotional pleasure that can be derived from a work of art. *rasa* is the heightened emotional response to the text. Bharata also classified the various emotions depicted in performing arts into eight different *rasas*, or flavors, which are *śṛṅgāra* (romance), *hāsyā* (comedy), *karuṇā* (piteous), *raudra* (anger), *vīra* (heroism), *bhayānaka* (fear), *bībhatsa* (disgust), and *adbhuta* (wonder). The ninth emotion, *śānta* (peace) is also enlisted by the other scholars.⁵ The *śānta rasa* is not compatible for dramas but other kinds of poetry can be composed in this *rasa*. The concept of *rasa* theory remains an integral part of Indian culture and has greatly influenced the performing arts in India and beyond.

In Bharata's *nāṭyaśāstra*, a formula⁶ for the arousal of *rasa* is presented, wherein the combination of *vibhāva*, *anubhāva*, and *vyabhicārī bhāva* is necessary to evoke the experience of *rasa*. The term '*vibhāva*' refers to the stimulants of emotions, while '*anubhāva*' represents the physical responses that accompany emotional reactions, and '*vyabhicārī bhāva*' denotes the transitory emotions. The basic emotions or *bhāvas* of the reader or spectator are activated by the *vibhāvas*, while the *anubhāvas* and *vyabhicārī bhāvas* serve to indicate the emotional response experienced. This formula suggests that the experience of *rasa* is not solely dependent on a single aspect of the literary text or performance, but rather requires the combination of multiple elements to evoke a complete emotional response.

Computational aspect: Computational identification of *rasa* in poetry is an interesting and challenging research area. One of the main challenges in identifying *rasa* computationally is that the interpretation of *rasa* is subjective. Different readers or critics may have different opinions on the dominant emotion evoked by a particular work of poetry. Another challenge is the complexity of the *vibhāva*, *anubhāva*, and *vyabhicārī-bhāva* that contribute to the formation of *rasa*. These elements are often implicit or subtle in the text, and their identification requires a deep understanding of the cultural and literary context in which the text was produced. To overcome these challenges, possible computational approaches that can be taken include using machine learning algorithms to identify patterns in the text that are associated with particular emotions, and incorporating contextual information such as the author, genre, and historical period. In addition, the use of computational linguistics techniques, such as sentiment analysis and topic modeling, may also be helpful in identifying the dominant emotions expressed in a text. However, it is important to note that while computational systems may be able to identify the dominant *rasa* of a work of poetry, they may not be able to fully capture the richness and complexity of the *vibhāva*, *anubhāva*, and *vyabhicārī-bhāva* that contribute to the formation of *rasa*. The identification of these elements requires a deep understanding of the cultural and literary context in which the text was produced, and is likely to remain the purview of human literary critics and scholars. In conclusion, while computational approaches may be able to provide some insight into the identification of *rasa* in poetry, the complexity and subjectivity

⁵*na yatra duḥkham na sukham na dveṣo nāpi matsarah| samaḥ sarveṣu bhūteṣu sa śāntaḥ prathito rasaḥ ||, nāṭyaśāstra .*

Where there is absence of sorrow, joy, hatred, and jealousy, with existing sense of equality for everyone is the '*śānta rasa*'.

⁶*vibhāvānubhāvavyabhicārisamyogādrasaniṣpattiḥ| ,nāṭyaśāstra*
The *rasa* is the combined effect of *vibhāva*, *anubhāva*, *vyabhicārībhāva*

of *rasa* theory poses significant challenges. Further research in this area is needed to develop computational models that can better capture the cultural and literary context of poetic works and the nuances of the *vibhāva*, *anubhāva*, and *vyabhicārī bhāva* that contribute to the formation of *rasa*.

Open issues and future direction: The future direction of computational linguistics in identifying *rasa* in poetry requires a comprehensive approach that covers all the crucial dimensions of the problem. Data annotation is one crucial aspect of the future direction of computational linguistics in identifying *rasa* in poetry. Data annotation involves the manual tagging of texts with information such as the dominant *rasa*, *vibhāva*, *anubhāva*, and *vyabhicārī bhāva*. Possible approaches that can be taken include using supervised machine learning algorithms to identify patterns in the text that are associated with particular emotions. This involves training a model on a labeled dataset of texts annotated with the dominant *rasa* and associated *vibhāva*, *anubhāva*, and *vyabhicārī bhāva*. Another approach is to use unsupervised machine learning algorithms such as clustering and topic modeling to identify the dominant emotions expressed in the text. This approach requires minimal human annotation. In addition, incorporating contextual information such as the author, genre, and historical period can also be useful in identifying the dominant *rasa* in a text.

3.4 *rīti* school

Basics: In this study, the focus is on the concept of *rīti*, also referred to as *mārga* (way), in poetry. It corresponds to “style” in literary analysis. This aspect of poetry has been heavily emphasized by the scholar Vāmana, who considers *rīti* as the soul of poetry. According to Vāmana, there are three *rītis*, namely *vaidarbhī*, *gaudī*, and *pāñcālī*, which were named after the geographical areas from where poets constructed in these styles. The deterministic elements of *rīti* include the letters, length and quantity of compounds, and the complexity or simplicity of the composition. The *vaidarbhī* style is considered the most delightful style of poetry, consisting of all ten *guṇas*⁷ explained by Vāmana. The construction of *vaidarbhī* contains short compounds.⁸ The *gaudī* style, dominated by *oja* and *kānti guṇas*,⁹ and lacks *sukumāratā* and *mādhurya guṇas*. *sukumāratā* and *mādhurya* are the qualities which occur in a construction having less compounds and soft letter combinations are used. But, here in the *gaudī*, the composition possesses long compounds and too many joint consonants. *pāñcālī* style has a simple composition having no or few compounds and simple construction.

Vāmana also describes ten qualities of sound and ten qualities of meaning, including *śleṣa* (ambiguity), *prasāda* (simplicity), *śamatā* (uniformity of diction), *mādhurya* (sweetness or pleasantness), *sukumāratā* (softness), *arthavyakti* (explicitness), *udārata* (raciness), *oja* (floridity), *kānti* (brilliance), and *samādhi* (symmetry).¹⁰ These 10 qualities of poetry are compressed into 3 qualities suggested by letters, compounds, and diction. *mādhurya* (pleasantness), which leads to the melting of the mind, is suggestive of the *sparśa* consonants (k, kh, g, gh, c, ch, j, jh, t, th, d, dh, p, ph, b, bh) with the exception of those in the ‘ṭa’ class (ṭ, ṭh, ḍ, ḍh), combined with nasal consonants (ṇ, ñ, n, m), the consonants ‘r’ and ‘ṛ’ when followed by a short vowel, and when there are no lengthy compounds. *oja*, the cause of lustrous expansion of mind, is suggestive of complex diction consisting of combinations of first consonants of the class (k, c, ṭ, t, p) with the second consonants (kh, ch, ṭh, th, ph) and the third (g, j, ḍ, d, b) with the fourth one gh, jh, ḍh,

⁷ *samagraguṇopetā vaidarbhī* | 2.11, Kāvyaśāstrakāra-sūtravṛtti
The composition style having all the qualities is *vaidarbhī*

⁸ We need to perform empirical analysis of existing annotated poetry to get threshold of length of short compounds.

⁹ *ojaḥkāntimatī gaudīyā* | 2.12, Kāvyaśāstrakāra-sūtravṛtti
oja and *kānti* are the qualities (*guṇas*) that exist in the construction with long compounds and complex arrangement of letters. When these qualities are explicit in the writing style, the *rīti* is called as *gaudī*.

¹⁰ *ojaḥ prasadaśleṣasamatāsamādhimādhuryasaukumāryodāratarthavyaktikāntayo bandhaguṇāḥ* || 3.4, Kāvyaśāstrakāra-sūtravṛtti
Śleṣa, *prasāda*, *Samatā*, *mādhurya*, *Sukumāratā*, *Arthavyakti*, *Udārata*, *oja*, *Kānti*, and *Samādhi* are the 10 qualities of diction.

dh, bh), any consonant with ‘r’ in any order, any consonant with itself, the ‘ṭa’ class without ‘ṇ’, ‘ś’ and ‘ṣ’, and consisting of long compounds. *prasāda* is present in all the *rasas* and all kinds of poetries and *rīti*s equally. In *prasāda* *guṇa*, words can be comprehended right after the hearing of them. In conclusion, *rīti* plays an essential role in the composition of poetry, as emphasized by Vāmana. *vaidarbhī*, *gauḍī*, and *pāñcālī* are the three *rīti*s, each having its own unique features and characteristics. Additionally, the ten qualities of sound and ten qualities of meaning and their compression into three *guṇas* suggested by letters, compounds, and diction are important elements of *rīti*. The proper deployment of these elements can significantly enhance the impact of poetry on the reader or listener.

Computational aspect: The identification of the *rīti* of a composition can be considered a deterministic process. *kāvyaśāstra* provides various clues that enable the classification of a *rīti* category. For instance, if a composition comprises of soft syllables, no joint consonants, and a dearth of compounds or short compounds, it is considered as *vaidarbhī rīti*. Conversely, if a composition contains more joint consonants, long compounds, the usage of fricatives, and specific combinations of joint syllables, it is considered as *gauḍī rīti*. The remaining compositions, which do not fall into these two categories, are classified as *pāñcālī rīti*. To the best of our knowledge, currently no computational system exists that can determine the *rīti* of a composition.

Open issues and future direction: A natural direction for future research would be to consolidate the provided clues and develop a rule-based computational system for the identification of *rīti* in various compositions by different poets. This would enable automated analysis and assessment of *rīti* in *kāvya*. An empirical investigation could be carried out to explore the degree to which *rīti* is effective in identifying the *rasa* of a *kāvya*. Additionally, further research could explore the correlation of *rīti* school with other *kāvyaśāstra* schools. Vāmana, the founder of the *rīti* school, maintains that different *rīti* can provide unique experiences for readers. Therefore, it would be of interest to conduct a cognitive analysis of brain signals of readers after exposing them to compositions of different *rīti*s. This would provide valuable insights into the effect of *rīti* on the reader’s cognitive processes and emotional responses to *kāvya*.

3.5 *dhvani* school

Basics: The school of *dhvani*, a prominent school of Indian poetics, is associated with Ānandavardhana, who authored the seminal work *Dhvanyāloka*, which expounds on the theory of suggestion in poetry. Other significant figures in this school include Abhinavagupta, Mammaṭa, etc. According to the *dhvani* school, poetry’s key elements lies in suggestion or *dhvani*, which alludes to the verbal, hidden, and profound aspects of poetry. This school emphasizes the power of suggestion and implication in poetry and argues that a poem’s true meaning is not merely in its literal content, but in the emotional response it elicits in the reader through suggestion and implication. The meaning is distinguished in three categories : (1) *vācya* or literal meaning, (2) *lakṣaṇa* or indirect meaning, which is preferred when the literal meaning is inadequate and contradictory, and (3) *vyāṅgya* or poetic/metaphorical meaning, which is a deeper meaning that does not conflict with the literal meaning and evokes wonder by reaching out to the soul of poetry. When the *vyāṅgyārtha* is felt more delightful than the other meanings, the *vyāṅgyārtha* is called as *dhvani* or suggested meaning.¹¹ Based on the degree of *dhvani*, a poem is classified into three categories that demonstrate high, medium, or low conformity with the standards of fine Sanskrit poetry, as articulated by experts in *kāvyaśāstra*: (1) *uttama kāvya* or high composition, (2) *madhyama kāvya* or medium composition, and (3) *adhama kāvya* or low composition. In *uttama kāvya*, *dhvani* is present, evoking wonder in the reader. In *madhyama kāvya*, *vyāṅgyārtha* is present, but it does not evoke wonder compared to *vācārtha*, while in *adhama kāvya*, *dhvani* is absent. Furthermore, *dhvani* is divided into three broad categories: (1)

¹¹ *yatrārthaḥ śabda vā tamarthamupasarjanīkṛtasvārthau / vyañktaḥ kāvyaviśeṣaḥ sa dhvanirīti sūribhiḥ kathitaḥ* // 1.13, *Dhvanyāloka*

(When the word and its meaning in a poetry, bestow to obtain the suggestive sense, which arouses the pleasure, is called as the *dhvani* by the learned men.)

vastu-dhvani, which implies some rare fact or idea, (2) *alanikāra-dhvani*, which suggests a figure of speech, and (3) *rasa-dhvani*, which evokes a feeling or mood in the reader.

Computational aspect: Identifying *dhvani* in *kāvya* computationally is a complex and challenging task due to the subjective nature of literary interpretation and the intricacy of the language. *dhvani*, which encompasses various layers of meaning, including literal, indirect, and metaphoric, presents a challenge to computational identification due to the absence of annotated data. Poetic devices such as simile, metaphor, and alliteration add to the complexity of creating a unified set of features for the identification of *dhvani*. Furthermore, identifying *dhvani* requires additional information, such as the context, mood of the composer, his biography, and his other compositions. The cultural and historical context further complicates the identification of *dhvani*, which often requires scholars' commentaries to decode the layers of meanings. Even humans may not be able to identify *dhvani* without these inputs, indicating the level of expertise required for such tasks. At present, to the best of our knowledge, no system is available to provide *dhvani* analysis for Sanskrit poetry.

Open issues and future direction: In future research, it is crucial to address the challenges of identifying suggestive meaning in poetry by formulating a well-defined problem statement. One potential direction is to explore the use of machine learning techniques to identify *dhvani* in *kāvya*. This could involve developing annotation schemes that capture different levels of meaning, including literal, indirect, and metaphoric, which can be used to train machine learning models. Evaluation of performance is another important direction for future research. Metrics could be developed to measure the accuracy of the system's predictions of *dhvani*. These metrics could be based on human evaluations or derived automatically by comparing the system's output to expert annotations. One additional aspect that could be explored in future research is the use of multi-lingual and cross-lingual approaches for identifying *dhvani*. Many works of Sanskrit poetry have been translated into other languages, and it would be interesting to investigate whether the same *dhvani* can be identified across languages, and whether insights from one language can be used to improve the identification of *dhvani* in another language. Lastly, researchers could explore ways of integrating multiple sources of information to improve the accuracy of *dhvani* identification. For example, incorporating biographical information about the composer, their other works, and the cultural and historical context of the composition could help to disambiguate multiple possible meanings and identify the intended *dhvani* more accurately.

3.6 *vakrokti* school

Basics: Kuntaka's *vakrokti* school is a prominent school of Indian poetics that emphasizes the use of oblique expressions in poetry. Kuntaka's seminal work, *Vakroktijīvitā*, lays out the principles of this school and classifies the levels of expression of *vakrokti* into six categories. The first category is phonetic figurativeness, which involves the skillful use of syllables to embellish the sound of the poem. This is closely related to *rītis* and *anuprāsa* (alliteration) *alanikāra*, which are types of *śabdalanikāra*. The second category is lexical figurativeness, which involves the use of oblique expressions at the level of the root word without suffix. The third category is the obliqueness in the suffixes. The fourth category is involves the figurativeness, which involves the use of oblique expressions at the level of the sentence. In this category, one has to rely on a complete sentence to understand the oblique meaning. Different *arthalanikāras* are categorised under this category. The fifth category is sectional figurativeness, which involves the twist in the chapter-wise arrangement of the poetry. The sixth category is compositional figurativeness, which involves understanding the oblique meaning by relying on the complete composition. Kuntaka considers *vakrokti* to be the soul of poetry, and argues that it is the only embellishment possible to the word and its meaning. The use of *vakrokti* is essential to create effective poetry, and mastery of the six levels of expression is fundamental to the creation of effective poetry in the *vakrokti* school.

Computational aspect: Upon analysis of Kuntaka's *vakrokti* school, it becomes apparent that his theory of oblique expression incorporates various elements of the previously established

schools of *rīti*, *rasa*, *dhvani*, and *alaṅkāra*. Despite this, Kuntaka’s contribution to the field lies in his systematic classification of 6 levels of oblique expression. However, the computational challenges posed by the deep semantics of this theory are similar to those discussed in the other schools. Therefore, it is difficult to develop a module capable of accurately identifying *vakrokti* in a composition. To date, no computational system exists for computing *vakrokti*, as it remains a complex and challenging task.

Open issues and future direction: As the field of NLP advances, there is growing interest in exploring the use of oblique expressions in computational models. In particular, the study of oblique expressions can contribute to the development of natural language generation, sentiment analysis, and machine translation systems. One potential area of research is the identification and classification of oblique expressions in large corpora of texts. Machine learning algorithms can be trained to recognize patterns of oblique expression usage and distinguish between different types of oblique expressions, such as the six categories identified in the present analysis of *Śikṣāṣṭaka*. This would require the creation of annotated datasets that can be used for training and testing purposes. Another area of research is the development of computational models that can generate oblique expressions in natural language. Such models could be trained to generate oblique expressions based on the context of the text and the intended meaning. This would require a deep understanding of the different types of oblique expressions and their functions, as well as the ability to generate language that is both grammatically correct and semantically appropriate. Despite the potential benefits of using oblique expressions in computational models, there are also several challenges that need to be addressed. One of the main challenges is the ambiguity of oblique expressions, which can make it difficult for computational models to accurately interpret their meaning. Another challenge is the variability of oblique expression usage across different languages and cultural contexts, which requires a more nuanced and context-specific approach.

3.7 *aucitya* school

Basics: Kṣemendra, a renowned poet of the 11th century, introduced the concept of *aucitya* in his seminal work *aucitya-vicāra-carcā*. *aucitya*, meaning appropriateness, suggests that the elements of poetry, such as *rasa*, *alaṅkāra*, and *rīti*, should be used in an appropriate manner.¹² *aucitya* is considered the soul of a poem, and appropriateness is regarded as the secret of beautiful composition. This theory has been widely accepted by scholars without any argument and is often referred to as the ‘Theory of Coordination’ since it regulates all aspects of *nāṭyaśāstra*. *aucitya* is a tool that aids writers in wielding their poem according to their will and effectively delivering their ideas. Kṣemendra categorized *aucitya* into several classes, namely *pada* (word form), *vākya* (sentence), *prabandhanārtha* (meaning of the whole composition), *guṇa* (qualities), *alaṅkāra* (poetic figures), *rasa* (sentiments), etc. In conclusion, Kṣemendra’s concept of *aucitya* has had a significant impact on the field of poetry. The idea of appropriateness and the use of poetry elements in a balanced manner are essential components of successful composition. The categorization of *aucitya* into multiple classes provides a comprehensive framework for analyzing and understanding the nature of poetry. Therefore, *aucitya* is an invaluable tool for writers, enabling them to deliver their ideas efficiently and effectively.

Computational aspect: According to the available literature, no computational system currently exists that provides an analysis of *aucitya*. In order to develop a module for *aucitya* analysis, we propose considering the mutual compatibility of *rīti*, *rasa*, and *alaṅkāra* in the initial implementation. For instance, *vaidarbhī* is considered a compatible *rīti* when deploying the *śṛīgāra rasa*, while *gauḍī* is appropriate for the *vīra rasa*. Additionally, certain *alaṅkāras* are suitable for specific *rasas*. At a later stage, we may annotate corpora and build data-driven metrics to automatically measure the *aucitya* of a composition. However, to accomplish this, it

¹² *ucitasthānavinyāsādalaṅkṛtiralaṅkṛtiḥ | aucityādacyutā nityaṃ bhavantyeva guṇā guṇāḥ*||
(The figures are decorative when they do not overpass the appropriateness in the poetry. The qualities can be assumed as qualities in real sense when they follow the validity of appropriateness.) 1.6, *aucitya-vicāra-carcā*

is essential to establish standardized data annotation policies in advance. One major challenge in evaluating poetic appropriateness across various languages, cultures, and time periods is the lack of standardized rules or models. Furthermore, the subjective nature of poetic appropriateness makes it challenging to reach a consensus among scholars and experts on the definition of *aucitya*.

Open issues and future direction: Moving forward, the development of a computational system for *aucitya* analysis presents an exciting area of research. In terms of future directions, several questions can be explored. Firstly, the effectiveness of the proposed mutual compatibility approach between *rīti*, *rasa*, and *alanikāra* needs to be evaluated by analyzing the performance of the initial module. Furthermore, additional features could be incorporated to improve the accuracy of *aucitya* analysis, such as word choice, meter, and rhyme patterns. Moreover, there is a need to establish standardized guidelines for the annotation of corpora in different languages and cultural contexts. This would facilitate the creation of a large, diverse dataset that can be used to train the *aucitya* analysis system. Additionally, research could focus on the development of data-driven metrics that automatically evaluate poetic appropriateness. Another potential direction for research is to investigate the interplay between language, culture, and poetic appropriateness. This involves analyzing the extent to which poetic conventions vary across different languages and cultures and how these variations affect the evaluation of *aucitya*. The impact of historical and temporal changes on poetic conventions can also be explored to understand the evolution of poetic conventions over time. Finally, collaboration between experts in literature and computer science can help establish a consensus on what constitutes *aucitya*. This could lead to the development of a standardized set of rules and models for evaluating poetic appropriateness, which could be applied across different languages, cultures, and time periods.

4 The proposed framework

This section presents the description of a proposed framework for the analysis and classification of poetry. The framework is designed to categorize compositions into 3 classes that demonstrate high, medium, or low conformity with the standards of fine Sanskrit poetry, as articulated by experts in *kāvyaśāstra*. Figure 1 depicts the proposed framework, which employs a hierarchical ensembling architecture consisting of 7 modules. The violet modules are deterministic, while the remaining modules are learning-based and currently supported by human experts. Each module can be trained independently, and the outputs and features of the previous modules are utilized to enhance the performance of the next phase modules. The *aucitya* module is responsible for learning the weight of each module by employing all their outputs, except the meter module. We illustrate the proposed framework by showing analysis on *Śikṣāṣṭaka* composition. Refer to Appendix 6 for the rationale behind the selection of *Śikṣāṣṭaka* and its analysis.¹³

The first layer of the framework consists of 3 modules namely, *rīti*, Meter and *alanikāra* module. The *rīti* module is the first module in the proposed framework, and it is responsible for identifying the *rīti* of a composition. This is deterministic, and the classification is enabled by various clues provided by the *kāvyaśāstra*. The next module, the meter identification module, is also deterministic, and commendable efforts have been made by the SCL community in recent years to develop user-friendly toolkits for the identification of meter (Neill, 2023; Rajagopalan, 2018; Terdalkar and Bhattacharya, 2023). In the *alanikāra* module, the identification of *śabdalanikāra* is considered deterministic, and it involves verifying the occurrence of specific patterns of syllables or words. In contrast, the identification of *arthalanikāra* presents a significant semantic challenge, even for experienced annotators. The module relies on a supervised paradigm of binary classification to identify whether any *arthalanikāra* is present or not. The *rasa* and *vakrokti* (oblique) modules are the next two modules in the framework. For the *rasa* module, a classification problem with 9 classes of *rasas* is framed. These *rasas* are *śṛṅgāra* (love and beauty), *hāsyā* (comedy), *karuṇā* (piteous), *raudra* (anger), *vīra* (heroism), *bhayānaka* (fear), *bībhatsa*

¹³We could not keep this as part of the main article due to the space constraints.

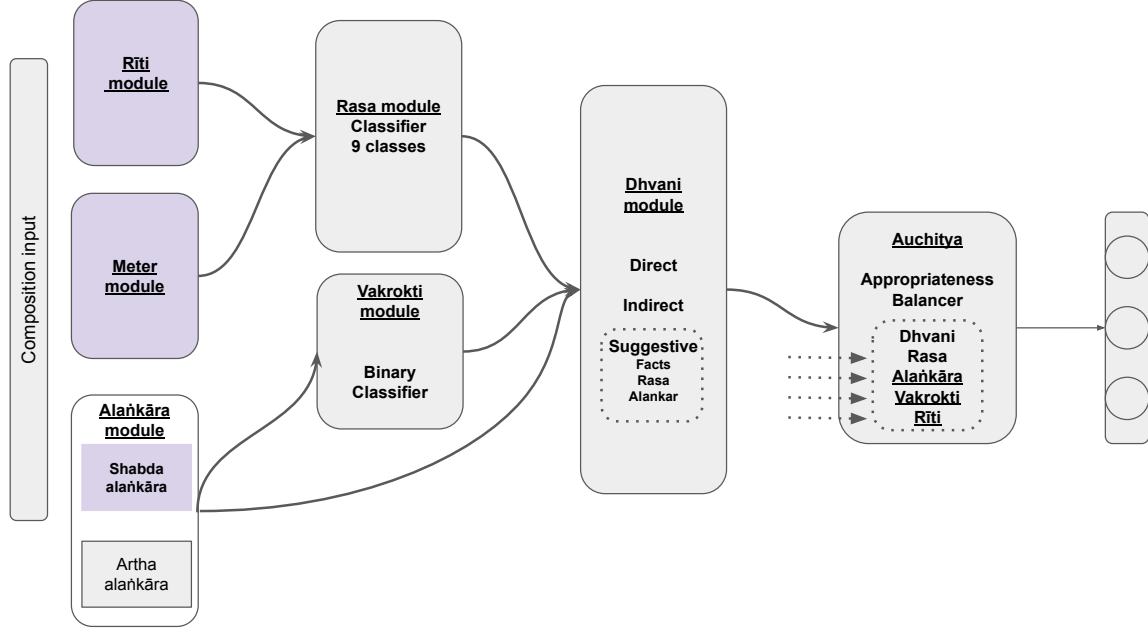


Figure 1: The proposed framework for analysis and classification of poetry using a hierarchical ensembling architecture. It consists of 7 modules, with violet modules being deterministic and the rest being supervised modules, currently supported by human experts. All modules are trained independently. The outputs and features of previous modules are helpful for the next phase modules, and the *aucitya* module learns the weight of each module using all their outputs except the meter module. The composition is finally classified into three classes that demonstrate high, medium, or low conformity with the standards of fine Sanskrit poetry, as articulated by experts in *kāvyaśāstra*. We illustrate the proposed framework by showing analysis on *Śikṣāṣṭaka* composition. Refer to Appendix 6 for the composition.

(disgust), *adbhuta* (wonder), and *śānta* (peace). It is argued that *rīti* and meter may be helpful and can serve as auxiliary information to identify *rasa*; therefore, they are used as features in the *rasa* module. The *vakrokti* module is framed as a binary classification problem to identify the presence of oblique. Here, the *alaṅkāra* module has a strong correlation in contributing to oblique identification. The next layer of the module is the *dhvani* module, which is also a classification problem with 3 classes: direct meaning, indirect meaning, and suggestive meaning. Suggestive meaning has a strong correlation with *rasa*, *alaṅkāra*, and *vakrokti*. Therefore, these features are plugged into the *dhvani* module. Finally, the *aucitya* module learns the weight of each module using a supervised paradigm. These weighted features of all modules are used for the final classification of the composition into three classes that demonstrate high, medium, or low conformity with the standards of fine Sanskrit poetry, as articulated by experts in *kāvyaśāstra*. In the absence of annotated data, human experts are relied upon for the modules that are supervised modules. In the future, it is hoped that all the modules can be automated, and researchers can consider training these modules in an end-to-end fashion. Overall, the proposed framework presents a systematic approach to analyze and classify poetry into different categories based on various features. The framework has the potential to assist poets, scholars, and critics in the evaluation of compositions and provide insights into the nuances of poetry.

5 Web Interface

This work employs compound tagging, morphological tagging, *Kāraka* dependency tagging, and *anvaya* to annotate the *Śikṣāṣṭaka*. The primary objective of this annotation exercise is to

facilitate a literal understanding of the composition. By providing grammatical information, this annotation serves as a baseline to evaluate the *dhvani*, or poetic suggestion, of the composition. The stanzas were annotated by 4 annotators, each an expert in one of the aforementioned tasks. In cases where there was a discrepancy in the annotation process, the annotators discussed and resolved the issue. All annotators hold a minimum academic qualification of a Master in Arts in Sanskrit. The annotations are publicly available via an interactive web-based platform as well as standard text annotation format.



Figure 2: Web-based interactive modules to illustrate annotations and poetry analysis. Here, we showcase the verse-level analysis for *alankāra* module.

Web-based application The motivation to build a web-based application to illustrate poetry analysis (Delmonte, 2015; Delmonte and Prati, 2014) is that it can help to make poetry analysis more accessible, engaging, and effective, providing students with a rich learning experience that encourages deeper understanding and appreciation of this art form. This template can serve as a proxy to illustrate how an automated system should produce the poetry analysis. There are 7 dimensions to our analysis which can be classified into two broad categories, namely, stanza-level (metrical and *alankāra* analysis) and global-level (*rīti*, *vakrokti*, *rasa*, *dhvani* and *auchitya* analysis). As the names suggest, stanza-level analysis shows the analysis for each stanza and global analysis considers complete composition to provide the respective analysis. The stanza-level modules are shown in blue color and the rest in purple. Our platform can provide the analysis in two possible ways. First, a user can choose to analyze any stanza through all the modules. Otherwise, the user can also opt for choosing any module and analyzing all the stanzas from the perspective of the chosen module. Our web template leverages the flex module to provide interactive features. We publicly release of the web application along with the codebase to facilitate future research in this direction.

6 Śikṣāṣṭaka analysis

In this section, we provide reasoning for choosing the *Śikṣāṣṭaka* and demonstrate the suggested framework through its analysis. Our thorough analysis shows that *Śikṣāṣṭaka* is indeed an *uttama kāvya*.

Why *Śikṣāṣṭaka*: To facilitate a more thorough and nuanced analysis of *kāvya*, we set a few criteria to guide our selection of the most appropriate composition for our study. These criteria are as follows: (1) the composition should be sufficiently small to enable comprehensive scrutiny

from diverse *kāvyaśāstra* perspectives; (2) the poet who has authored the composition ought not to possess a significant reputation in the *kāvyaśāstra* domain to obviate the potential for biases that may arise from establishing the composition as *uttama kāvya*; (3) the composition should have made a substantive contribution to the traditions from a non-literary perspective to explore the role of *kāvyaśāstra* aspects in its accomplishment.

The *Śikṣāṣṭaka* composition is well-suited for our analysis as it satisfies all three criteria that we have established. First, it meets the requirement of being compact enough to allow for in-depth examination from various *kāvyaśāstra* perspectives as it consists of only eight stanzas.¹⁴ Additionally, not all *aṣṭakas* can be considered *uttama kāvya* (the fine poetry), which further supports its appropriateness as a subject of study. Second, the author of *Śikṣāṣṭaka*, Caitanya Mahāprabhu, is not primarily known as a poet or literary figure.¹⁵ Thus, he meets the second criterion of not being a well-established poet in the *kāvyaśāstra* domain, which helps to minimize the potential biases that could arise from claiming the composition as *uttama kāvya*. Finally, *Śikṣāṣṭaka* has made significant contributions to the traditions of Gauḍīya Vaiṣṇavism from a non-literary perspective, which satisfies the third criterion. This composition has significantly influenced the lifestyle of the religious community adhering to the principles of Gauḍīya Vaiṣṇavism, serving as the fundamental backbone of their philosophy for the past 500 years. The enduring prevalence and practice of these teachings within the community underscore the profound impact of this composition on their way of life. In summary, the *Śikṣāṣṭaka* composition satisfies all three criteria of our selection process, making it an excellent choice for our analysis.

alaṅkāra analysis: In our analysis of the *Śikṣāṣṭaka*, we have employed the *alaṅkāra* categorization outlined by Mammaṭa in his influential work “Kāvya prakāśa”. This text provides a comprehensive overview of 67 *alaṅkāras* or literary ornaments that can be utilized to embellish and enhance the expression of poetry. According to the *alaṅkāra* school, *alaṅkāra* is considered the soul of poetry, and without its incorporation, a poetic composition lacks vitality. In other words, *kāvya* without *alaṅkāra* is likened to a lifeless entity, deemed by some poets of this school to be comparable to a widow.¹⁶ Furthermore, it is worth noting that certain poets from this tradition place greater emphasis on *arthālaṅkāra*, or figurative language, over *śabdālaṅkāra*, which deals primarily with sound patterns and word repetition. The *Śikṣāṣṭaka*, a devotional composition in Sanskrit, exhibits the mood of separation (*vipralambha-śṛṅgāraḥ*) as its primary *rasa* or mood. The author portrays himself as a devotee, and his beloved is Lord Govinda. The appropriate use of *alaṅkāras* (figures of speech) in this composition serves to express the *rasa* without hindrance. The author employs *śabdālaṅkāras* (*anuprāsa*¹⁷) and *arthālaṅkāras* (*rūpaka*¹⁸, *upamā*¹⁹, *vyatireka*²⁰, *tulyayogitā*²¹ and *viśeṣokti*²²) in *Śikṣāṣṭaka*. The use of *rūpaka*

¹⁴We encourage readers to go through this composition: <https://sanskritshala.github.io/shikshastakam/shloka.html> where word-to-word meanings and translations are given.

¹⁵Before becoming the leading figure of the bhakti movement, he was a Sanskrit teacher and a formidable debater. Thus he had full control of the subtleties of the language.

¹⁶*alaṅkārahitā vidhavaiva sarasvatī*/ 2.334, Agnipurāṇa
A poetry which is also a form of goddess Sarasvatī, is not decorated by *alaṅkāras*, looks like a widow, who is not wearing any ornaments.

¹⁷*varṇasāmyamanuprāsaḥ*/ 9.79, Kāvya prakāśa
The similarity in the letters used in the poetry is ‘Anuprāsa’. It is similar to the alliteration.

¹⁸*tadrūpakambhedo yaḥ upamānopameyayoḥ*/ 10.93, Kāvya prakāśa
Rūpaka is a figure of speech, where the *upameya*, which is being compared and the *upamāna* with which is compare are explained as if both are not different from each other. It is similar to the metaphor.

¹⁹*sādharmyamupamā bhede*/1.87, Kāvya prakāśa
When the *upameya* and the *upamāna* are not compared based on the similarity possessed by the both is called as *Upamā*. It is similar to the simile.

²⁰*upamānād yadanyasya vyatirekaḥ saḥ eva saḥ*, 10.105, Kāvya prakāśa
If the *upameya* is said to be having a higher degree of quality than the *upamāna*, then it is called as *vyatireka alaṅkāra*.

²¹*nīyatānāni sakṛddharmaḥ sā punaḥ tulyayogitā*/ 10.104, Kāvya prakāśa
A single mention of a property belonging to various other things is *Tulyayogitā*

²²*viśeṣoktirakhaṇḍeṣu kāraṇeṣu phalāvacaḥ*/ 10.108, Kāvya prakāśa
The condition in which various reasons are stated but the result is not seen is called *viśeṣokti*. There are two

(metaphor) and *upamā* is frequent, with the former appearing 6 times and the latter 4 times. The metaphors are employed to equate two things directly, while similes use “like” or “as” to make comparisons.

In the first stanza, the author uses a series of 5 metaphors to describe the victory of *Śrīkṛṣṇa Saṅkīrtana*. The use of these metaphors creates a garland-like effect, which serves as an offering to acknowledge the victory of *Śrīkṛṣṇa Saṅkīrtana*. Additionally, the use of *antyānuprāsa Śabdalaṅkāra* (a figure of speech where every word ends with a similar suffix) creates a rhythmic effect. In the second stanza, the author expresses his sorrow of not having an attachment to such a glorious *Saṅkīrtana*, where the Lord invests all his potencies without keeping any rules and regulations. Although there is every reason to get attached to such *Saṅkīrtana*, the author cannot get attached, which is expressed through *Uktanimitta viśeṣyokti alaṅkāra*. This *alaṅkāra* is used to denote that all the causes are present for action to happen, yet the action does not occur. In the third stanza, the author talks about the prerequisites of developing attachment for the *Saṅkīrtana*: humility and tolerance. The author employs *vyatireka alaṅkāra* to embellish this stanza by comparing humility with a grass and tolerance with a tree. In this figure of speech, the subject of illustration (*upamāna*) has higher qualities than the subject of comparison (*upameya*). Thus, the author says that one should be lower than a grass and more tolerant than a tree. In the fourth stanza, multiple things (wealth, followers, beautiful women and flowery language of Vedas) are coupled with a single property “*na kāmāye*” (do not desire). This device is called *tulyayogitā alaṅkāra*. In the fifth stanza, the author beautifully couples metaphor and simile to express his eternal servitude to Govinda. The author compares the way water drops fall from a lotus into the mud, similarly, he has fallen from Govinda’s lotus feet to the ocean of nescience (material existence) as a dust-like servant. The author requests Govinda to place him back at his lotus feet. In the sixth stanza, again *tulyayogitā alaṅkāra* is employed to connect different symptoms mentioned to a single property. In the seventh stanza, the author expresses his intense feeling of separation from Govinda by deploying three similes (*upamā alaṅkāra*). The author uses these similes to express his love in the mood of separation. He compares a moment to a great millennium, his eyes to the rainy season, and the entire world to void. This garland of similes (*māloṇamā alaṅkāra*) serves as an offering to express the author’s love for Govinda. The final stanza employs the *anuktanimitta-viśeṣyokti* device, wherein a condition is expressed but the consequent effect is absent, and no explanation is offered for the lack of effect. This constitutes the *anuktanimitta-viśeṣyokti alaṅkāra*. The author enumerates several potential causes for being despised, yet the anticipated outcome of animosity does not manifest. Despite hatred conditions, the author maintains devotion to the lord. The rationale for the absence of hatred is not mentioned here. In conclusion, the *Śikṣāṣṭaka* employs a range of *alaṅkāras* to express its mood (*rasa*) without hindrance. The appropriate use of metaphors, similes, and other figures of speech serves to create a garland-like effect that acknowledges Govinda’s glory and expresses the author’s devotion and love.

Metrical analysis: The *aṣṭaka*, which comprises a series of 8 stanzas, is typically composed in a single meter. In the case of the *Śikṣāṣṭaka*, there are 5 meters employed, namely, *śārdūlavikrīḍita*, *vasantatilaka*, *anuṣṭup*, *vijoginī* and *upajāti* (*indravamśa* and *vaṃśastha*). Further details on how to identify meters can be found in the relevant literature (Neill, 2023; Rajagopalan, 2018; Terdalkar and Bhattacharya, 2023). The identification of meters has aided in the identification of typographical errors (*tanuja* → *tanūja*, *dhūli* → *dhūlī*, *gadagada* → *gadgada*) in some of the existing manuscripts of the *Śikṣāṣṭaka*. One may wonder about the use of 5 different meters in the *Śikṣāṣṭaka*. Some scholars, or *ācāryas*, have argued that the stanzas were not composed in a single sitting. Rather, they were collected in Rupa Goswami’s (disciple of the author of *Śikṣāṣṭaka*) *Padyāvalī*, which is an anthology of compositions by expert poets in the *gauḍīya* Vaiṣṇava tradition. Kṛṣṇadas Kaviraj Goswami later compiled and arranged them

types of this figure of speech. 1) - when the reason is specified for the unseen effect it is *uktanimitta-viśeṣyokti* otherwise it is *anuktanimitta-viśeṣyokti*.

in a meaningful order in his composition, the Caitanya Caritāmṛta. We posit that the use of multiple meters serves as an evidence supporting this claim.

rasa analysis: A fundamental aspect of evoking *rasa* involves combining three elements, namely *vibhāva*, *anubhāva*, and *vyabhicārī bhāva*. The *vibhāvas* activate the basic emotions or *bhāvas* of the reader or spectator, while the *anubhāvas* and *vyabhicārī bhāvas* indicate the emotional response experienced. In the composition under discussion, the author assumes the mood of a devotee and reciprocates with his beloved Lord Kṛṣṇa. The author employs several words to indicate that the *vibhāva* is *kṛṣṇa*, including *śrī-kṛṣṇa-saṅkīrtanam* (congregational chanting of Kṛṣṇa’s holy name), *nāmnām* (Kṛṣṇa’s holy name), *hariḥ* (another name of Kṛṣṇa), *nanda-tanuja* (Kṛṣṇa, the son of Nanda Maharaj), *tava nāma-grahaṇe* (chanting Kṛṣṇa’s holy name), Govinda (another name of Kṛṣṇa), and *mat-prāṇa-nāthaḥ* (the master of my life). The *anubhāva* of the author is evident in the seventh stanza, where he expresses intense feelings of separation. He considers even a moment to be a great millennium, and tears flow from his eyes like torrents of rain. He perceives the entire world as void. The author employs several words to indicate the *vipralambha śṛṅgāra*, such as *nānurāgaḥ* (no attachment to Kṛṣṇa), *a-darśanāna* (Kṛṣṇa not being visible), *govinda-virahaṇa* (separation from Govinda), and *mat-prāṇa-nāthaḥ* (the master of my life). In conclusion, it is evident from our analysis of *vibhāva* and *anubhāva* in this composition that the *rasa* evoked is *vipralambha śṛṅgāra*, which is characterized by intense feelings of separation and longing. The author effectively employs *vibhāvas*, such as the names and descriptions of Kṛṣṇa, to activate the basic emotions of the reader or spectator, while his *anubhāvas*, such as his intense feelings of separation and tears, serve to indicate the emotional response experienced. The composition is a powerful example of how the combination of *vibhāva* and *anubhāva* can be used to evoke *rasa* in Indian classical literature.

rīti analysis: The *Śikṣāṣṭaka* is an example of a composition that embodies the *mādhurya guṇa* and *vaidarbhī rīti*. This is apparent through the simple composition, usage of soft consonants, limited occurrence of long compounds, and the restricted usage of joint consonants. Moreover, the *rasa* of the *kāvya* is *vipralambha śṛṅgāra*, which is aptly brought out through the use of *vaidarbhī rīti* and *mādhurya guṇa*. The utilization of any other *rīti* would have led to a *rasa doṣa*, highlighting the significance of choosing the appropriate *rīti* to convey the intended *rasa*.

dhvani analysis: The *Śikṣāṣṭaka* is a set of 8 stanzas containing sublime instructions delivered without any specific audience. In contrast to the Bhagavad-gītā, which is directed towards a particular audience, the *Śikṣāṣṭaka* is meant for inner contemplation and self-instruction. We can draw three possible dhvanis from these 8 stanzas. *The first dhvani deals with the sambandha, abhidheya, and prayojana for a devotee.* *sambandha* refers to the relation of the subject with the *abhidheya* of devotion, *abhidheya* refers to the means of devotion which is being stated, and *prayojana* refers to the fruit of devotion. The first five stanzas of the *Śikṣāṣṭaka* discuss the *sambandha* aspect, while the entire set of stanzas serves as the *abhidheya*. The last three stanzas focus on *prayojana*, which involves absorption in the remembrance of Kṛṣṇa and the intense emotions that this experience brings.

The second dhvani presents the higher stages of devotional service. The first five stanzas describe *sādhana bhakti*, or the devotional service that is practiced through discipline and rules. The last 3 stanzas discuss *prema*, the ultimate perfection of devotion. *The third dhvani is the biography of the author.* In the initial stanza of the *Śikṣāṣṭaka*, the author’s proficiency in Sanskrit grammar and poetry is conveyed by the phrase “*vidyā-vadhū-jīvanam*.” The Caitanya Caritāmṛta (CC) further provides a detailed description of the author’s logical expertise, wherein he is seen to skillfully refute and reestablish his own arguments, as well as his prowess in teaching devotion to Kṛṣṇa through grammar. Additionally, CC narrates an incident where the author defeated the great poetry scholar Keśava Kāśmirī. The phrase “*parami vijayate śrī-kṛṣṇa-saṅkīrtanam*” illustrates the author’s victorious preaching of the message of *saṅkīrtanam*, or congregational chanting of the holy names of Kṛṣṇa. CC even goes on to mention how

animals like tigers, deers and elephants were inspired to participate in *saṅkīrtanam*, resulting in a blissful embrace between a tiger and a deer. The second stanza of the *Śikṣāṣṭaka* reveals the author's egalitarian nature, as he considered everyone to be eligible to participate in *saṅkīrtanam* without any discrimination. The third stanza introduces the author's *bīja-mantra*, which urges one to develop a taste for *saṅkīrtanam* and show mercy towards all living entities. The author's adherence to the principle of humility is evident in his desire for devotees to follow the same. The fourth stanza recounts the author's renunciation of wealth, followers, and even his beautiful wife at the age of 24 to embrace the life of a *sanyāsi*, or a renunciant. The last three stanzas of the *Śikṣāṣṭaka* reflect the author's mood of separation in the last 24 years of his life. The CC provides a vivid description of the same. In summary, the author's teachings in the *Śikṣāṣṭaka* are a reflection of his own life experiences and practices.

vakrokti analysis: The present analysis examines the use of oblique expressions in *Śikṣāṣṭaka*. The study identifies all 6 categories of oblique expressions deployed in the poem. The first category, phonetic figurativeness, concerns the skillful use of syllables to enhance the poetic sound, and we find that *Śikṣāṣṭaka* employs various types of *anuprāsa alaṅkāras*. The second category, word-root level figurativeness, relates to the use of oblique expressions at the level of individual words, and the poem utilizes *rūpaka alaṅkāra* for this purpose. The third category, sentential figurativeness, focuses on oblique expressions at the level of sentences, and employs several *arthalaṅkāras*. The fourth category, Contextual Figurativeness, relies on the poem's context and utilizes a series of *rūpaka alaṅkāras* to create a garland-like effect. The fifth category, compositional figurativeness, involves understanding the oblique meaning by examining the poem's different section. *Śikṣāṣṭaka* uses this category to discuss stages of *bhakti* and the concept of *sambandha*, *abhidheya*, and *prayojana* in an oblique manner. The final category, refers to the use of complete composition to convey oblique. We find that the author talks about his biography in the entire composition in an oblique manner. Overall, the study reveals that *Śikṣāṣṭaka* employs all six categories of oblique expressions, highlighting the author's mastery of poetic devices and his ability to convey complex spiritual ideas in a highly nuanced and layered manner.

aucitya analysis: Our analysis suggests that the *Śikṣāṣṭaka* is an exemplary composition that demonstrates *aucitya*. The composition employs the *vipralambha sṛṅgāra rasa*, and the *vaidarbhī rīti* with the *mādhurya guṇa*, which are perfectly compatible. Additionally, the use of *alaṅkāras* is deployed in an appropriate manner, without overwhelming the expression of the *rasa*. The composition's *rasa* remains consistent and does not change abruptly. Instead, it gradually intensifies throughout the composition, reaching its pinnacle in the last stanza. This uniformity in the *rasa*'s expression contributes to the effectiveness of the composition in evoking the desired emotional response.

Is *Śikṣāṣṭaka* an *uttama kāvya*? The criterion for a composition to be qualified as an *uttama kāvya* is the presence of *dhvani*, which evokes wonder in the reader.²³ *dhvani* is the soul of a *kāvya* and is of three types: *vastu-dhvani*, *alaṅkāra-dhvani*, and *rasa-dhvani*. *Vastu-dhvani* signifies rare facts or ideas; *alaṅkāra-dhvani* indicates figures of speech, and *rasa-dhvani* evokes feelings or moods in the reader. In the context of *vastu-dhvani*, *Śikṣāṣṭaka* explores the *sambandha*, *abhidheya*, and *prayojana* for a devotee, gradations of devotional service, and the biography of the author. The composition provides an insightful glimpse into the key elements of *bhakti* and its various stages, making it a source of rare knowledge for the reader. In terms of *alaṅkāra-dhvani*, *Śikṣāṣṭaka* employs a range of figures of speech such as metaphors, similes, and other literary devices to express its mood (*rasa*) without hindrance. The appropriate use of these devices creates a garland-like effect that acknowledges Govinda's glory and expresses the author's devotion and love. The composition's poetic beauty is further enhanced by its rhythm

²³ *idamuttamamatisayini vyāṅgace vācyād dhvanirbudhaiḥ kathitah*/1.4, *Kāvya prakāśa*
The highest kind of poetry is the one in which the suggestive meaning dominates the other meanings. In this case, the suggestive meaning is called *dhvani* by scholars.

and musicality, making it a delight for readers. Moreover, *Śikṣāṣṭaka* is a powerful example of how the combination of *vibhāva* and *anubhāva* can be used to evoke *vipralambha* *ṣṛṅgāra rasa*, making it an exemplar of *rasa-dhvani*. The composition conveys the feeling of separation from the divine, which is central to the Vaiṣṇava tradition of *bhakti*, and generates a deep emotional response in the reader. In conclusion, the evidence presented above establishes that *Śikṣāṣṭaka* is indeed an *uttama kāvya*. Its exploration of rare knowledge, its *alanikāra* beauty, and its evocation of deep emotions through *rasa-dhvani* which renders greater enjoyment than the other meanings make it a masterpiece of Sanskrit literature.

7 Conclusion

In conclusion, this article presents an innovative approach to bridge the gap between Sanskrit poetry and computational linguistics by proposing a framework that classifies Sanskrit poetry into levels of the characteristics of fine composition. The proposed framework takes a human-in-the-loop approach, combining the deterministic aspects delegated to machines and the deep semantics left to human experts. The article provides a human annotated analysis of *Śikṣāṣṭaka*, a Sanskrit poem, from the perspective of 7 prominent *kāvyaśāstra* schools to illustrate the proposed framework. The analysis establishes that *Śikṣāṣṭaka* is indeed the *uttama kāvya* composition. Moreover, the article provides compound, dependency, *anvaya*, meter, *rasa*, *alanikāra*, and *rīti* annotations for *Śikṣāṣṭaka* and a web application to illustrate the poem's analysis and annotations. The roadmap of the proposed framework opens new possibilities for the automatic analysis and classification of Sanskrit poetry while preserving the rich tradition of Sanskrit poetry.

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A Śikṣāṣṭaka Composition

Stanza 1

ceto-darpaṇa-mārjanam bhava-mahā-dāvāgni-nirvāpaṇam |
 śreyaḥ-kairava-candrikā-vitarāṇam vidyā-vadhū-jīvanam ||
 ānandāmbudhi-varḍhanam prati-padam pūrṇāmr̥tāsvādanam |
 sarvātma-snapanam param vijayate śrī-kṛṣṇa-saṅkīrtanam ||1||

Synonyms: cetaḥ — of the heart; darpaṇa — the mirror; mārjanam — cleansing; bhava — of material existence; mahā-dāva-agni — the blazing forest fire; nirvāpaṇam — extinguishing; śreyaḥ — of good fortune; kairava — the white lotus; candrikā — the moonshine; vitarāṇam — spreading; vidyā — of all education; vadhū — wife; jīvanam — the life; ānanda — of bliss; ambudhi — the ocean; varḍhanam — increasing; prati-padam — at every step; pūrṇa-amṛta — of the full nectar; āsvādanam — giving a taste; sarva — for everyone; ātma-snapanam — bathing of the self; param — transcendental; vijayate — let there be victory; śrī-kṛṣṇa-saṅkīrtanam — for the congregational chanting of the holy name of Kṛṣṇa.

Translation: Let there be all victory for the chanting of the holy name of Lord Kṛṣṇa, which can cleanse the mirror of the heart and stop the miseries of the blazing fire of material existence. That chanting is the waxing moon that spreads the white lotus of good fortune for all living entities. It is the life and soul of all education. The chanting of the holy name of Kṛṣṇa expands the blissful ocean of transcendental life. It gives a cooling effect to everyone and enables one to taste full nectar at every step.

Stanza 2

nāmnām akāri bahudhā nija-sarva-śaktis |
tatrārpitā niyamitaḥ smaraṇe na kālaḥ ||
etādṛśī tava kṛpā bhagavan mamāpi |
dur-daivam īdṛśam ihājani nānurāgaḥ ||2||

Synonyms: nāmnām — of the holy names of the Lord; akāri — manifested; bahudhā — various kinds; nija-sarva-śaktiḥ — all kinds of personal potencies; tatra — in that; arpitā — bestowed; niyamitaḥ — restricted; smaraṇe — in remembering; na — not; kālaḥ — consideration of time; etādṛśī — so much; tava — Your; kṛpā — mercy; bhagavan — O Lord; mama — My; api — although; durdaivam — misfortune; īdṛśam — such; iha — in this (the holy name); ajani — was born; na — not; anurāgaḥ — attachment.

Translation: My Lord, O Supreme Personality of Godhead, in Your holy name there is all good fortune for the living entity, and therefore You have many names, such as “Kṛṣṇa” and “Govinda,” by which You expand Yourself. You have invested all Your potencies in those names, and there are no hard and fast rules for remembering them. My dear Lord, although You bestow such mercy upon the fallen, conditioned souls by liberally teaching Your holy names, I am so unfortunate that I commit offenses while chanting the holy name, and therefore I do not achieve attachment for chanting.

Stanza 3

tṛṇāt api su-nīcena |
taror iva sahiṣṇunā ||
amāninā māna-dena |
kīrtanīyaḥ sadā hariḥ ||3||

Synonyms: tṛṇāt api — than downtrodden grass; su-nīcena — being lower; taroḥ — than a tree; iva — like; sahiṣṇunā — with tolerance; amāninā — without being puffed up by false pride; māna-dena — giving respect to all; kīrtanīyaḥ — to be chanted; sadā — always; hariḥ — the holy name of the Lord.

Translation: One who thinks himself lower than the grass, who is more tolerant than a tree, and who does not expect personal honor but is always prepared to give all respect to others can very easily always chant the holy name of the Lord.

Stanza 4

na dhanam na janam na sundarīm |
kavitām vā jagat-īśa kāmaya ||
mama janmani-janmani īśvare |
bhavatāt bhaktir a-haitukī tvayi ||4||

Synonyms: na — not; dhanam — riches; na — not; janam — followers; na — not; sundarīm — a very beautiful woman; kavitām — fruitive activities described in flowery language; vā — or; jagat-īśa — O Lord of the universe; kāmaya — I desire; mama — My; janmani — in birth; janmani — after birth; īśvare — unto the Supreme Personality of Godhead; bhavatāt — let there be; bhaktiḥ — devotional service; ahaitukī — with no motives; tvayi — unto You.

Translation: O Lord of the universe, I do not desire material wealth, materialistic followers, a beautiful wife or fruitive activities described in flowery language. All I want, life after life, is unmotivated devotional service to You.

Stanza 5

ayi nanda-tanuja kiñ-karam |
patitaṁ mām viṣame bhava-ambudhau ||
kṛpayā tava pāda-paṅkaja- |

sthita-dhūlī-saḍṛśaṁ vicintaya||5||

Synonyms: ayi — O My Lord; nanda-tanuja — the son of Nanda Mahārāja, Kṛṣṇa; kiṅkaram — the servant; patitam — fallen; mām — Me; viṣame — horrible; bhava-ambudhau — in the ocean of nescience; kṛpayā — by causeless mercy; tava — Your; pāda-paṅkaja — lotus feet; sthita — situated at; dhūlī-saḍṛśaṁ — like a particle of dust; vicintaya — kindly consider.

Translation: O My Lord, O Kṛṣṇa, son of Mahārāja Nanda, I am Your eternal servant, but because of My own fruitive acts I have fallen into this horrible ocean of nescience. Now please be causelessly merciful to Me. Consider Me a particle of dust at Your lotus feet.

Stanza 6

nayanam galad-aśru-dhārayā |
vadanam gadgada-ruddhayā girā ||
pulkair nicitam vapuḥ kadā |
tava nāma-graheṇa bhaviṣyati||6||

Synonyms: nayanam — the eyes; galat-aśru-dhārayā — by streams of tears running down; vadanam — mouth; gadgada — faltering; ruddhayā — choked up; girā — with words; pulkaiḥ — with erection of the hairs due to transcendental happiness; nicitam — covered; vapuḥ — the body; kadā — when; tava — Your; nāma-graheṇa — in chanting the name; bhaviṣyati — will be.

Translation: My dear Lord, when will My eyes be beautified by filling with tears that constantly glide down as I chant Your holy name? When will My voice falter and all the hairs on My body stand erect in transcendental happiness as I chant Your holy name?

Stanza 7

yugāyitam nimeṣeṇa |
cakṣuṣā prāvṛṣāyitam ||
śūnyāyitam jagat sarvaṁ |
govinda-viraheṇa me ||7||

Synonyms 7: yugāyitam — appearing like a great millennium; nimeṣeṇa — by a moment; cakṣuṣā — from the eyes; prāvṛṣāyitam — tears falling like torrents of rain; śūnyāyitam — appearing void; jagat — the world; sarvaṁ — all; govinda — from Lord Govinda, Kṛṣṇa; virahaṇa me — by My separation.

Translation: My Lord Govinda, because of separation from You, I consider even a moment a great millennium. Tears flow from My eyes like torrents of rain, and I see the entire world as void.

Stanza 8

āśliṣya vā pāda-ratām pinaṣṭu mām |
a-darśanān marma-hatām karotu vā ||
yathā tathā vā vidadhātu lampaṭo |
mat-prāṇa-nāthaḥ tu sa eva nāparaḥ ||8||

Synonyms: āśliṣya — embracing with great pleasure; vā — or; pāda-ratām — who have fallen at the lotus feet; pinaṣṭu — let Him trample; mām — Me; a-darśanāt — by not being visible; marma-hatām — brokenhearted; karotu — let Him make; vā — or; yathā — as (He likes); tathā — so; vā — or; vidadhātu — let Him do; lampaṭaḥ — a debauchee, who mixes with other women; mat-prāṇa-nāthaḥ — the Lord of My life; tu — but; saḥ — He; eva — only; na aparāḥ — not anyone else.

Translation: Let Kṛṣṇa tightly embrace this maidservant who has fallen at His lotus feet, or let Him trample Me or break My heart by never being visible to Me. He is a debauchee, after all, and can do whatever He likes, but still He alone, and no one else, is the worshipable Lord of My heart.