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Jyotiṣa as the Oldest Prediction Algorithm in the World

Dr. Kaustav Sanyal
Assistant Professor, Department of BCA, Bengal Institute of Science and Technology

***Abstract:* This paper explores Jyotiṣa, the ancient Indian science of astronomy and astrology, as the world's oldest predictive algorithm. Rooted in the Vedic corpus and refined in classical texts such as the *VedāṅgaJyotiṣa*, *BṛhatParāśaraHorāŚāstra*, and the *SūryaSiddhānta*, Jyotiṣa systematizes celestial observations into mathematical rules for forecasting terrestrial events. Unlike modern probabilistic and machine learning algorithms, Jyotiṣa relies on deterministic computations of planetary positions, periodicities, and cyclical models of time. This study positions Jyotiṣa as not merely a spiritual or divinatory practice, but as a structured algorithmic framework anticipating modern predictive analytics.**
Keywords: Algorithm, Astrology, Data Mining, Jyotiṣa, Prediction

I. INTRODUCTION

Prediction lies at the heart of science. In contemporary research, predictive modelling forms the backbone of disciplines as diverse as climatology, epidemiology, finance, and artificial intelligence. At its core, prediction requires three essential components:

1) data acquisition,
2) transformation of raw data into patterns through mathematical rules, and
3) generation of forecast outcomes. In the language of computer science, this process corresponds to an algorithm, afinite set of well-defined instructions that convert input into output [1].

From regression models to deep learning networks, all modern predictive algorithms operate on the same fundamental principle: data-driven recognition of temporal or spatial patterns, followed by extrapolation into the future [2]. Yet, if prediction is framed as the algorithmic transformation of observable inputs into future-oriented outputs, then the origins of predictive algorithms are not modern at all. They extend deep into antiquity, with one of the most structured and rigorous systems being the Indian science of Jyotiṣa [3].

Codified as one of the six Vedāṅgas—the auxiliary sciences of the Vedas—Jyotiṣa was developed not as speculative divination but as a precise computational framework for mapping the cosmos and forecasting its terrestrial implications. The *VedāṅgaJyotiṣa* (c. 1200–800 BCE) offers evidence of this system in its raw form: a compact set of rules for determining tithis (lunar days), nakṣatras (lunar mansions), and yogas (astronomical combinations) [4] [5]. These rules were expressed algorithmically: they take the position of the Sun and Moon as input, apply modular arithmetic based on cyclical time, and output calendrical predictions for ritual and agricultural activities.

The raw siddhānta of Jyotiṣa rests on a few foundational principles that parallel modern computational paradigms:

- Cyclical Time as a Dataset: Unlike linear Newtonian time, Jyotiṣa models time as recursive cycles—*kalpas*, *yugas*, *samvatsaras*. Each cycle serves as a training dataset, where recurrence of patterns is assumed to imply predictability. This reflects what modern time-series analysis calls "seasonality".
- Nakṣatra System as Data Partitioning: The division of the ecliptic into 27 (later 28) nakṣatras is equivalent to discretizing continuous celestial data into symbolic bins—akin to feature engineering in machine learning. Each *nakṣatra* carries weights (śakti, guṇa), comparable to categorical variables in modern prediction.
- Deterministic Algorithms for Planetary Motion: Texts such as the *SūryaSiddhānta* (4th–5th century CE) detail trigonometric functions for planetary longitude. The procedures are algorithmic, involving iterative approximation—paralleling numerical methods in computational science.
- Decision Trees of Prediction (Daśā System): The *BṛhatParāśaraHorāŚāstra* introduces structured rules for allocating planetary periods (*daśā-bhukti*) and interpreting their combined effects. These function as if–then decision trees, analogous to classification algorithms in machine learning [6].

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Thus, Jyotiṣa can be understood as the oldest predictive algorithmic system, not merely in a spiritual or cultural sense, but in the technical sense defined by modern science: a stepwise, rule-based, data-to-output transformation pipeline. What differentiates it from contemporary models is its cosmological framework—where the dataset is the cosmos itself, and the predictive validity is evaluated not by statistical metrics, but by alignment with lived experience, ritual efficacy, and cyclic recurrence [7].

In the following sections, this paper situates Jyotiṣa within the framework of predictive sciences, demonstrating how its raw siddhānta embodies principles that resonate with, and in some cases anticipate, the algorithmic structures of modern computational prediction [8].

II. METHODOLOGY

This study adopts a comparative–computational methodology to analyse Jyotiṣa as an algorithmic system of prediction. The approach proceeds in three stages:

1) Defining Algorithmic Criteria

In computer science, an algorithm is defined as a finite sequence of unambiguous steps that transform input data into output [9]. We evaluate Jyotiṣa against this criterion by identifying:

- Inputs: astronomical data (positions of Sun, Moon, planets, nakṣatras, tithis).
- Processing Rules: deterministic computations (cyclical arithmetic, daśā rules, yoga decision trees).
- Outputs: predictions (ritual timings, individual horoscopes, social/meteorological forecasts).

2) Modelling Jyotiṣa as a Prediction Pipeline

Jyotiṣa is treated as a data pipeline, comparable to modern predictive models (Figure 1):

- Astronomical Observation – Gathering raw celestial positions.
- Preprocessing (Calendarization) – Mapping observations into lunar days, nakṣatras, rāśis.
- Feature Selection – Identifying significant celestial factors (grahas, yogas, aspects).
- Rule-based Computation – Applying siddhānta formulas and daśā systems.
- Prediction Generation – Output of muhūrta, phala, or long-range forecasts.
- Validation – Comparison with observed reality and tradition [10].

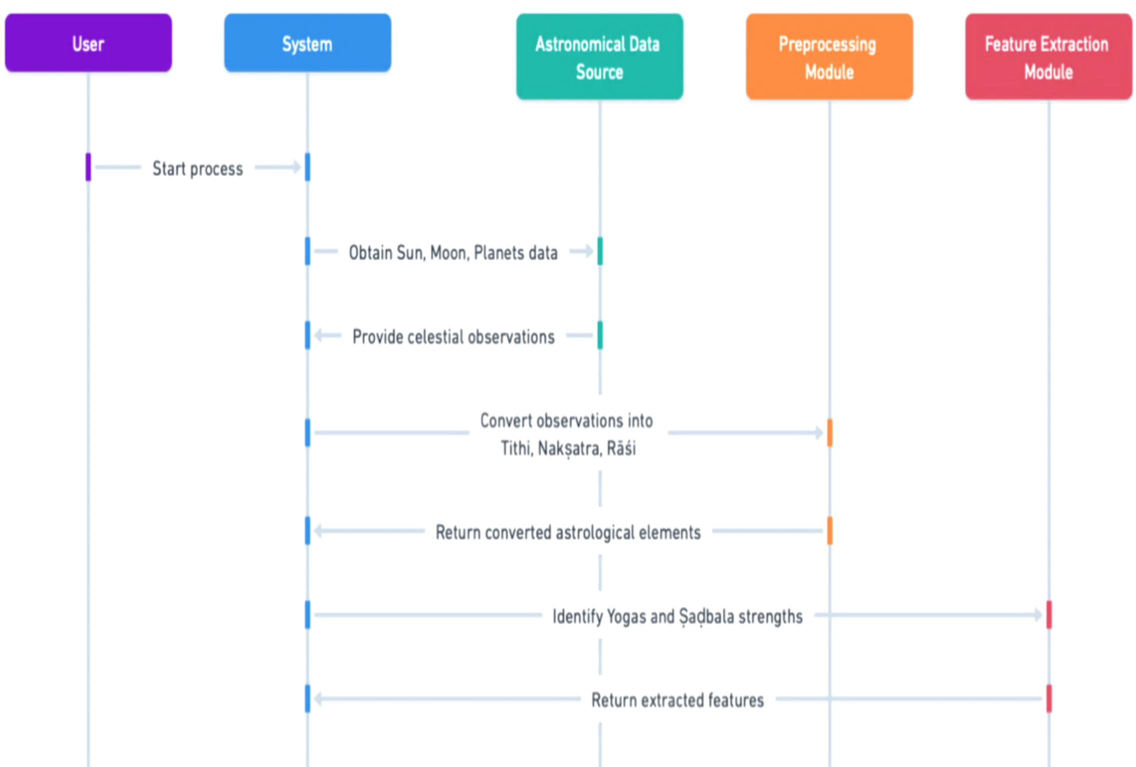

Figure 1General Jyotiṣa Prediction Algorithm

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3) Comparative Framework with Modern Data Mining

To highlight the algorithmic nature of Jyotiṣa, we place it alongside a modern data mining predictive pipeline.

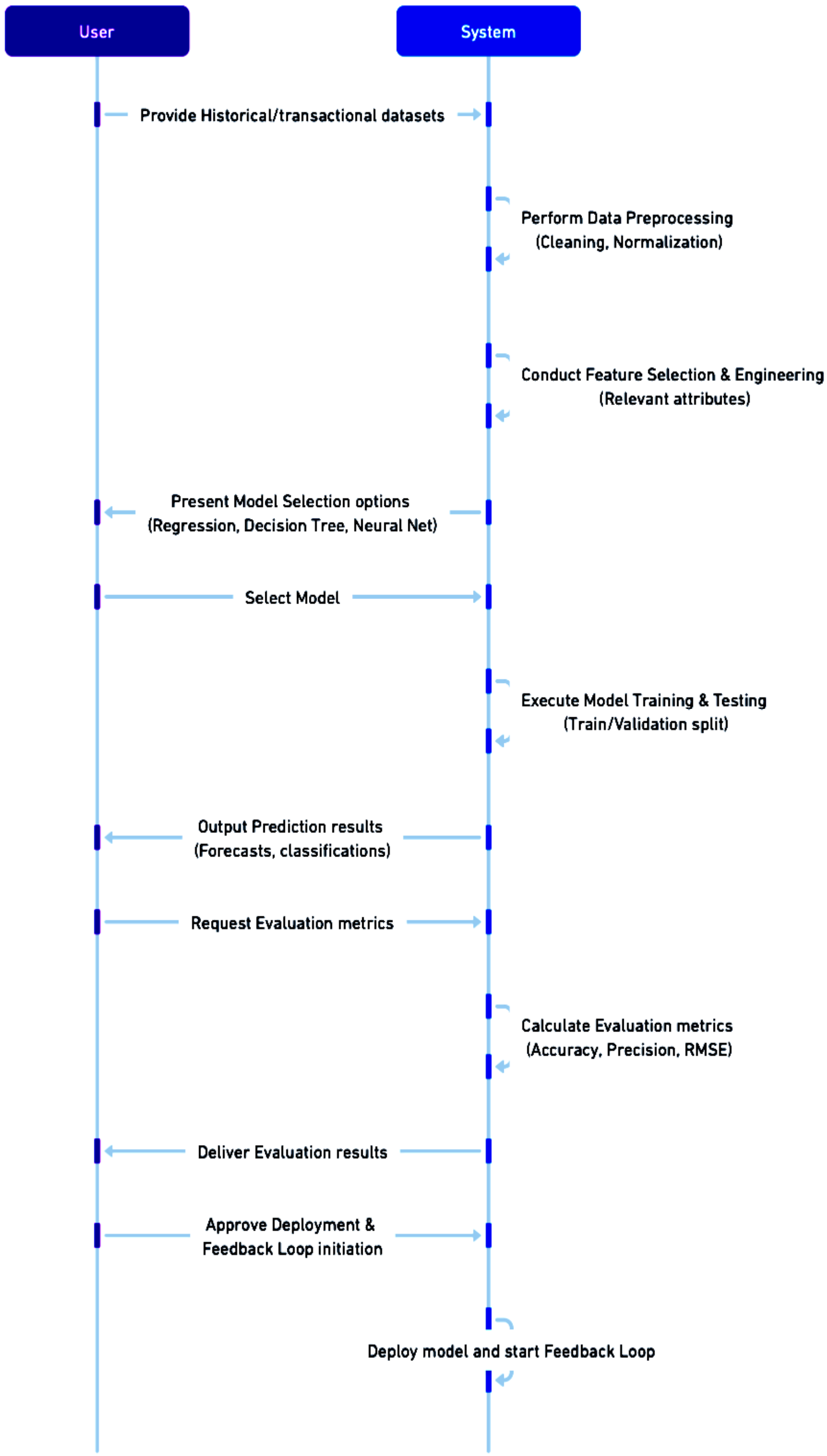

Figure 2 Modern Data Mining Prediction Algorithm

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Alignment of the Two Pipelines

Both Jyotiṣa and modern data mining transform raw inputs into future-oriented predictions.Jyotiṣa does so with deterministic cyclical rules, while modern methods rely on statistical/probabilistic optimization**.**By framing Jyotiṣa as an algorithmic pipeline, we demonstrate its legitimacy as the oldest structured predictive system**.**

III. JYOTIṢAAS AN ALGORITHM

Jyotiṣa, traditionally classified as one of the six Vedāṅgas, is often described as a "science of light," but its deeper character is algorithmic. It converts raw celestial inputs into structured predictions by means of deterministic, stepwise rules. In this sense, Jyotiṣa can be formalized as an algorithmic system comparable to modern computational models.

1) Algorithmic Structure in Jyotiṣa

In computer science, an algorithm is a finite sequence of well-defined instructions that:

- Take an input.
- Process the input through a set of logical or mathematical rules.
- Generate an output.

Jyotiṣa fits this definition precisely:

- Inputs (Data Acquisition): Planetary longitudes, lunar phases, solar ingress, nakṣatra positions.
- Processing Rules (Computation): Application of siddhānta (astronomical calculations), daśā systems, and yoga formation rules.
- Outputs (Prediction): Timing of rituals (muhūrta), personal forecasts (jātaka), long-range events (samāja–phalita, varṣaphala).

Input Layer: Celestial Data

The first step in Jyotiṣa is data collection.

- Ancient astronomers used gnomon shadows, nakṣatra risings, and eclipse timings as observational instruments.
- Data was discretized through:
- Tithi: Lunar day (1/30th of a synodic month).
- Nakṣatra: Division of the ecliptic into 27 (or 28) segments of 13°20′ each.
- Rāśi: Twelve zodiacal signs, each 30°.
- Example: *On a given day, the Moon is in Rohiṇīnakṣatra, Sun in Vṛṣabharāśi, Jupiter in Dhanuṣa.*

This step parallels data collection in machine learning, where raw numerical data (transactions, sensor readings) is gathered before preprocessing.

Table 1Algorithmic Structure of Jyotiṣa

Algorithmic Component	Modern Computer Science Definition	Jyotiṣa Equivalent
Input	Raw data received for processing	Celestial positions (Sun, Moon, planets), Nakṣatras, Tithi, Rāśi
Preprocessing	Transformation of raw data into usable form	Panchāṅga calculation: mapping planetary positions into calendaric time units
Feature Extraction	Identifying relevant variables from data	Grahabala (planetary strength), Yogas, Aspects (dṛṣṭi)
Algorithm / Ruleset	Deterministic or probabilistic rules applied	Siddhānta computations, Daśā systems, Muhūrta rules
Computation Process	Step-by-step execution of defined rules	Sequential application of Graha rules, Daśā timelines, transits
Output	Final result of the algorithm	Predictions: Personal (Jātaka), Social (Rāṣṭra), Cosmic (Mundane)
Validation	Testing accuracy against reality	Observed outcomes across generations, ritual success, cyclical recurrence

2) Processing Layer: Rule-Based Computation

Planetary positions are computed with trigonometric rules (*SūryaSiddhānta* uses sine functions centuries before Europe).Time is modeled as cyclical recurrence (yugas, kalpas).Modular arithmetic is applied:*E.g.* 27 nakṣatras repeat every lunar cycle.60-year Jovian cycle repeats planetary influences.

This corresponds to deterministic numerical computation in modern algorithms.

3) Daśā System (Time-Series Forecasting)

Each planet rules specific intervals of life (Mahādaśā, Antardaśā).Sequence is fixed (e.g., VimśottarīDaśā of 120 years).

- Algorithm:
  - Determine Janma Nakṣatra (birth constellation).
  - Identify the ruling planet of that nakṣatra.
  - Initialize the sequence of planetary periods.
  - Progress stepwise through nested sub-periods.

This is structurally equivalent to a decision-tree model in predictive analytics [11].

Table 2Stepwise Algorithm of Jyotiṣa

Step	Algorithmic Function	Jyotiṣa Action	Example
1	Data Collection	Observe planetary positions	Sun in Karkaṭa, Moon in Rohiṇī
2	Preprocessing	Convert into Panchāṅga variables	Tithi = ŚuklaDvitīyā, Nakṣatra = Rohiṇī
3	Feature Selection	Extract significant factors	Moon exalted, forming Chandra-Maṅgala yoga
4	Rule Application	Apply deterministic rules	Chandra-Maṅgala = prosperity prediction
5	Sequence Execution	Place in Daśā/Antardaśā framework	Moon-Mars period = heightened finance
6	Output Generation	Deliver final phala	Native gains wealth during specific period
7	Validation	Compare outcome with life events	Wealth acquisition confirmed

4) Yoga Computation (Combinatorial Rules)

Yogas are conditional rules: *If* planet A in rāśi X *and* planet B aspecting from Y, *then* outcome Z.Example: *Rājayoga* arises when kendra and trikona lords combine.This is rule-based symbolic computation, analogous to if–then production systems in early AI.

5) Output Layer: Prediction Generation

Muhūrta (Timing Prediction): Algorithm outputs auspicious intervals by matching tithi, nakṣatra, yoga.Jātaka (Horoscopic Prediction): Algorithm outputs personality traits and life events based on planetary combinations.Saṃvatsara/Varṣaphala (Annual Prediction): Algorithm outputs long-term forecasts using solar ingress into Aries and Tajika system.These outputs are deterministic predictions generated by structured rules, much like the outputs of modern regression or classification models.

6) Feedback & Validation

Unlike modern predictive algorithms validated by statistical accuracy (RMSE, F1-score), Jyotiṣa validates prediction through:Empirical recurrence: Did the predicted eclipse occur? Did the monsoon align with the nakṣatra rule?Ritual efficacy: Was the yajña effective when performed in the selected muhūrta?Experiential validation: Generational transmission of rules that “work” in lived society.This feedback mechanism ensured continuous refinement of siddhāntas, just as modern algorithms are updated through iterative learning.

7) Formalization as an Algorithm

We can express Jyotiṣa as an algorithm M = (I, P, O) where:

I (Input): Astronomical data (graha positions, lunar phases).

P (Process): Deterministic rule-set (siddhānta arithmetic, daśā decision trees, yoga computations).

O (Output): Predictions of events, timings, auspicious/inauspicious outcomes.

In pseudocode form:

```
Algorithm Jyotisha_Predict
Input: {Planetary positions, Tithi, Nakshatra}
Process:
  1. Compute Rashi, Graha strengths, Yogas
  2. Determine Dasha sequence from Janma Nakshatra
  3. Apply conditional rules for planetary combinations
Output:
  {Muhūrta, Jātaka, Varṣaphala predictions}
```

Table 3Jyotiṣa vs. Modern Predictive Algorithms

Aspect	Modern Prediction (Data Mining)	Jyotiṣa Prediction (Astrological)
Data Type	Historical, numerical datasets	Celestial coordinates, time cycles
Preprocessing	Normalization, cleaning	Panchāṅga calculation, calendarization
Feature Selection	Relevant statistical features	Grahabala, Yogas, Nakṣatra strengths
Model/Ruleset	Regression, Decision Trees, Neural Nets	Daśā systems, Siddhānta formulas
Training/Testing	Train-test split, evaluation metrics	Validation via generational testing, śāstra–paramparā
Output	Forecasts, classifications	Phala: Jātaka (personal), Muhūrta (ritual), Saṁhita (mundane)
Nature of Prediction	Probabilistic (statistical likelihoods)	Deterministic (cyclical cosmic law)

IV. IMPLEMENTATION

The practice of Jyotiṣa and the modern discipline of predictive algorithms in data mining belong to radically different epistemic universes—one rooted in Vedic cosmology, the other in statistical formalism. Yet, when examined through the lens of computational theory, striking structural parallels emerge. Both systems begin with the recognition of patterns in complex datasets and proceed through systematic transformations of that data in order to generate predictive outcomes. What modern computer science terms an "algorithmic pipeline" finds its ancient analogue in the layered procedures of Jyotiṣa: the observation of celestial data, its categorization within a mathematically precise framework, and the eventual projection of future states.

A. Conceptual Parallels

In modern predictive analytics, the foundation lies in the acquisition of data, its cleaning, and the extraction of relevant features before feeding them into models such as regressors, classifiers, or neural networks. Jyotiṣa demonstrates a homologous structure: astronomers and astrologers begin with precise planetary observations, employ calendrical adjustments (pañcāṅga calculations) to normalize the data, and then derive "features" such as grahabala (planetary strengths), yogas (combinatory configurations), and daśā cycles. These features are mapped against canonical rule-systems preserved in classical texts like *BṛhatParāśaraHorāŚāstra*. Just as a decision-tree classifier follows branching conditional rules, Jyotiṣa applies structured if-then mappings: *if* Mars occupies the ascendant with Saturn in the seventh, *then* the predictive output concerns conflict or strife in marriage [12].

This analogy is not merely superficial. In both systems, predictive validity depends not only on raw data but on the choice of features and the robustness of transformation rules. The difference lies in their interpretative scaffolding: modern algorithms are probabilistic and open to empirical recalibration, whereas Jyotiṣa operates within a deterministic cosmology wherein the positions of planets are viewed as causal encoders of karmic structure.

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Table 4Algorithmic Parallels between Jyotiṣa and Modern Data Mining

Phase	Modern Prediction Systems	Jyotiṣa System
Input Data	Transactional logs, sensor data, user attributes	Planetary longitudes, nakṣatra, tithi, rāśi
Transformation	Data cleaning, normalization, discretization	Pañcāṅga generation, sidereal correction, mean vs. true motion
Feature Engineering	Selection of predictive attributes, PCA, clustering	Grahabala, aspects (dṛṣṭi), yoga formations, daśā activation
Predictive Model	Regression, classification, ensemble methods	Daśā-phala rules, gochara (transits), prashna charts
Output	Probability score, predicted class/label	Phala (concrete prediction of events and tendencies)

B. *Process-Level Comparison*

When studied in terms of computational flow, Jyotiṣa and modern predictive algorithms follow nearly identical structural pipelines, albeit with contrasting epistemologies. A modern algorithm, for instance, may begin with a dataset of consumer purchases. After normalizing transaction dates and applying feature-selection methods, a logistic regression model may classify the probability that a customer will make a purchase in the next cycle. In Jyotiṣa, the dataset is the sky itself: planetary positions are mapped against fixed stars and temporal markers. After computing sidereal positions and constructing horoscopic charts, rules are applied to derive predictions about events such as marriage, profession, or health [13].

What emerges in both systems is a pattern of sequential data refinement followed by the application of rule-based inference. Modern data mining insists on empirical validation through accuracy metrics such as RMSE, F1-score, or ROC curves [14][15]. Jyotiṣa, by contrast, validates through generational transmission, textual authority, and the pragmatic success of lived predictions. Thus, while the form is algorithmic in both cases, the validation mechanism distinguishes empirical science from cosmological science.

Table 5Process Mapping: Jyotiṣa vs. Machine Learning Workflow

Step	Machine Learning Pipeline	Jyotiṣa Pipeline
1	Data Collection (historical logs, surveys)	Planetary ephemerides, pañcāṅga elements
2	Preprocessing (data cleaning, outlier removal)	Sidereal correction, true vs. mean motion of grahas
3	Feature Engineering (attributes extraction)	Yogas, daśās, grahabala, divisional charts (varga)
4	Model Application (classifier, regression, neural net)	Interpretive framework (daśā-phala, yogic conditions)
5	Prediction (probability, label, outcome)	Phala (eventual manifestation of karmic tendencies)
6	Validation (accuracy score, cross-validation)	Generational proof, textual authority, śāstra-based consistency

C. *Philosophical and Technical Distinctions*

Although the structural parallels are strong, the philosophical differences are significant. Jyotiṣa rests on the principle of *ṛta*—the cosmic order—where prediction is deterministic because karmic consequences are inscribed in planetary configurations. Modern data mining operates within stochastic models; prediction is always accompanied by error margins, confidence intervals, and probabilistic weights. From a technical standpoint, Jyotiṣa's "features" (yogas, aspects, daśās) are finite and rule-bound, whereas machine learning features may be continuously generated and optimized through iterative learning.

Another distinction lies in adaptability. Machine learning models retrain themselves as new data arrives, thereby improving over time. Jyotiṣa, by contrast, relies on a fixed corpus of rules, but incorporates contextual modifications by learned practitioners. Thus, the adaptability of Jyotiṣa is qualitative and hermeneutic, whereas that of modern algorithms is quantitative and computational.

Table 6Distinctive Contrasts

Dimension	Jyotiṣa	Modern Prediction Algorithms
Epistemology	Deterministic, based on karmic cosmology	Probabilistic, based on statistical inference
Validation	Generational testing, śāstra authority, experiential	Accuracy metrics, statistical validation, cross-validation

Dimension	Jyotiṣa	Modern Prediction Algorithms
	verification	
Adaptability	Hermeneutic reinterpretation by expert astrologer	Iterative retraining with new data
Computational Basis	Rule-based symbolic logic (yoga/daśā systems)	Numerical optimization, gradient descent, probabilistic modeling
Temporal Scope	Cyclical, cosmic, spanning yugas and lifetimes	Linear, limited to dataset history and projection window

Jyotiṣa may legitimately be regarded as the oldest prediction algorithmic framework in human history. Its reliance on structured data (graha positions), deterministic rule-application (yogas and daśās), and generative predictions (phala) places it firmly within the same logical lineage as modern data mining techniques. Yet, its metaphysical grounding and validation methods mark a divergence that emphasizes continuity of form but difference in ontology.

V. CONCLUSION

The comparative inquiry into Jyotiṣa and modern prediction algorithms reveals that the foundations of predictive science were laid far earlier than generally acknowledged. Jyotiṣa, in its raw Vedic and Siddhāntic form, emerges not as a mystical abstraction but as a highly systematized algorithmic framework. It relies on structured data acquisition from celestial positions, rigorous preprocessing through chart construction, and predictive models based on codified rules of planetary interactions. In this sense, Jyotiṣa anticipates by millennia the same logical flow that underpins contemporary data mining and machine learning algorithms.

While modern computational models emphasize probability, statistical validation, and machine-optimized accuracy, Jyotiṣa embeds prediction within a broader cosmological ontology where human fate, natural cycles, and cosmic rhythm are interlinked. This does not diminish its algorithmic nature; rather, it situates Jyotiṣa as an early synthesis of deterministic computation with metaphysical causality. Modern science isolates the "how" of prediction, while Jyotiṣa integrates both the "how" and the "why."

The analysis underscores a critical epistemological bridge: predictive systems, whether modern or ancient, are fundamentally about transforming structured inputs into intelligible outputs through formalized rules. Jyotiṣa represents the oldest extant evidence of this paradigm, predating contemporary algorithms by thousands of years. By acknowledging Jyotiṣa as the earliest predictive algorithm, the history of computational science is enriched, gaining continuity with ancient intellectual traditions that were as much algorithmic as they were spiritual.Jyotiṣa should not merely be regarded as cultural heritage or religious practice but as the proto-algorithmic science of prediction—a system whose logical architecture continues to resonate with the very structures of modern data-driven forecasting.

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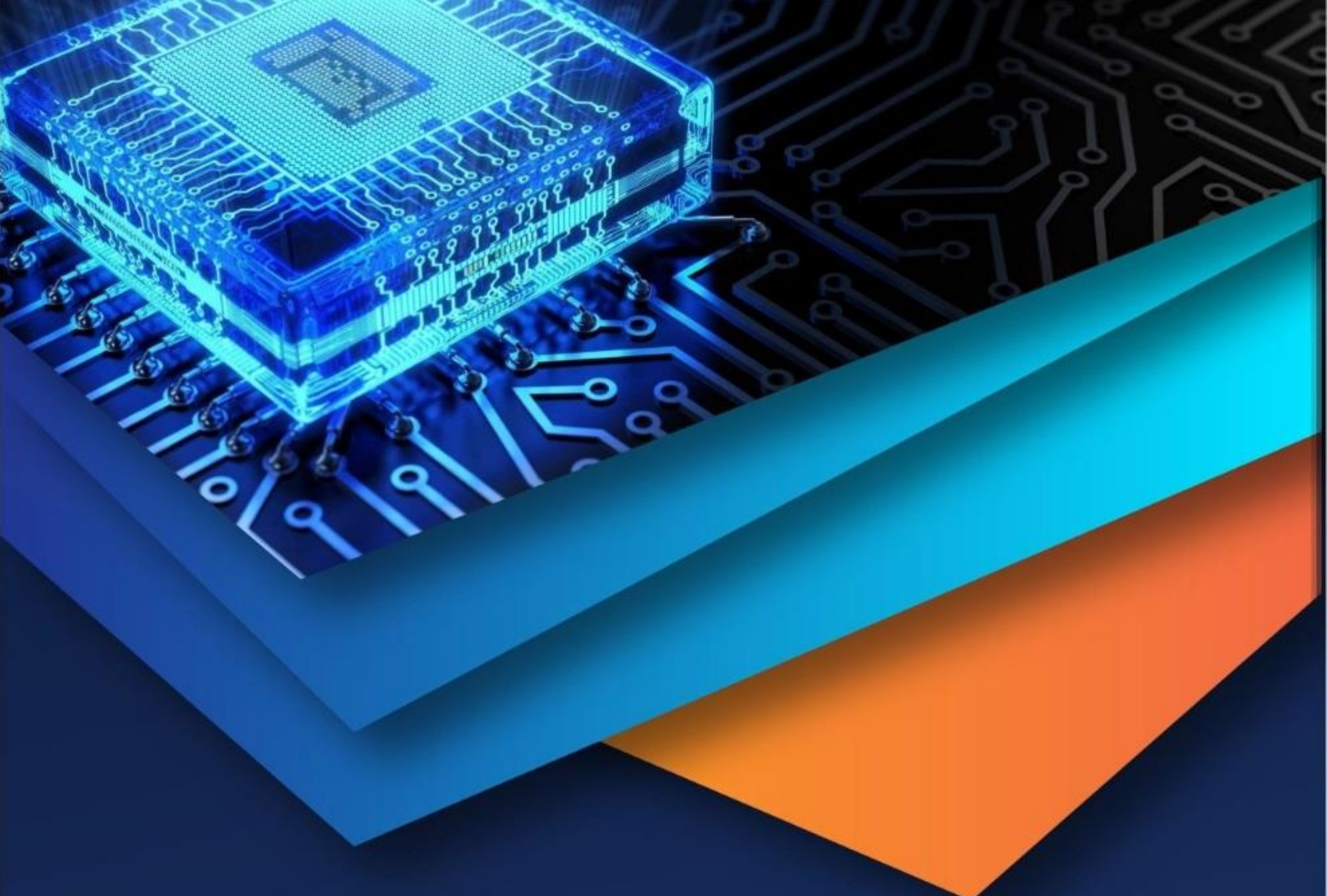

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