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An Indigenous Framework For Rainfall Prediction Based On Sun–Moon Planetary Positions And Nakshatra Configurations

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Rainfall prediction is a challenging scientific problem because rainfall exhibits substantial temporal and spatial variability and is influenced by complex and nonlinear atmospheric processes. Although conventional methods and advanced computing approaches have improved rainfall forecasting, there is still a need for further investigation. Advanced computing approaches have improved rainfall forecasting. There is a continuing need to investigate complementary sources of information that may provide additional predictive features. In the Indian context, traditional knowledge systems have historically incorporated astronomical observations and Panchang-based indicators for interpreting seasonal and rainfall conditions. The present study proposes an indigenous framework for rainfall prediction based on sun–moon planetary positions and Nakshatra configurations. The proposed framework considers the 27 traditional Nakshatras and their respective positions associated with the Sun and Moon. Traditional classifications of Nakshatras into masculine, feminine, and neutral categories are incorporated to represent the qualitative interpretation of Sun–Moon configurations. Since 27 Nakshatras can be associated with the Sun and 27 with the Moon, the framework generates a possible Sun–Moon Nakshatra combination matrix. These traditional configurations are transformed into structured computational features and examined against historical rainfall observations. The present study is an attempt to investigate indigenous astronomical knowledge on the occurrence of rainfall with the help of Sun–Moon Nakshatra combinations and to find out whether these characteristics can be used to predict rainfall. The methodology includes data collection, preprocessing, feature engineering, and encoding of the Nakshatra attributes. The proposed framework provides a systematic approach for transforming traditional Nakshatra-based rainfall knowledge into reproducible computational features. By integrating indigenous knowledge, the study contributes to the computational evaluation and scientific assessment of traditional rainfall indicators and explores their potential usefulness as complementary features in rainfall prediction.

Keywords: Rainfall Predictio, Nakshatra; Sun–Moon Planetary Positions, Indigenous Knowledge, Panchang, Astronomical Features, Nakshatra Combination.

1. Introduction

Rainfall is a key component of the hydrological cycle and is essential for agriculture, water resources management, ecosystem sustainability, and socio-economic development. In India, agriculture and water supply are mainly dependent on the monsoon, and hence, accurate knowledge of the rainfall occurrence, time, intensity, and spatial distribution is very essential for agricultural planning, irrigation management, reservoir operation, and drought and flood preparedness. The southwest monsoon contributes a major chunk of the annual rainfall in most

parts of India. Hence, the correct forecast of monsoon is of special importance to the agricultural and water-resource sectors of the country (Pai et al., 2011). Rainfall is still one of the most difficult variables to predict in the atmosphere, despite the great advances of meteorological forecasting, because of its high spatial and temporal variability and its dependence on complex atmospheric processes.
Traditionally, the prediction of rainfall is based on meteorological observations, statistical methods, atmospheric models, and numerical weather prediction systems, with knowledge recorded in ancient Indian texts and almanacs, including Panchang traditions. For example, the India Meteorological Department (IMD) has developed and implemented statistical and dynamical methods for seasonal and regional forecasts. This information is written in ancient Indian texts, almanacs and monsoon traditions (Panchang) (Pai et al., 2011). in ancient Indian texts, almanacs, and Panchang traditions of the monsoon (Pai et al., 2011). The uncertainty and nonlinear dynamics of rainfall processes, however, provide a strong motivation to search for complementary indicators and alternative sources of information that can be systematically represented and empirically evaluated.

In addition, indigenous knowledge systems have historically been associated with rainfall prediction. Weather and rainfall predictions have historically been based on astronomical events, seasonal changes, biological indicators, wind patterns, cloud characteristics, and other environmental cues by traditional farming communities. Such knowledge has been retained in ancient Indian texts, almanacs, Panchang traditions and other native sources. This knowledge : This knowledge still exists in the form of ancient Indian texts, almanacs, Panchang traditions and other native sources. in ancient Indian texts, almanacs, Panchang traditions, and other native sources. in ancient Indian texts, almanacs, traditions of Panchang, and other native sources. Such knowledge is available in the ancient Indian texts, almanacs, the panchang tradition, and other native sources. The ancient Indian texts, almanacs, and Panchang traditions record this information. The research on indigenous knowledge of rainfall forecasting has shown that the Panchang-based information was used earlier for the prediction of rainy days and seasonal rainfall (Singh & Dwivedi, 2003; Vaidya et al., 2023). The observations provide a significant cultural and knowledge base for studying traditional methods with modern scientific approaches.
This present work deals with the indigenous model that correlates the locations of the Sun and Moon relative to Nakshatras with the traditional associations of rain and rainfall conditions. Rather than taking these classical interpretations as scientifically verified causal relations, the study attempts to translate them into formalized, quantifiable, and computable variables. Then we examine the relationship between the historically observed rainfall and the statistical and machine learning techniques used. Thus, the study bridges the traditional Indian astronomical knowledge and the modern data-driven prediction of rainfall.

1.1 Background of the Study

The prediction of rainfall has progressed from empirical observation and statistical relationships to sophisticated numerical and computational forecasting systems. Contemporary monsoon forecasts make use of information from atmospheric, oceanic, land surface and large-scale climate processes. The operational forecasting systems developed by

IMD are based on statistical and dynamical modeling approaches and have been continuously improved thru research and evaluation (Pai et al., 2011).

High performance computing technologies have opened up new avenues for rainfall forecasting. However, the use of machine learning and advanced data analytics models can demonstrate nonlinear relationships between the predictor variables and historical rainfall records, thereby supplementing the conventional statistical and numerical methods. Among the various machine learning techniques that have been studied for Indian summer monsoon (ISM) rainfall prediction in recent years, probabilistic and regression methods have been included (Narang et al., 2024). Any predictive model's performance, however, is highly contingent on the quality, relevance, and representation of the input features.

However, there is still a need to explore and develop a rainfall prediction system incorporating indigenous knowledge and traditional environmental indicators. In India, traditional methods of predicting rainfall have included observations of astronomical events, planetary positions, Nakshatras, cloud patterns, winds and other environmental indicators. In India, Vaidya et al. (2023) reported several indigenous practices of weather and rainfall predictions and stressed on importance of Panchang and Nakshatra-based observations in history. In a similar study, Singh and Dwivedi (2003) studied the correlation between the Panchang's rain predictions and rainfall observations recorded over a period of 13 years in Uttar Pradesh. The study demonstrated the feasibility of quantitatively assessing traditional rain predictions.

The present study builds upon this broader background by focusing specifically on the Sun–Moon Nakshatra configuration. The study considers the Nakshatra occupied by the Sun and the Nakshatra occupied by the Moon as structured astronomical features. This approach enables an indigenous knowledge-based framework to be examined using the principles of empirical data analysis and predictive modelling.

1.2 Traditional Indian Approach to Rainfall Prediction

The Panchang is a traditional Indian calendrical and astronomical system containing information relating to astronomical positions, calendrical elements, and temporal cycles. Historically, Panchang-based information has been used not only for calendrical and religious purposes but also, within indigenous knowledge traditions, for interpreting seasonal and environmental phenomena. Research on indigenous rainfall prediction in India has documented the use of Panchang and almanac-based indicators for anticipating rainfall and rainy days (Singh & Dwivedi, 2003; Vaidya et al., 2023).

The Nakshatras are an important part of the traditional Indian knowledge of Astronomy. The traditional system divides the celestial ecliptic into 27 Nakshatras. The passage of celestial bodies through these divisions has been historically used in different interpretative frameworks. The traditional observation of rainfall considers the Sun and Moon in various nakshatras as important indicators.

The Moon moves fairly fast through the Nakshatra system and on a given day traditionally has an association with a particular Nakshatra. This is popularly known as Nitya or daily Nakshatra. The Sun, however, remains associated with a particular Nakshatra for about 13-15 days. Thus, the Sun and the Moon provide two time-varying astronomical features that can be used together to describe a particular Sun-Moon Nakshatra configuration.

In traditional Indian literature on rainfall, various relationships are described between planetary or Nakshatra positions and atmospheric conditions. In their review of indigenous Indian weather prediction, (Vaidya et al. 2023) report traditional rules involving Sun-Moon positions in masculine, feminine and neutral asterisms. Some of these traditional rules relate certain combinations to rain, wind, lightning or other atmospheric phenomena. The conceptual basis of the present research is these historical observations.

1.3 Nakshatra and Rainfall

A Nakshatra represents a traditional lunar constellation or asterism within the Indian astronomical framework. The system traditionally recognizes 27 Nakshatras showing in table1

Table 1 Name of all Nakshatra

Ashwini	Bharani	Krittika	Rohini	Mrigashira	Ardra	Punarvasu
Pushya	Ashlesha	Magha	Purva Phalguni	Uttara Phalguni	Hasta	Chitra
Swati	Vishakha	Anuradha	Jyeshtha	Mula	Purva Ashadha	Uttara Ashadha
Shravana	Dhanishta	Shatabhisha	Purva Bhadrapada	Uttara Bhadrapada	Revati.	

In the traditional interpretation of rainfall, the position of the Sun and Moon are considered together. Some configurations of Sun and Moon have traditionally been associated with certain atmospheric conditions. For example, the conventional rules in the indigenous rainfall literature relate combinations involving different categories of Nakshatras with rainfall, wind or atmospheric disturbances (Vaidya et al., 2023).

A major aspect of this indigenous scheme is the classification of Nakshatras into masculine, feminine and neutral. The interpretations of the relation between the Sun's Nakshatra and the Moon's Nakshatra have a basis in these classifications. Hence, instead of treating the 27 Nakshatras as independent categorical variables, the present study considers their combined configuration and the traditional categories associated with them.

Some Nakshatras are also given special importance in traditional observations of rainfall and monsoon. Observations of seasons and rainfall in traditional sources and recent literature of indigenous rainfall practices have brought out the significance of Nakshatras such as Rohini, Mrigashira, Ardra, Punarvasu, Pushya and Swati (Vaidya et al., 2023). In particular, Ardra has traditionally been associated with observations concerning the monsoon, Rohini and Mrigashira with observations of clouds, wind, thunder and rainfall expectations.

Past studies have also attempted to evaluate ancient or traditional rainfall rules against modern rainfall observations. For example, (Shekharam 2022) studied the traditional rainfall rules of Brihat Samhita using IMD gridded rainfall data and computational methods.Accordingly, the present research converts these qualitative traditional interpretations into structured features. The Sun's Nakshatra, Moon's Nakshatra, their traditional gender categories, and the resulting Sun–Moon combination are represented in a computational form and subsequently examined in relation to observed rainfall.

1.4 Research Problem

In this study researcher is developing a structured framework based on the Sun's Nakshatra, Moon's Nakshatra, their traditional gender classifications, and their combined configurations. The framework seeks to translate traditional Nakshatra-based rainfall interpretations into computational features that can be statistically compared with historical rainfall observations.

1.5 Research Objectives

The specific objectives of the study are:

- To analyze the positions of the Sun and Moon in relation to the 27 Nakshatras.
- To classify the Nakshatras according to their traditional masculine, feminine, and neutral categories.
- To develop a Sun–Moon Nakshatra Combination Matrix representing the 729 possible configurations.
- To design framework provides a systematic approach for transforming traditional Nakshatra-based rainfall knowledge into reproducible computational features

1.6 Contributions of the Study

The present study contributes to the computational examination of indigenous knowledge by developing a structured framework for evaluating traditional Nakshatra-based rainfall interpretations using historical rainfall observations.

First, the study provides a systematic representation of traditional astronomical information by treating the Sun's and Moon's Nakshatra positions as structured rainfall-related features. This transforms a qualitative traditional framework into a representation that can be analyzed using statistical and machine learning methods.

Second, the study incorporates the traditional gender classification of Nakshatras as an additional feature for representing the qualitative interpretation of Sun–Moon configurations. This enables traditional rules to be encoded into categorical variables suitable for computational analysis.

Third, the development of the 27 × 27 Sun–Moon Nakshatra Combination Matrix provides a comprehensive representation of the possible configurations. The matrix consists of 729 possible Sun–Moon combinations, establishing a systematic configuration space for the proposed framework.

Finally, the proposed framework provides a systematic mechanism for determining their statistical association and predictive value. The framework therefore represents an attempt to integrate an indigenous astronomical perspective with modern computational rainfall prediction while retaining empirical validation as the basis for scientific assessment.

2. Review of Literature

Rainfall prediction has been an important area of research because of its direct relevance to agriculture, water-resource management, disaster preparedness, hydrological planning, and climate-sensitive economic activities. The complexity and variability of rainfall processes have resulted in the development of diverse prediction approaches, ranging from traditional statistical techniques and physically based meteorological models to remote-sensing-based systems and machine learning methods. In parallel with modern scientific approaches, India has a long tradition of observing atmospheric, seasonal, astronomical, and environmental indicators for anticipating rainfall. The present study is situated at the intersection of these two domains by examining whether traditional Nakshatra-based rainfall indicators can be represented as structured computational features and empirically evaluated against observed rainfall data.

2.1 Traditional Indian Meteorological Knowledge

India possesses a long history of observing seasonal and environmental phenomena for agricultural and weather-related decision-making. Traditional knowledge systems incorporated observations of clouds, winds, celestial bodies, seasonal transitions, biological indicators, and astronomical positions. A recent review published in the Journal of Agrometeorology describes traditional Indian weather forecasting as an important component of India's indigenous knowledge heritage and specifically discusses Varahamihira, Brihat Samhita, Nakshatras, and indigenous rainfall indicators.

2.1.1 Panchang

The Panchang is a traditional Indian calendrical system containing astronomical and calendrical information. Within different regional Panchang traditions, astronomical positions and seasonal periods have been used in interpreting environmental and agricultural conditions. The research framework underlying the present study proposes the use of Panchang data to obtain historical planetary-position information relevant to rainfall. The attached research material specifically proposes collecting Sun and Moon planetary-position data from Panchang for a historical period.

2.1.2 Jyotisha

Jyotisha is a traditional Indian knowledge system concerned with astronomical and calendrical observations and their traditional interpretations. Within rainfall-related traditions, the positions of celestial bodies and Nakshatras have been associated with weather and seasonal conditions.

The present research does not seek to establish these traditional interpretations as physical meteorological mechanisms. Instead, it treats them as a source of hypotheses that can be converted into measurable features and evaluated against observed rainfall.

2.1.3 Agricultural Astrology and Indigenous Knowledge

Traditional agricultural knowledge incorporated observations intended to support decisions concerning sowing, cultivation, rainfall expectations, and seasonal agricultural activities. In the Indian context, traditional rainfall prediction has been discussed in connection with astronomical observations, environmental indicators, and agricultural practices. The literature on India's ancient weather-forecasting traditions identifies Nakshatra and indigenous knowledge as components of this historical forecasting framework.

2.1.4 Traditional Monsoon Indicators

Traditional Indian rainfall indicators include observations associated with celestial positions as well as environmental signs such as clouds, winds, thunder, and other natural phenomena.

The attached research material specifically identifies Rohini, Mrigashira, Ardra, Punarvasu, Pushya, and Swati as Nakshatras traditionally associated with monsoon behaviour.

2.2 Research Gap

However, several research gaps remain.

- Limited Empirical Validation of Traditional Rainfall Indicators
- Need to Convert Qualitative Rules into Computational Features
- Need to Compare Traditional Predictions with Observed Rainfall

The research framework shows a change from traditional rules to structured Sun–Moon features and then to study their connection with past rainfall. Thus, the proposed study attempts to bridge traditional rainfall knowledge and modern computational analysis by integrating:

3. Traditional Nakshatra-Based Rainfall Prediction Framework

The present study is based on the conceptual framework of the conventional Nakshatra-based rainfall prediction. The framework adopted in this study does not consider these traditional interpretations as causal relationships. The research material shows that traditional interpretations have linked these positions to rainfall, wind, cloud formation, lightning, and other atmospheric conditions.

The framework adopted in this study does not consider these traditional interpretations as causal relationships. Instead, it takes a set of historically documented rules, formalizes them into structured variables, and then compares them to the observed rainfall data.

3.1 Concept and Classification of Nakshatras

A Nakshatra is traditionally understood as a lunar constellation or asterism associated with the apparent movement of the Moon through the celestial sphere. The traditional framework divides the sky into 27 Nakshatras, each having its own characteristics and significance. The source material describes Nakshatra as an "indestructible entity" and provides the following sequence of 27 Nakshatras: Ashwini, Bharani, Krittika, Rohini, Mrigashira, Ardra, Punarvasu, Pushya, Ashlesha, Magha, Purva Phalguni, Uttara Phalguni, Hasta, Chitra, Swati, Vishakha, Anuradha, Jyeshtha, Mula, Purva Ashadha, Uttara Ashadha, Shravana, Dhanishta, Shatabhisha, Purva Bhadrapada, Uttara Bhadrapada, Revati

Within the traditional rainfall framework, Nakshatras are not considered merely as astronomical divisions. They are associated with particular environmental and seasonal interpretations. The source material states that the positions of the Sun and Moon in different Nakshatras were traditionally considered in relation to wind, lightning, cloud formation, and rainfall patterns.

Particular importance is assigned to Rohini, Mrigashira, Ardra, Punarvasu, Pushya, and Swati in relation to monsoon behaviour. Traditional observations during these Nakshatra periods were associated with assessment of rainfall and atmospheric conditions.

Among these, Rohini and Ardra receive particular attention. Observations of cloud formation, wind direction, and thunder during Rohini and Mrigashira were traditionally used to estimate future rainfall, while rainfall during the Ardra period was considered an indicator of a healthy monsoon. Rohini Yoga was also considered an important traditional rainfall indicator.

3.2 To analyze the positions of the Sun and Moon in relation to the 27 Nakshatras

The Sun occupies an important position in the traditional rainfall framework. the Sun remains associated with a particular Nakshatra for approximately 13–15 days. This relatively longer association forms the basis for defining a solar Nakshatra period and the corresponding Kaarti concept.
The Moon represents the second major celestial variable in the proposed rainfall framework. Unlike the Sun, whose association with a Nakshatra extends over approximately 13–15 days, the Moon is traditionally associated with a Nakshatra for approximately one day.
it creates different Sun–Moon combinations within the same solar Nakshatra period.

3.2.1 Nitya/Daily Nakshatra

The approximately one-day association of the Moon with each Nakshatra provides the basis for the concept of the Nitya or Daily Nakshatra in the research framework. Because the Moon changes its Nakshatra approximately every day, the Moon's Nakshatra can be matched with the Sun's Nakshatra for each observation date.

This combination forms the fundamental unit of analysis in the proposed model:
Sun Nakshatra + Moon Nakshatra = Sun–Moon Nakshatra Combination
Since there are 27 possible Nakshatras for the Sun and 27 possible Nakshatras for the Moon, the framework produces: 27 × 27 = 729 possible Sun–Moon combinations matrix can be represented in table 2:

Table 2: Sun Moon Combinations

Sun \ Moon	**Ashwini**	**Bharani**	**Krittika**	**...**	**Revati**
Ashwini	Combination 1	Combination 2	Combination 3	...	Combination 27
Bharani	Combination 28	Combination 29	Combination 30	...	Combination 54
Krittika	...	...	...	...	...
...	...	...	...	...	...
Revati	...	...	...	...	Combination 729

Each cell represents a unique combination of the Sun's and Moon's Nakshatra positions.
The matrix therefore provides a systematic representation of the traditional framework and allows each observation date to be assigned a unique Sun–Moon combination.

3.3 To classify the Nakshatras according to their traditional gender categories: In the traditional Nakshatra-based rainfall prediction framework, the 27 Nakshatras are classified into three gender categories: Masculine (Purusha), Feminine (Stri), and Neuter (Napumsaka). This classification forms an important component of the proposed methodology because the traditional rainfall prediction is determined not only by the individual Nakshatra occupied by the Sun or Moon, but also by the gender relationship between the Sun Nakshatra and Moon Nakshatra.

- **Nakshatras are considered Masculine (Purusha):** Ardra, Punarvasu, Pushya, Ashlesha, Magha, Purva Phalguni, Uttara Phalguni, Hasta, Chitra, Swati
- These Nakshatras are assigned the code M (Masculine) in the computational framework. The masculine classification is subsequently used to determine the rainfall category when the Sun or Moon occupies one of these Nakshatras.
- **Nakshatras as Feminine (Stri):** Ashwini, Bharani, Krittika, Rohini, Mrigashira, Mula, Purva Ashadha, Uttara Ashadha, Shravana, Dhanishta, Shatabhisha, Purva Bhadrapada, Uttara Bhadrapada, Revati
- These Nakshatras are represented by the code F (Feminine) in the Sun–Moon Nakshatra Combination Matrix.
- **Nakshatras as Neuter (Napumsaka):** Vishakha, Anuradha, Jyeshtha
- These Nakshatras are represented by the code **N (Neuter)** in the computational framework.

Table 3 showing Gender Classification of Nakshatras Used in the Study:

Table 3: Gender Classification of Nakshatras

Gender Category	**Traditional Term**	**Code**	**Nakshatras**	**Number**
Masculine	Purusha	M	Ardra, Punarvasu, Pushya, Ashlesha, Magha, Purva Phalguni, Uttara Phalguni, Hasta, Chitra, Swati	10
Feminine	Stri	F	Ashwini, Bharani, Krittika, Rohini, Mrigashira, Mula, Purva Ashadha, Uttara Ashadha, Shravana, Dhanishta, Shatabhisha, Purva Bhadrapada, Uttara Bhadrapada, Revati	14
Neuter	Napumsaka	N	Vishakha, Anuradha, Jyeshtha	3

To develop a 27 × 27 Sun–Moon Nakshatra combination matrix representing the possible planetary-position combinations: The gender classification described above is subsequently used to transform the Sun and Moon Nakshatra positions into Sun–Moon gender combinations. **Table 4 show** nine possible gender combinations for predication of traditional rainfall interpretation:

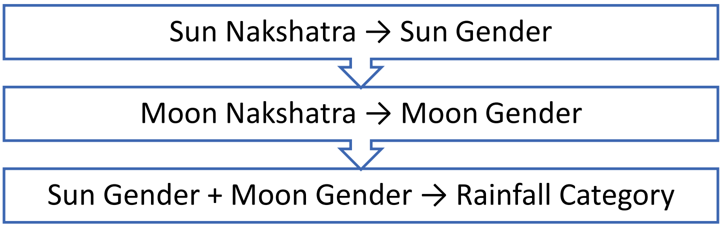
Table 4: Nine Possible Gender Combinations

Sun Gender	**Moon Gender**	**Code**	**Traditional Rainfall Interpretation**
Feminine (F)	Masculine (M)	H	High/Heavy Rainfall
Masculine (M)	Feminine (F)	M	Moderate Rainfall
Feminine (F)	Feminine (F)	P	Probability/Possibility of Rain

Masculine (M)	Masculine (M)	P	Probability/Possibility of Rain
Feminine (F)	Neuter (N)	L	Low Rainfall
Masculine (M)	Neuter (N)	NR	No Rainfall
Neuter (N)	Feminine (F)	NR	No Rainfall
Neuter (N)	Masculine (M)	NR	No Rainfall
Neuter (N)	Neuter (N)	NR	No Rainfall

Thus, the traditional classification can be computationally represented showing in figure 1:

Figure 1: Traditional Classification



This transformation provides the foundation for converting the traditional qualitative rainfall rules into structured categorical features for subsequent statistical analysis and machine learning in future.
The gender classification is directly incorporated into the proposed Sun–Moon Nakshatra Combination Matrix. Since there are 27 possible Nakshatras for the Sun and 27 possible Nakshatras for the Moon, the framework generates: 27×27=729 possible Sun–Moon combinations:

Table 5: Possible Sun-Moon Combinations with Gender

Sun \ Moon	**Ashwini - F**	**Bharani – F**	**Krittika – F**	**...**	**Revati - F**
Ashwini – F	P	P	P	...	P
Bharani – F	P	P	P	...	
Krittika – F	...	...	...	...	...
...	...	...	...	...	...
Revati - F	P	P	P	...	P

In the matrix, Sun Nakshatras are arranged along one dimension and Moon Nakshatras along the other. Each cell therefore represents one unique Sun–Moon Nakshatra configuration and is assigned a traditional rainfall category based on the gender combination of the two Nakshatras.

For example, when both the Sun and Moon occupy Feminine Nakshatras, the combination is classified as P (Possibility of Rain). The same P category is applied when both occupy Masculine Nakshatras. In contrast, a Feminine Sun with a Masculine Moon produces an H (High Rainfall) classification, while a Masculine Sun with a Feminine Moon produces M (Moderate Rainfall).

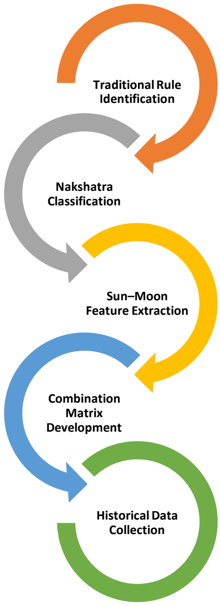
The central principle of the proposed traditional framework is that rainfall interpretation is based not only on the individual Nakshatra occupied by the Sun or Moon, but also on the combination of their Nakshatra categories.

Traditional interpretations associate different Sun–Moon gender combinations with different rainfall conditions. The source states that when the Sun and Moon occupy neutral Nakshatras, windy atmospheric conditions are expected. When both are positioned in feminine Nakshatras, the atmosphere is traditionally interpreted as unstable, with possible lightning, luminous clouds, and electrical disturbances. When the Sun and Moon occupy opposite gender categories—feminine and masculine or masculine and feminine—the combination is interpreted as favourable for rainfall.

Proposed Framework Structure: The major stages of the proposed framework are described below and showing in figure 2:

1. **Traditional Rule Identification:** Traditional rainfall rules involving Nakshatras, Sun–Moon positions, gender classifications, and Kaarti periods are identified from the selected Panchang and traditional textual sources.
2. **Nakshatra Classification:** The 27 Nakshatras are identified and classified according to the traditional gender categories—masculine, feminine, and neutral—after verification from the authoritative source.
3. **Sun–Moon Feature Extraction:** The Nakshatra occupied by the Sun and Moon on each observation date is extracted from Panchang data.
4. **Combination Matrix Development:** The Sun and Moon Nakshatras are combined to construct a 27 × 27 matrix containing 729 possible combinations.
5. **Historical Data Collection:** Panchang-derived features are integrated with historical observed rainfall data for the corresponding dates and geographical units.

Figure 2: Proposed Framework Structure



The proposed framework contains 729 possible Sun–Moon Nakshatra combinations. The uploaded research material explicitly identifies this 27 × 27 structure and the resulting 729 combinations. After pre-processing and feature engineering, the final analytical dataset can be structured as follows:

Table 6: Final Analytical Dataset Table

Date	**Sun Nakshatra**	**Moon Nakshatra**	**Sun Gender**	**Moon Gender**	**S–M Combination**	**Rain Status** - 0/1
Date 1	Uttara Bhadrapada	Ardra	F	M	H	1
Date 2	Bharani	Vishakha	F	N	L	1
Date 3	Ardra	Vishakha	M	N	NR	0
Date 4	Ardra	Dhanishta	M	F	M	1

The Table 6 has seven primary variables, Date, Sun Nakshatra, Moon Nakshatra, Sun Gender, Moon Gender, S-M Combination and Rain Status. The Date is the day of observation, and Sun Nakshatra and Moon Nakshatra are the Nakshatras occupied by the Sun and Moon on that day. Sun Gender and Moon Gender are categorical variables, indicating the traditional gender classification of the respective Nakshatras, M, F and N mean Masculine, Feminine and Neutral respectively. The S–M Combination feature is generated by combining the two gender categories based on the conventional interpretation of the Sun–Moon Nakshatra relationship. Finally, Rain Status is a binary target variable that shows the occurrence of rainfall and no rainfall by 1 and 0 respectively. This structure converts the usual Nakshatra rainfall indicators to a form that can be analyzed statistically and by machine learning. For example on Date 1, the Sun is in Uttara Bhadrapada (F) and the Moon is in Ardra (M) giving S–M combo H, with the observed Rain Status 1. This shows how the traditional astronomical information is transformed into structured features for computational analysis.

4. Conclusion, Future Scope and Limitations

4.1 Limitations of Research Limitations of the study were:

- **No Causal Evidence:** The paper does not report statistical correlates of the Sun-Moon nakshatra setups with actual rainfall records.
- **Geographical Limitation:** The study might be restricted to a specific geographical region and the results might not be directly transferable to other regions with different climatic conditions.
- **Machine Learning Limitations:** The performance of the model depends on the size of the data set, the quality of the features, the distribution of the classes, the choice of algorithms and the tuning of parameters.
- **Generalization:** A model that has been trained on historical data from a specific location and time may not perform as well for different climatological conditions or for future time periods.
- **Interpretation of Results:** A statistical association or a relatively high prediction accuracy should not be taken as evidence that Nakshatra configurations physically influence rainfall.
- **Need for Further Validation:** The proposed framework needs to be validated on larger independent and geographically diverse datasets before it can be considered for operational rainfall forecasting.

4.2 Future Scope: The present study has following future scope:

- Future research can include other Panchang parameters like Tithi, Yoga, Karana, lunar phases and planetary positions for more holistic indigenous framework for rainfall prediction.
- Fusion with meteorological variables: The Nakshatra based features can be fused with temperature, humidity, atmospheric pressure, wind speed, cloud cover and other meteorological parameters to see if indigenous features improve the prediction performance.
- Geographical Expansion: The proposed framework can be tested in different states, districts and climatic zones of India in a bid to find out whether the observed relationships remain consistent across the geographical regions.
- Advanced Machine Learning Techniques: Future work can use advanced algorithms such as Support Vector Machine, XGBoost, Artificial Neural Networks, Deep Learning and Ensemble models.

4.3 Summary

The present work is an attempt to propose an indigenous framework for prediction of rainfall from the planetary positions of Sun-Moon and Nakshatra configurations. The framework is a systematic representation of the 27 Nakshatras of Sun and Moon. So there are 729 possible combinations of Sun and Moon. In this study we incorporate the conventional classification of Nakshatras into masculine, feminine and neutral, to convert qualitative indigenous rainfall interpretations into structured computational features.
The proposed framework promises to bridge the gap between traditional Indian astronomical observations and modern data-driven approach but also stresses the need for scientific validation and reproducibility. The framework is limited and needs to be further validated with larger datasets, additional meteorological variables and different geographical regions. However it provides a basis for future research. The results can be useful for the elaboration of complementary approaches for rainfall forecasting that combine the indigenous astronomical indicators and the traditional meteorological information.

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