

# Lexical Analysis of Religious Texts using Text Mining and Machine Learning Tools

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## ABSTRACT

This paper presents a text mining approach to compare and to explore the similarities and the differences between various religious texts using POS Tagging and Term Document Matrix. Automated text mining and machine learning tools have been used for lexical analysis of the ten world famous religious texts: the Holy Bible, the Dhammapada, the Tao Te Ching, the Bhagwad Gita, the Guru Granth Sahib, the Agama, the Quran, the Rig Veda, the Sarbachan and the Torah. The extracted nouns categories were used as features to explore some interesting relationships between these religions and ideas that have emerged in different religions from different geographic regions.

## General Terms

Text Mining, Algorithms, Machine Learning

## Keywords

Religious Texts, POS Tagging, R, Lexical Analysis

## 1. INTRODUCTION

Religion has been a subject of study from various standpoints. The historian has been interested in religions as social movements and has taken pains to trace the development of various religions. How has religion come to acquire a place and importance in the life of the humans has been one of the concerns. The sociologist is primarily interested in the institutional and ritualistic aspects of religion. The meaning and functions of a religion cannot be understood fully without a reference to its scriptures. Therefore, to understand religion one has to understand the religious text, be it the Bible for the Christians or the Vedas for the Hindus or the Quran for the Muslims. If these sacred books are taken away from their respective religions, the latter will lose its meaning.

The literary and philosophy scholars use critical and qualitative methods for deep understanding of religious texts. These methods involve going through countless pages of plain text. But with advancement in computing power and free availability of text in digitized form, it has become easy to go through huge amounts of plain-language digitized text to find useful information that's been hiding in plain sight.

Automated lexical analysis techniques are being used nowadays for retrieval of useful information from large amounts of unstructured texts. Several studies have taken place in order to study different religions. Daniel McDonald et al. [1] presented a method for automated extraction of topics from nine religious texts to form a Self-Organizing Map to find relationships between these religious texts. With so many religious texts available in the world only nine were taken into consideration leaving out important world religions i.e.

Buddhism, Jainism, Sikhism. Qahl, Salha Hassan Muhammed et al. [2] developed an automatic similarity detection engine using the Bible and the Quran as corpus to explore the performance of various feature extraction and machine learning techniques. Only two religious texts were taken into consideration and it doesn't give deeper insight into difference in ideas and belief of these two religions. Frank Lloyd Sindler et al. [3] has written a thesis on comparative study of Christian, Jewish and Islamic theodicy. No automated technique have been used to analyze the lexical content of religious texts and only three religions have been taken into consideration. Altogether very little efforts have been made in the past for automated analysis of important religious texts.

Text analytics, also referred to as text mining [4], is a statistical and machine learning methodology for deriving high quality information from unstructured raw information for further analysis via application of natural language processing (NLP) [5] and analytical methods. Text analysis involves information retrieval, lexical analysis to study word frequency distributions, pattern recognition, tagging/annotation, information extraction, data mining techniques, visualization and predictive analytics.

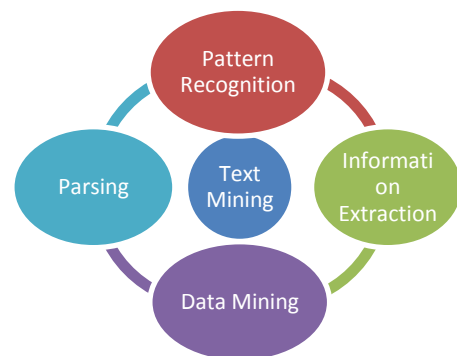


Figure 1: Components of Text Mining

## 2. COLLECTION OF RELIGIOUS TEXTS

The English translations of religious texts were downloaded from the Internet in the pdf format. The books analyzed included the Holy Bible, the Dhammapada, the Tao Te Ching, the Bhagwad Gita, the Guru Granth Sahib, the Agama, the Quran, the Rig Veda, the Sarbachan and the Torah. The selection of books has been done such that the important religions from different parts of the world can be analyzed and studied.

## 2.1 The Holy Bible

The Holy Bible [6] (The Old Testament and The New Testament) has its origin in the Middle East. The Holy Bible is a group of religious texts of Christianity. It includes laws, stories, prayers, songs, and wise words. We have used the Douay-Rheims version of the Old Testament and the New Testament 1609, 1582 translated from the Latin Vulgate.

## 2.2 The Dhammapada

The Dhammapada [7] originated in India. The Dhammapada is fundamental to religious Buddhism. It is a collection of sayings of the Buddha in verse form and one of the most widely read and best known Buddhist scriptures. The Dhammapada is a collection of 423 verses as uttered by Gautama Buddha himself to his disciples. It is divided into 26 chapters under such headers as Thought, Flowers, Old Age, Self, Happiness, Pleasure, Anger, Thirst, Brahmana and others. We have used the English Translation of the text from Pali by F. Max Muller.

## 2.3 The Tao Te Ching

The Tao Te Ching [8] originated in China. The Tao Te Ching is fundamental to the religious Taoism. The oldest excavated portion dates back to the late 4th century BCE. The book was originally written in classical Chinese using seal script. The English Translation of Tao Te Ching has been used for the analysis and study.

## 2.4 The Bhagwad Gita

The Bhagwad Gita [9] is originated in India. It is the sacred book of the religious Hinduism. The Bhagavad Gita is a 700-verse Hindu scripture in Sanskrit that is part of the Hindu epic Mahabharata (chapters 23–40 of the 6th book of Mahabharata), ascribed to the Sage Vyasa. The English Translation of Bhagwad Gita by A.C. Bhaktivedanta Swami Prabhupada has been used for the analysis.

## 2.5 The Guru Granth Sahib

The Guru Granth Sahib [10] originated in Northern India. Guru Granth Sahib is the central religious scripture of Sikhism, regarded by Sikhs as the final, sovereign and eternal living Guru following the lineage of the ten human Gurus of the religion, of whom six contributed the bulk. The English translation of Guru Granth Sahib by Singh Sahib Sant Singh Khalsa has been used for the analysis.

## 2.6 The Agama

The Agama [11] has its origin in India. Agamas are texts of religious Jainism based on the discourses of the tirthankara. Some authors date the composition of Jain Agamas starting from the 6th century BCE. The English translation by Hita Ajmera, Hemal Doshi, Nandita Sheth, Samir Sheth, Swati Kamdar, Vishal Parekh, Jayshri Doshi, Ami Damani and Girish Shah has been used for the analysis.

## 2.7 The Quran

The Quran [12] has its origin in the Middle East. The Quran is the sacred text of Islam. Muslims believe that the Quran was verbally revealed by God to Muhammad through the angel Gabriel. The Quran is divided into chapters (surah in Arabic), which are then divided into verses (ayah). The English Translation of the Quran by Talal Itani has been used for the analysis and study.

## 2.8 The Rig Veda

The Rig Veda [13] has its origin in India. The Rigveda is an ancient Indian collection of Vedic Sanskrit hymns. It is a

collection of 1,028 hymns and 10,600 verses, organized into ten books. It is the book of the religious Hinduism and is the oldest extant texts in any Indo-European language. The English translation of the text by Ralph T. H. Griffith (2nd edition), Kotagiri (Nilgiri) 1896, has been used for the analysis.

## 2.9 The Sarbachan

The Sarbachan [14] has its origin in India. The Sarbachan is the religious text of the Radhasoami Faith. The teachings of Soami Ji Maharaj, the founder of the Radhasoami Faith, were published in the form of Sarbachan in prose. The English translation of the Sarbachan by S.D. Maheshwari has been used for the analysis.

## 2.10 The Torah

The Torah [15] has its origin in the Middle East. It is the central text of the religious Judaism. The English translation of Torah published by the Wellsprings of Torah, a Messianic Congregation has been used for analysis.

## 3. PARTS OF SPEECH (POS) TAGGING OF TEXT

After selecting the books for the lexical analysis, Part-of-speech tagging (POS tagging) of the words, constituting the religious texts was done using the “openNLP” package in R [16]. The Part-of-speech tagging is the process of marking up a word in a text (corpus) as corresponding to a particular part of speech, based on both its definition and its context. The POS tags used by the “openNLP” package are the Penn English Treebank POS tags.

## 4. EXTRACTION OF LEXICAL TOKENS

POS tagging was followed by extraction of lexical tokens or words from the texts was done using R. Lexical tokens are the words which primarily convey information, which include nouns, verbs, adjectives and adverbs. Words or tokens other than lexical tokens are known as functional tokens. The total breakdown of terms into nouns, verbs, adjectives and adverbs between the ten books is reported in Table 2. The observations made are as follows:

- The Holy Bible had the largest number of tokens followed by the Guru Granth Sahib, the Rig Veda, the Torah, the Quran, the Sarbachan, the Bhagwad Gita, the Agama, the Dhammapada, and followed by the Tao Te Ching with minimum token count as reported in Figure 3.

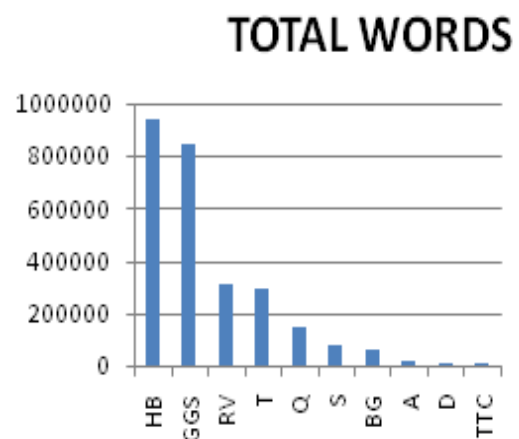


Figure 2: Comparison of Religious Texts based on total number of Words

- Nouns made up 15 to 40 percent of the terms, verbs made up 7 to 21 percent of the terms, the Adjectives made up 2.5 to 40 percent of the terms and the adverbs made up 1 to 9 percent of the terms.
- As shown in figure 4, the Agama, the Rig Veda ,the Bhagwad Gita and the Sarbachan had a greater number of Nouns than other texts did.

### NOUNS (%)

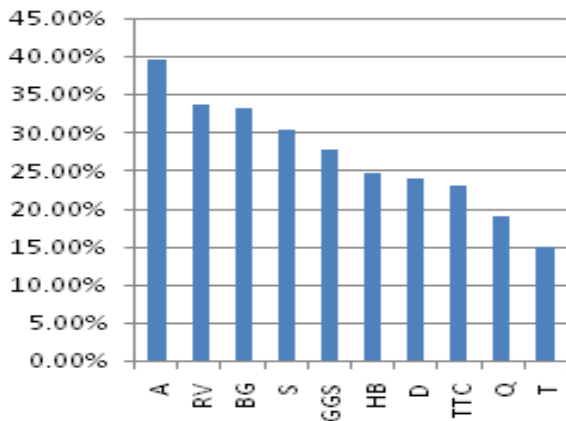


Figure 3: Comparison of Religious Texts based on total Noun categories

- As shown in figure 5, the Tao Te Ching, the Quran, the Dhammapada and the Guru Granth Sahib had a greater number of verbs than other texts did.

### VERBS (%)

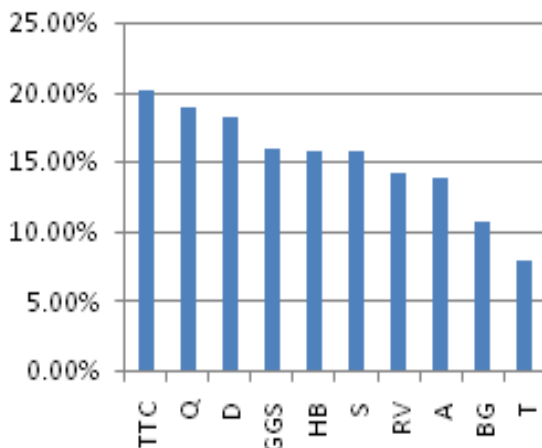


Figure 4: Comparison of Religious Texts based on total Verb categories

- It was observed that the books which has a larger number of nouns subsequently showed an opposite behaviour with a smaller percentage of verbs than the other books.
- The Quran, the Tao Te Ching and the Dhammapada had similar number of nouns and verbs.
- After combining the lexical tokens together, the Bible, the Guru Granth Sahib and the Rig Veda had the largest number of lexical tokens.

## 5. CALCULATION OF LEXICAL RICHNESS OF RELIGIOUS TEXTS

The most popular measures used in the measurement of Lexical Richness are Lexical Density(LD) and Lexical Variation(LV) [17 ].

Lexical Density is defined as the percentage of lexical words in the text ,i.e. nouns ,verbs ,adjectives ,adverbs:

$$LD = \frac{\text{Number of Lexical Tokens}}{\text{Total Number of Tokens}} \times 100$$

Lexical Variation(LV) is the type/token ratio, i.e. the ratio in percent between the different words in the text and the total number of running words:

$$LD = \frac{\text{Number of Types}}{\text{Total Number of Tokens}} \times 100$$

The Lexical Density(LD) and Lexical Variation(LV) of the ten religious texts was calculated as shown in Table 3. The observations made are as follows:

- The Agama had the highest Lexical Density followed by the Rig Veda and the Tao Te Ching. The Torah had the least Lexical Density as shown in Figure 6.
- The Bhagwad Gita had the highest Lexical Variation followed by the Agama and the Tao Te Ching.The Guru Granth Sahib had the least Lexical Variation as shown in Figure 6.

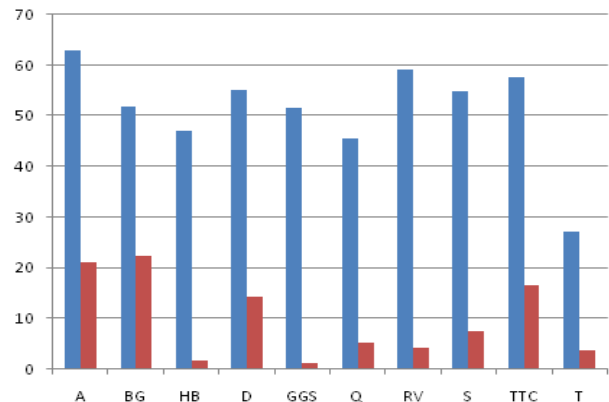


Figure 5: Comparison of Religious Texts based on Lexical Density and Lexical Variation(blue bar=Lexical Density, red bar=Lexical Variation)

## 6. CATEGORISATION OF COMMON NOUNS

In order to find the important noun categories of all the religious texts, term document matrix has been created using the “tm” package in R [ 18]. The term document matrix describes the frequency count of words among all resumes. In the term document matrix , each row represents one religious text and each column represents a word(noun) and each entry represents the frequency count of a particular word in that particular resume. Some pre processing steps have been used to create the term document matrix. All the punctuation marks have been removed have been removed since these are of no significant use , all the Upper case letters have been converted into lower case in order to maintain the similarity and words are stemmed so that any differences in the tenses or the usage

of the words would not be able to affect the term document matrix. The extracted nouns were categorized into common noun categories with most common examples as shown in Table 4. The observations made are as follows:

- Apart from common internal body parts, only the Torah and the Holy Bible had references to flesh as a unique body part instance.
- The Quran had a greater number of references to emotions like danger, fear, hatred, anger, duties, burdens than other texts did.
- The Bhagwad Gita, the Quran and the Tao Te Ching had a large number of references to sacrifice.
- Hour, month and year were the common units to measure time periods. Unlike other religious texts, the Tao Te Ching had references to only morning in the date/time category.
- The Holy Bible had references to the Babylon and the Jeremia. And the Torah had references to the Israel and the Egypt in the place category.
- The 'Lotus' emerged as the one and only flower referred to in the religious texts i.e. the Bhagwad Gita, the Dhammapada, the Guru Granth Sahib, the Rig Veda and the Sarbachan, all having Indian origin.
- The religious texts having Indian origin had greater references to the five important elements of Nature i.e. fire, air/wind, water, earth and the sky which indicates that according to these texts these elements play an important role in human life.
- The Rig Veda had maximum references to God under different names i.e. Indra, soma, varuna, indu, surya, rudra, brahaspati, visvedeva, saraswati, yama, kali and Vishnu. Similarly, the Bhagwad Gita had multiple references to God as Vishnu, shiva, rudra, yama, indra, varuna, soma, kali, Krishna and arjuna. Both belong to the religious Hinduism and share names of God.  
Another striking observation was that these were the names of the five essential elements of Nature in the regional language of India i.e. Hindi. This shows that the followers of Hinduism worshipped the five elements of Nature as God.
- The Holy Bible, the Rig Veda had greatest number of references to the precious stones/metals i.e. gold, silver, pearl, ornament and diamond. The Tao Te Ching had no references to this category.
- The Rig Veda, the Bhagwad Gita and the Guru Granth Sahib had the maximum number of common animal instances.
- All the religions with Indian origin had references to hymns, songs and prayers as a medium to communicate with God.
- All the religions had a reference to 'boat' as the water vehicle.
- All the religions with the Indian origin had a large number of instances of 'yoga' and 'yogi'. The Rig Veda, the oldest sacred texts, had the maximum instances of these words depicting the origin of yoga in India thousands of years ago.
- Another striking observation made was the large number of occurrences of the word 'one' throughout all religions. This indicates that all the religious texts believe in the existence of one eternal God.

- There is a reference to a festival known as 'Holi' in the Agama, the Guru Granth Sahib, the Rig Veda and the Sarbachan.
- Another interesting observation made was that in there were some instances of the Holy Bible and the Torah in the Quran, all three belonging to the same origin i.e. the Middle East. They were: torah, pharaoh, noah, joseph, aaron, Isaac, Jacob, altar, jesus, Solomon, church, Babylon.
- The Sarbachan had instances belonging to the Bhagwad Gita, the Aama, the Rig Veda, the Quran and the Guru Granth Sahib. They were: jain, sri, Krishna, veda, shiva, Vishnu, brahma, kali, muslim, nanak, quran.
- The Guru Granth Sahib had instance belonging to the religious Hinduism i.e. Krishna.
- These results show that the religions belonging to the same geographic region influenced each other and they also relate or compared themselves with the other religions of the same geographic region.

## 7. CONCLUSION AND FUTURE WORK

The results of the Lexical Analysis of Religious Texts clearly show that the religious texts originating from the same Geographic region had maximum number of shared Noun categories. This indicates that geographic regions had an impact on these religious texts. Some religious texts had references to the God of other religions indicating that those religious texts compared themselves with other religions of the same geographic region.

In future even more religious texts can be included in the analysis and Hierarchical Clustering can be performed to explore the similarities and the differences between different religions belonging to different geographic regions. Also various religious texts of the same religion from different era can be compared and analysed to study how a religion evolved and developed with time.

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## 9. APPENDIX

**Table 1: Tallies for Categories of Lexical Tokens across Religious Books**

Holy Books	Nouns (Total)	Nouns (%)	Verbs (Total)	Verbs (%)	Adjectives (Total)	Adjectives (%)	Adverbs (Total)	Adverbs (%)	Others (Total)	Others (%)	Total Words
Agama (A)	7957	39.58	2783	13.84	1354	6.73	572	2.84	7436	37.01	20102
Bhagwad Gita (BG)	19328	33.21	6237	10.71	2864	4.92	1713	8.86	8514	42.30	58200
Bible (HB)	230682	24.63	147106	15.71	32508	3.47	31757	3.39	494629	52.80	936682
Dhammapada (D)	2898	23.85	2216	18.24	951	7.83	638	5.25	5447	44.83	12150
Guru Granth Sahib (GGS)	233700	27.67	134347	15.91	42215	4.99	25897	3.07	408457	48.36	844616
Quran (Q)	28196	18.87	28322	18.95	5966	3.99	5736	3.84	81182	54.35	149402
Rig Veda (RV)	102783	33.54	43225	14.12	24614	8.03	10415	3.39	125379	40.92	306416
Sarbachan (S)	23155	30.41	11929	15.67	3920	5.15	2722	3.57	34409	45.20	76135
Tao Te Ching (TTC)	2214	22.87	1943	20.07	866	39.11	553	5.71	4105	12.24	9681
Torah (T)	44540	15.02	23480	7.92	7408	2.50	5093	1.72	215902	72.84	296423

**Table 2: Tallies for Lexical Density and Lexical Variation Across Religious Books**

Holy Books	Total Number Of Lexical Tokens	Total Types Of Tokens	Total Number Of Tokens	Lexical Density (%) (LD)	Lexical Variation (%) (LV)
Agama (A)	12666	4262	20102	63.01	21.20
Bhagwad Gita (BG)	30142	12985	58200	51.79	22.31
Holy Bible (HB)	442053	16167	936682	47.19	1.73
Dhammapada (D)	6703	1750	12150	55.17	14.40

Guru Granth Sahib(GGS)	436159	10111	844616	51.64	1.20
Quran(Q)	68220	7924	149402	45.66	5.30
Rig Veda(RV)	181037	12985	306416	59.08	4.24
Sarbachan(S)	41726	5728	76135	54.80	7.52
Tao Te Ching(TTC)	5576	1608	9681	57.60	16.61
Torah(T)	80521	11300	296423	27.16	3.81

**Table 3: Important Noun Categories with instances across all Religious Books**

Categories	Agama	Bhagwad Gita	Holy Bible	Dhammapada	Guru Granth Sahib	Quran	Rig Veda	Sarbachan	Tao Te Ching	Torah
Family Relations	Mother,son,child,father,wife	Son,mother,father,children,wife	Son,father,mother,husband,children	Mother,father,son,wife,children	Husband,mother,child,father,wife,daughter	Mother,son,father,children,wife,brethren	Mother,son,father,child,husband,brother,sister	Mother,husband,father,son,brother,wife,child	Mother,son,children	Mother,father,children,son,wife,child
External Body Parts	Head,eye,feet,hair,hnd,mouth,knee	Eye,mouth,feet,arm,palm,teeth,ear,hair	Hand,feet,eye,head,face,mouth,tongue	Tongue,hair,arm,hand,feet,head,eye,mouth,ear	Feet,tongue,forehead,eye,mouth,palm	Hand,eye,face,feet,ear,head,palm,mouth,	Arm,tongue,eye,mouth,foot,hair,teeth,ear	Feet,eye,head,neck,head,ear,arm,tongue,mouth	Arm,eye,ear,mouth,foot,hand	Teeth,palm,head,shoulder,ear,face,eye.feet
Internal Body Parts	Mind,heart,limb,womb,bone,blood	Flesh,mind,heart,womb,blood	Heart,mind,womb,bone,blood,breast	Heart,mind,bone,blood	Mind,heart,womb,bone,breast,blood	Heart,womb,bone,blood,breast	Heart,mind,limb,womb,bone,blood,breast	Mind,heart,breast,womb,bone	Mind,heart,bone	Flesh,blood,womb,breast,bone,heart
Emotions	Anger,pain,pleasure,love,hate,free,dom,joy,sorrow	Pleasure,pain,fear,love,anger,happiness,sorrow,freedom,hope,honor,danger,pride,hate	Pain,fear,joy,hope,love,honor,hate,anger,terror,pride,wrath	Pain,pleasure,happiness,fear,love,hate,anger,sorrow,freedom,joy,danger,honor	Love,pain,egotism,fear,hope,anger,danger	Pleasure,hate,fear,wrath,danger	Joy,delight,love,pleasure,freedom,anger,danger,fear,hope,sorrow,terror,pain	Pleasure,pain,fear,anger,honor,sorrow,laugh,delight,distress	Honor,fear,distress,sorrow,danger,love	Terror,dread,pain,sorrow,joy,love,anger,danger
Virtues	Kind,truth,faith,wisdom,strength,care,knowledge	Sacrifice,wisdom,art,grace,kind,rig,hteous,wit	Mercy,courage,wisdom,strength,truth,grace,faith,wit,care	Truth,wisdom,strength,kind,care,trust	Grace,wisdom,grace,mercy,kind,faith,courage	Wisdom,faith,sacrifice,strength	Art,wisdom,kind,grace,care,wrath	Mercy,art,devotion,grace,faith,strength,wisdom,courage	Righteousness,sacrifice,trust,wit,wisdom,care,wit	Grace,wrath,courage,kind,care,wisdom
Date/Time	Day,dark,night,hour,month,dawn,ye,ar,today	Dark,night,day,month,dawn,today,ye,ar	Day,night,morning,dark,hour,ye,ar,month,spring,today	Night,day,dark,month,hour,ye,ar,today	Night,day,dark,hour,morning,dawn	Day,night,hour,morning,dark,dawn,month	Dawn,day,morning,night,dark,today	Night,day,hour,today,morning,dawn,month	morning	Month,morrow,today,day,night
Earth/Place	World,universe,earth,hell	World,universe,earth,heaven,hell,	Earth,heaven,world,Israel,paradise,hell,Babylon,Jeremia	World,earth,heaven,hell	World,universe,earth,heaven,paradise	Earth,heaven,hell,world,universe	Heaven,earth,world,universe	World,earth,universe,heaven,hell	Universe,world,heaven,earth	Israel,egypt,earth,heaven,hell

Plants	Plant,fruit,tree,flower,root	Wood,lotus,tree,root,seed,plant,herb,forest,grass	Tree,grasses,forest,herb,plant,branch,seed	Forest,flower,lotus,tree,grasses,sandalwood,plant,wood,root,thorn,seed	Lotus,forest,plant,flower,sandalwood,wood,herb	Tree,plant,seed,thorn,herb,flower,root	Grass,plant,wood,forest,tree,herb,seed,lotus	Lotus,flower,seed,tree,plant,wood,forest,sandalwood	Plant,tree,thorn,root	Flower,grass,plant,forest,root,tree
God	Lord,guru,God,Goddess,Sri,Mahavira	Lord,God,Vishnu,Shiva,Rudra,Yama,Indra,Varuna,Soma,Kali,Krishna,Arjuna,bhagwan	Lord,God,Jesus,Christ,goddess	God,Lord	Lord,Guru,Nanak,God,Creator	Allah,Lord,God	Indra,god,soma,lord,varuna,indusurya,rudra,brahaspati,goddess,visvedeva,saraswati,yama,kali,vishnu	Guru,Radhasoami,Lord,God,Soami	Lord	Lord,God
Eatables	milk	Fruit,water,food,butter,milk,salt,nectar	Water,fruit,cake,bread,salt,sweet,corn,wheat,vine,milk,food,meat	Water,fruit,milk,honey	Water,fruit,milk,sweet,grain,butter,corn,honey,salt,bread,cake,wheat,grape,meat	Water,food,grain,vine,milk,meat,honey,grape,bread	Water,juice,milk,butter,grain,cake,corn,fruit,barley,honey,meat	Water,milk,butter,fruit,grain,sweet,cake,salt	Water,food	Milk,cake,honey,vine,salt,barley,wheat,flour
Elements of Nature	Moon,sun,air,light,rain,fire,star,river,sky,wind,ocean,light,sea	Fire,light,sun,ocean,moon,wind,air,river,rain,lake,sky,flame,star	Sky,ocean,air,wind,sun,river,light,sea,rain,moon	Moon,wind,fire,air,rain,light,sun,sky,star,sea	Light,ocean,fire,sun,rain,moon,wind,river,air,sea	Fire,sky,light,river,moon,wind,sea,ocean,	Sun,moon,light,sky,river,rain,air,wind,fire,star	Sun,moon,ocean,sky,light,flame,rain,fire,star,river,sea	River,ocean,sky,light,air,wind	Sun,rain,moon,star,flame,sky,sea,river,ocean
Events	Birth,holi,wear,heaven,marriage	Death,battle,war	Death,battle,marriage,birth	Death,birth	Death,holi,birth,Basant,battle	birth	Holi,battle,birth,marriage	Holi,death,birth,Basant,war	Death,battle,war	,marriage,birth
Precious Stone/Metal	gold	Gold,iron,pearl,ornament	Gold,silver,iron,brass,pearl,diamond,ornaments	Gold,silver,iron,diamond,jewel	Gold,silver,iron,brass,diamond,jewel,ornament	Gold,silver,brass,pearl,ornament	Gold,iron,brass,pearl,jewel,ornament	Gold,silver,iron,diamond,pearl,jewel,ornament	-	Gold,jewel,brass,ornament
Animals	Elephant,cow,horse,bear,deer,snake,fish,bird,cattle,lion	Cow,horse,elephant,serpent,fish,dog,bee,calf,bird,lion,cattle	Lamb,horse,cattle,bird,lion,bear,dragon,calf,herd,sheep,dog,serpent,worm,camel,bull,hawk	Elephant,horse,bird,swan,fish,cow,bee,calf	Herd,bear,bull,fish,elephant,bird,serpent,horse,deer,swan,lion,cow,worm,dog,hawk,calf,sheep,bee,camel,dragon	Bird,bee,goat,bear,fish,dog,calf,cattle,horse,elephant,cow,serpent,herd	Horse,cow,bull,cattle,bird,bear,dragon,deer,herd,calf,swan,serpent,dog,elephant,lion,bee,sheep,fish,oxen	Bird,fish,snake,serpent,swan,bee,elephant,dog,lion,deer,bear,cow,calf	Horse,dog,fish,bird	Herd,bird,sheep,serpent,camel,worm,dog,hawk,lion,snake,bee,cow,bull,shekel,lamb,goat