VISUALISING INDIAN HERITAGE DIGITAL LIBRARY METAPHOR

Nagnath R. Ramdasi

Centre for Development of Advanced Computing, Pune (Mah), India
E-mail: ***ramdasi@cdac.ernet.in***

ABSTRACT

India's most valued and revered gift not only to Herself but also to the entire humanity is its profound and timeless heritage. It is for this reason the Indian heritage is to be properly grasped, understood, documented and apprehended and made accessible to widespread audience. However, this task is not easy. In Indian context, concept of heritage is explained in detail taking into account the broader vision of humanity. A fundamental problem associated with the new classes of visual data and their related analysis is that they focus, (despite their appearance) on abstract information, which does not automatically map onto the physical world. Thus, many interesting classes of visual information have no natural and obvious metaphorical representation. Once this is accepted, then it is necessary to visualize the complete picture of the heritage tree, that enables to express a logical flow of such tree with more authenticity, and in a metaphoric fashion to put it in digital form, with better human-computer interaction.

In this research paper, effort is to bring the clarity in the structure of Indian Heritage to express it in the form of Visual Metaphor Model, while undertaking a work of creation of 'digital library (DL) of Indian heritage'.

KEYWORDS: *Indian Heritage Digital Library, Visual Metaphor, Indian Heritage*

INTRODUCTION

It is rightly said that *the nation or the society, which does not know its heritage, cannot fully comprehend its present and hence is unable to steer its future.* India's most valued and revered gift not only to Herself but also to the entire humanity is its profound and timeless heritage. This heritage encompasses almost every aspect of human inquiry, exploration and existence covering philosophy and religion, language and literature, metaphysics and sciences, polity and social living, habitat and architecture, dance and music, and arts and crafts.

Centuries after centuries, rich tribute have been paid by scholars all over the world to the glorious heritage of India. While the commentaries of Max Muller and Will Durant are well known, Mark Twain said, "India is the cradle of the human race, the birthplace of human speech, the mother of history, the grandmother of legend, and the great grandmother of tradition. Our most valuable and most instructive materials in the history of man are treasured up in India only". French scholar Romain Rolland expressed, "If there is one place on the face of earth where all the dreams of living men have found a home from the very earliest days when man began the dream of existence, it is India". On scientific heritage of India, Albert Einstein once remarked, "We owe a lot to the Indians, who taught us how to count, without which no worthwhile scientific discovery could have been made".

There are several interesting facts about India. A few are quoted here. **(R1)** The world's first university was established in *Takshila* in 700 BC. More than 10,500 students from all over the world studied more than 60 subjects. The University of *Nalanda* built in the 4th century was one of the greatest achievements of ancient India in the field of education. *Mahabharat* is the largest and the greatest epic ever created till today. Sanskrit one of the richest language ever created, is the mother of all the Indian languages. Over 5000 years ago, Indians established *Harappan* culture in *Sindh* valley. India was the richest country in her past 10000 years of known history.

It is well-known that India invented the number system and zero was in tented by *Aryabhatta*. The place value system and the decimal system, was developed in India in 100 BC. *Bhaskaracharya* calculated the time taken by earth to orbit the sun hundreds of years before. The astronomer Smart, Algebra, Trigonometry and Calculus came from India. The value of π (pi) was first calculated by *Budhayana*, and he explained the concept of what is known as the Pythagorean Theorem. He discovered it in the 6th century long before the European mathematicians. The largest number used by Greeks and Romans was 10 **6, whereas Indians used numbers as big as 10**53 with specific names as early as 5000 BC during the *Vedic* period. Even today, the largest named number is tera, that is 10**12. The art of navigation was born in the river of *Sindh* 6000 years ago. The very word 'navigation' is derived from the *sanskrit* word '*nav* + *gatih*. The word navy is also derived from *sanskrit* '*nav*'. The earliest reservoir and dam for irrigation was built in Saurashtra.

Ayurveda is the earliest school of medicine known to humans. *Charaka*, the father of medicine consolidated *Ayurveda* 2000 years ago. *Susruta* is the father of surgery. He conducted complex surgeries 2600 years ago and had a deep knowledge of anatomy, physiology, etiology, embryology, digestion, metabolism, genetics and immunity.

There are several such known and unknown facts. Many scholars and researchers would like to see and study its original references and their authentic interpretations, which are easily and widely accessible Common people would also like this heritage to be available to them in their own languages, that too in a manner they understand.

Today, the heritage of India is scattered in texts in libraries, museums and in individual possessions, oral and disciplic traditions, archeological findings and artifacts, manuscripts in various forms, temples, cave paintings, in museums in India and outside, folklore, cultural traditions, and in dance and music. Much of India's heritage in its physical form unfortunately got lost or mutilated and destroyed through successive invasions, some of which may get stolen or lost. Books and manuscripts are decaying and oral and disciplic traditions are slowly vanishing. It is astonishing that the *Vedic* literature originally spread over 1131 branches has suffered irreparable damage during the past thousands of years, leaving behind only one percent of the treasure which is further facing the danger of disappearance today. Preservation of Indian heritage treasure presents a great and urgent challenge for India. Fortunately, the advancing Information Technology offers the solution to this, through the creation of digital libraries. On this background let us now proceed to explain the notion of Digital Library Technology.

DIGITAL LIBRARY INITIATIVES

With the development and spread of Information Technology, several projects are initiated in USA and Europe to build large-scale digital libraries, especially for the preservation of national heritage.**(R12, R14)**

One of the intensely pursued subjects of digital library is 'heritage' in the form of digital repository of rare texts, manuscripts, images, paintings, and artifacts. The Vatican Library Project is an outstanding example of a multinational and multidisciplinary project for building a digital repository of over 150,000 manuscripts, including the oldest known manuscripts of the Bible from 350 AD, and 1.5 million books including 8000 published during the first 50 years of the printing press.

The highly impacting success of this project has led to similar initiatives all over the world like, National Digital Library Federation (NDLF) which came into being in on March 1, 1995 as a joint initiative of 15 US research libraries and Commission on Preservation and Access. Immediate outcome of this was launching of the project "American Heritage Virtual Archival Project" and "California Heritage Collection".

Other well-known heritage projects include, Archivo General de Indians digital archival of 90 million pages of historical materials documentary; the Spanish Conquests; the Lutheralle Wittenberg Museums ambitious project of transferring 2.5 million objects to electronic format, the National Digital Palace Museum in Taipei to make world's largest digital collection of Chinese Cultural treasure to be available on the web.

Apart from these, several national projects on building digital libraries of national heritage are being initiated in UK, Germany, China, Indonesia, Russia, Japan, etc.

It is interesting to note that all these projects have been Government initiatives with substantive funding, both for technology development and digital content creation. With the proliferation of Internet and World Wide Web (WWW), the decade long research of digital libraries has suddenly become intense and wide scale with potential possibilities of rich presentations and worldwide access.

The US Government has made digital libraries development a flagship project in the HPCC and NII national initiative. Digital libraries development is very closely linked to advances in High Performance Computing and Networking or Communications (HPCC) and these advances have on one hand contributed to the development of digital library technology and on the other hand the problem of handling massive amount of digital content has challenged the HPCC technologies. It is for this reason the Digital Library Initiatives phase 2 or DL-2 has again become a flagship project of the HPCC/NII Agenda of the US Government.**(R14)**

Before discussing about Indian Heritage Digital Library, it is appropriate to go over concept of Digital Library and its definition, as follows.

Definition of Digital Library

D*igital Library is an organised collection of multimedia and multilingual data with information management methods that represent the data as information and knowledge.* **(R2)**

Thus, from the above definition, it is clear that data available in various format and different languages can be collected, captured, stored, organised, manipulated and made accessible; in whatever

media it consists of, but in digital form. The concept of a "digital library" is not merely equivalent to a digitized collection with information management tools. It is rather an environment to bring together collections, services, and people in support of the full life cycle of creation, dissemination, use, and preservation of data, information, and knowledge.

Two clear cut parts are seen in the above definition: one; Existing knowledge data, two; Information Management Systems (i.e. Digital Library), that represents original data in the form of Information and Knowledge.

Two Facets before Digitisation
In the light of the above definition, we clearly see the Indian Heritage in two parts:
  a. Knowledge Tree of Indian Heritage
  b. Digital Library of Indian Heritage

In both the parts mentioned above several challenges are needed to be taken into account.

Firstly, It is not that easy task to create Digital Library of Indian Heritage that has spread in different regional languages, in different forms with multifaceted complex dimensions within it. One needs to catch a single thread in it to compile and classify properly. It is for this reason the Indian heritage is to be properly grasped, understood and apprehended and made accessible to as wide as audience as possible. This 'knowledge tree exploration' is the main underlying idea of this research paper.

Secondly, technological challenges involved with Digital Library. As indicated earlier, the technology of digital library is closely linked with HPCC technology, covering computer networking, storage management, and access. In multilingual country like India, the heritage covers texts, rare manuscripts, and artifacts, not only in multimedia form but also in multilingual form. Therefore, undertaking a digital library initiative/s, requires a strong base, expertise, and infrastructure for handling HPCC as well as multilingual and multimedia technologies. Mere traditional libraries, documentation centres, or museums cannot adequately address this problem.

Established in March 1988, as a Scientific Society of Ministry of Information Technology Government of India, the Centre for Development of Advanced Computing (C-DAC), is primarily an R&D institution involved in the design, development and deployment of advanced Information Technology products and solutions. In addition to the HPCC solutions, C-DAC's Language Technology mission provides a framework for co-existence of all the living languages of the Indian Continent and world. To proliferate the benefits of IT to the vast and diversified multilingual population of India, C-DAC evolved and updated the Graphics and Intelligence based Script Technology (GIST), that is now extended to include multilingual and multimedia computing solutions, covering a wide range of applications such as publishing and printing, word-processing, graphics and imaging, electronic mail applications, web development tools etc. As a part of its initiative on Digital Libraries, C-DAC is developing the architecture and tools, standards and templates that will form the basis for archiving, querying, presenting and disseminating multimedia-based information. The deliverables include, providing the technology, contents and infrastructure for a Digital Library of Indian heritage including Ancient Literature, Arts and Culture, Museums, and Archeology. In this connection C-DAC has already carried out work on rendering of Bhagavad-Gita and Vishnu Sahasranama and limited work on RugVeda in Sanskrit using DESIKA, a natural language understanding system developed by C-DAC. The National Multimedia Resource Centre (NMRC) of C-DAC has released two CD-ROM titles; rendering of the 'Dnyaneshwari', a commentary on Shri Bhagvad Gita by Saint Dnyaneshwar, the marathi poet-saint in the 13th century and 'Shaili' another product is a comprehensive collection of borders, arches, corners and other artifacts from ancient Indian architecture.

All such technical challenges are based upon the technology development and applications of it to the specified purposes. Hence these challenges can be met in due course of time with the enhancement of technology. Hence, no more focus on these challenges is expected in this research paper. Perhaps, some of the technical developments may get a proper direction in the light of the effort in visualizing the complete knowledge tree as referred above. However, it is necessary to visualize such complete picture of the heritage tree, so that a logical flow with more authenticity can be achieved to put it in digital form. Such heritage tree has to be thought from the concept of meta psychology of it, then at meta theory level to metadata level and at the end data to be digitized under this flow. Once this is accepted then it is needed to express it in metaphoric fashion. Now, let us elaborate the concept of metaphor more.

CONCEPT OF METAPHORS
In 1994, *John Lowler* **(R16)** in his speech delivered to staff of Information Technology division of the University of Michigan, explained the concept metaphor as a human cognitive phenomenon, though the word 'metaphor' has to be distinguished out of several different meanings of the word. This phenomenon is real, but it is very abstract and can't really be investigated itself. To find out how it works, one has to look at more concrete phenomenon. For example "Health is Wealth". In this sentence metaphor theme here, 'Health' and 'Wealth' are

totally different concepts. A word 'maintained' that is defined with respect to one kind of things (Wealth) is used in context with a completely different kind of thing (Health). This he called as 'instantiation' of frame metaphor. Using a metaphor theme means that one can use words that are defined with respect to one frame in talking about concepts and words defined with respect to another. Thus, there are three levels:

1. Metaphor as a human cognitive phenomenon
2. Individual metaphor theme (Health is Wealth), and
3. Instantiation of metaphor themes (He maintained it better).

(R4) Any view, which holds that a metaphorical expression is used in place of some equivalent literal expression, Black calls it a substitution view of metaphor. To take a few examples *Whateley* **(R19)** defines a metaphor as a word substituted for another on account of the resemblance or analogy between their significations. According to a substitution view, the focus of a metaphor, the word or expression having a distinctively metaphorical views within a literal frame, is used to communicate meaning that might have been expressed literally.

Metaphor and Computer Science
In view of the concept of metaphor, computer science is not only chronologically new but radically new in kinds. Its mental process, its language, and the realities with which it deals are different from those of other sciences. **(R15)** *Juris Hartmanis*, a mathematician turned computer scientists, observed some years ago that computer science is a "brand new species of science," with paradigms radically different from those of other disciplines. *Edsger Dijkstra* **(R10)** made a similar claim for the radical newness of the discipline in his 1972 turning award lecture "On the Cruelty of Really Teaching Computer Science"

One rightfully expect a radically new discipline to use language in new and distinctive ways. Computer discourse is a different area for such differences and features. However, without going into that, or mentioning either linguistic or philosophical (cognitive) approach, it is necessary to focus the purposes of visual metaphor in computer science.

a. In the age of information today, computer is playing major roles because of its resemblance with human brain and connectivity. Human-computer interactions of 'single user PC' have changed with time. In distributed networks (or multi-user) environment of more sophisticated PCs, ways of rendering and presenting information have been changed substantially with inherent multimedia elements. As a result, that has profound impact over user interactivity. In view of this, it has become necessary to study the nature of interactions between computer and user-human in the light of visual presentations from the metaphorical aspects of it.

b. In **(R21)** our increasingly information dependent society, visualization research has changed the way we present interaction, and understand large and complex data sets and information. Rapid developments in entertainment technology like digital cameras, Video recorder, TV etc. computer hardware, and the exploitation of multimedia technology have opened up completely new possibilities for people together, interpret, extract and manipulate information using visual media.

c. A fundamental problem associated with the new classes of visual data and their related analysis is that they focus, despite their appearance, on abstract information, which does not automatically map onto the physical word. Thus, many interesting classes of visual information have no natural and obvious metaphorical representation.

d. Hypermedia systems are a special case amongst complex information systems, on digital libraries, that they are supposedly usable also by the "naïve" and casual users. To ensure this usability, applying user interface metaphors can solve the problematic of "getting lost in the cyberspace". **(R9, R6, R25)**

Metaphors are needed for hypermedia in order to: **(R23)**

- offer familiar and motivating presentation of the system
- impose further structure on node-and-link networks
- visualize interaction affordances

These three basic types of metaphor were discussed in International Hypermedia Conference'93
1. **Organizational metaphors** – the metaphor manifests inherent structure that can organize node-and-link information within these metaphor-based spaces.
2. **Functional metaphors** – the metaphor is represented through visually recognizable objects that allow direct manipulations
3. **Navigational metaphors** – the metaphor allow (inter) actions by user that lets them move around in the hyperspace.

To bring clarity in this concept of metaphor analogically, further it is desirable to discuss the nature and scope of Indian Heritage.

INDIAN HERITAGE: NATURE & SCOPE
Meta Philosophy
The fundamental question now arises, what is meant by 'heritage' itself? The definition and scope of 'heritage' is so vast in scope and depth that it is very difficult to comprehend and express it's true meaning

in words. Further, the definition and concept of 'heritage' is fundamentally different in the Indian context, from what is understood from the western point of view. In the Indian context 'sanskriti' is the true expression of the English word 'heritage'.

But what 'sanskriti' really is? The words 'prakriti', 'vikriti', and 'sanskriti', all originate from the root 'kri' meaning 'to act' from which is derived the noun 'kriti' meaning 'action'. 'Prakriti' means the whole nature or the environment, 'vikriti' means distortion in prakriti and 'sanskriti' means the actions and interactions which are continuously done by humans not only to prevent this distortion but also to preserve and enhance it as time progress.

Man lives through interactions **(R20)** with nature and its constituents and transforming the environment in a manner beneficial to him. Man can succeed only if he can control the surrounding environment and also his own body, mind and intellect. In this process he changes the environment and also changes himself in a visible as well as invisible way. This process of continuous change through time results in 'sanskriti'.

Thus, 'sanskriti' is a result of philosophy and practices of humans through successive generations. 'Sanskriti' does not belong to only one individual, but to society as a whole. Individual lifecycle is short but the lifecycles of societies or civilizations are long. 'Sanskriti' is embedded by one generation into the next generation and lives on. 'Sanskriti', thus decides the direction of the society or the civilization to which it belongs.

(Please refer the diagram of Visual Metaphor Model hereafter to understand the flow.)

Meta Theory
From Indian philosophical point of view sanskriti has three dimensions, namely **adhibhautic, adhidaivic** and **adhyatmic**.

adhibhautic - Understanding and transforming the outer environment for man's progress and development is the adhibhautic dimension of sanskriti. In this manner he creates agriculture, animal husbandry, architecture, cities, water and wastewater management systems, hospitals and healthcare systems, and science, engineering and technology, in general. All these belong to the adhibhautic aspect of sanskriti. Karma (Action) is the inherent important facet under this dimension of sanskriti.

adhidaivic - Man often finds that he does not have complete control on either his destiny or fate or the surrounding environment, He thus perceives the existence of invisible divine (or supportive) as well as evil (or obstructing) forces. He therefore performs worships, prayers, rituals, mantras and tantras, etc. to succeed in his endeavours or to remove obstacles

in his paths. These invocations and practices belong to the adhidaivic dimension of sanskriti , where, bhakti (devotion) has prime importance.

adhyatmic - Finally, he aspires to discover the nature of his own self (jiva), the cosmos (jagat) into which he exists, as well as the nature of the supreme creator (isvara), who is the primal cause of the creation. This process of understanding the nature of jiva, jagat, and isvara is the adhyatmic dimension of the sanskriti. This search leads to pursuit of philosophy, religion, art, culture, and knowledge, all of which are the adhyatmic aspects of the sanskriti. Thus, Dnyan (Knowledge) is the inherent part of this dimension.

Fourfold Purusharthas
(in the light of Action, Devotion and Knowledge)
The goal of sanskriti is only one – the ascent of man and civilization. Indian heritage has a distinctive nature in that it respects actions not only for the overall physical (adhibhautic) development, but also admits the existence of invisible subtle divine adhidaivic forces, which naturally springs in him the urge for prayers and devotion which in turn gives the dimension of love and surrender to his action. Further, to bring joy and beauty to his action, it also respects aesthetics and arts. But what distinguishes Indian sanskriti from other civilizations is it's emphasis on self-discovery (knowledge), which gives the adhyatmic dimension to his action. Indian heritage particularly respects human character and moral values and it is for this reason it worships sages, rishis, mahatmas, philosophers, selfless men and women, men of characters and moral values as the very incarnations of god. It has given a precious gift to the world in the form of fourfold purusarthas – dharma (religion or basic frame), artha (day-to-day earning for survival), kama (materialistic desires), moksha to achieve the ultimate happiness of life beyond material world. Such life is based on dharma to perform artha and kama and ultimately tries for moksha. In the process, dharma is instrumental cause for subsequent two and to reach at the stage of moksha, where all earlier three (dharma, artha, kama) act as instrumental causes and gradually these are being eliminated. Indian sanskriti is therefore not satisfied only with mere physical or economic (worldly) progress but demands reclaimation of man's true divine nature.

Meta Data
The foundation of Indian heritage is the ancient treatise of knowledge what are called as sastra-s. The entire edifice of Indian heritage is built on this foundation of knowledge. According to Indian tradition, knowledge pursuits are classified into three levels of learning, namely, upasana, meaning experience (consciousness), jnana meaning knowledge (pure science) and kausala meaning skill (applied science). Accordingly, sastra-s dealing with them are called Para vidya, Apara vidya and Kala.

Para vidya or *Brahma vidya*, numbering 32 and *nyasa vidya*, deals with meditation and self-realisation on the basis of *Upanisadic* portion of *Vedas*. These are elaborated in *Brahma-Sutras* of sage *Vyas*.
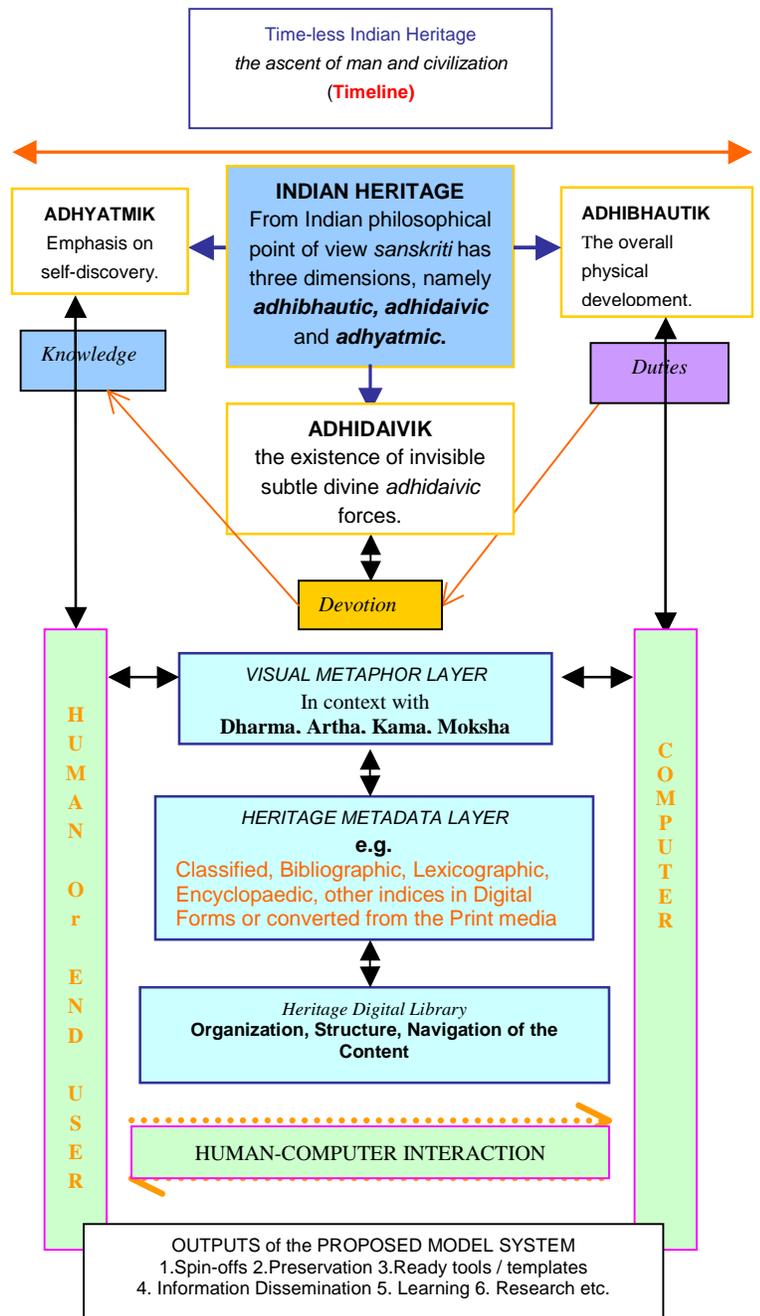
The *Apara vidya*-s (*sastra*-s) are classified into 14 subjects of study as *Vidya-stanas* (or *Dharma sastra*-s) which include the 4 *Veda*-s (scriptures), 6 *Vedangas*-s (*Vedic* and auxiliary sciences), 4 *Upanga*-s (supplementary subjects), and the nature of reality, itself has been apprehended in 6 *Darsana sastra*-s.

Natya sastra of *Bharat* and *Alankara sutra*-s of *Vamana* deal with arts and there are 64 *Kala*-s (applied sciences) covering a wide range of subjects. These 4 *Veda*-s, 6 *Vedanga*-s, and 4 *Upanga*-s, 6 *Darsana*-s, and 64 *Kala*-s from the *saastric* treatises of Indian heritage. There are several major interpretations, commentaries, critiques, and translations of these primary texts which builds the edifice of Indian heritage.

However, the crowning glory of Indian heritage is holy *Shrimad Bhagvatgita*. If one were to identify just one text which is a quintessence of the Indian philosophy enunciated in the aforementioned *sastra*-s, it is undoubtedly *Bhagavatgita*. This conversation on the battlefield of *Kuruksetra*, spanning across 700 *sloka*-s, between the God and the man, is regarded as a universal song and often called as 'Song Celestial' in an English translations. When the founder of the Theosophical Society wanted to choose a canonical text from universal religion, they uniquely chose no other text than *Shrimad Bhagavatgita*. From all over the years, *Bhagavatgita* has got translated into 75 major languages of the world with over 2000 translated texts, making it the second largest translated text in the world next only to Bible. *Bhagvatgita* will ever continue to guide the Indian thought as long as the Indian heritage shall last.

Amongst the translations and commentaries of *Shrimad Bhagavatgita* over the last several centuries, *Shri Dnyaneshwari* (the Knowledge Divine), also called *Bhavarthadeepika*, stands again as the most profound and enduring work. Spanning across 9000 *ovis* (poetic meter form), *Dnyaneshwari* is a creation of Marathi saint *Sant Dnyaneshwar* 700 years back, studied with exquisite metaphors, illustrations, so; *Dnyaneshwari* is a work of great literary beauty. It has inspired millions of devotees and aspirants and it has became a way of life of '*Varakari Pantha*' in Maharashtra. *Dnyaneshwari* itself has been translated not only in modern *Marathi* but in different languages in India and all over the world by several authors.

Indeed, Dnyaneshwari and other saints literature came from various '*bhakti sampradayas*' (devotional cults) in different parts of this country, notably amongst them by Namdeo, Eknath, Ramdas, Tukaram in Maharashtra; Chaitanya Mahaprabhu in Bengal; Surdas, Kabir and Tulasidas in Uttar Pradesh; Basawesarayya in Karnataka; Guru Nanak in Panjab; Meera in Rajashthan; Thiruwar in Tamilnadu have solaced, healed, inspired generations after generations in India. In fact these '*bhakti* movements' from the main stream of Indian heritage which will continue to quench the spiritual thirst of millions of Indians, from high intellectuals to rural folks, centuries after centuries.

Time-less Indian Heritage
the ascent of man and civilization
(**Timeline)**

INDIAN HERITAGE
From Indian philosophical point of view *sanskriti* has three dimensions, namely ***adhibhautic, adhidaivic*** and ***adhyatmic.***

ADHYATMIK
Emphasis on self-discovery.

ADHIBHAUTIK
The overall physical development.

Knowledge

Duties

ADHIDAIVIK
the existence of invisible subtle divine *adhidaivic* forces.

Devotion

HUMAN or END USER

COMPUTER

VISUAL METAPHOR LAYER
In context with
Dharma. Artha. Kama. Moksha

HERITAGE METADATA LAYER
e.g.
Classified, Bibliographic, Lexicographic, Encyclopaedic, other indices in Digital Forms or converted from the Print media

Heritage Digital Library
Organization, Structure, Navigation of the Content

HUMAN-COMPUTER INTERACTION

OUTPUTS of the PROPOSED MODEL SYSTEM
1.Spin-offs 2.Preservation 3.Ready tools / templates
4. Information Dissemination 5. Learning 6. Research etc.

(Visual Metaphor model of Indian Heritage Digitisation)

India is an ocean of humanity in which several streams of philosophies, religions, cultures, languages and practices have been assimilated over the ages. Therefore, one sees underlying fundamental unity in apparently contradicting diversities. The Indian heritage thus comprises of its

diverse philosophies, scientific contributions, literature, religions, *panthas* (cults and sects), worships, temples,

architecture, pilgrimages, celebrations, dance forms, arts and culture, social and home traditions. The *Vedic sruties 'Ekam sat bahuda vadanti'(absolute truth manifestes in many-fold forms), 'vasudhaiva kutumbakam'(whole world-one family), 'tattvamasi'(that, you are..),* are the canonical principles of Indian heritage. Furthermore, the fundamental unity or no duality of man and the supreme creator gives Indian heritage it's most profound and timeless position. It is for this reason that, 'Indian *sanskriti*' has remained 'the torch bearer' of humanity through successive ages.

Following are some of the topics explained by well known scholar Pandit Mahadeoshastri Joshi in his authentic encyclopaedic single handed work "Bharatiya Sanskriti Kosh" covering all parts and regions in India, urban as well as rural areas. Just to explain about the scope of Indian heritage I have mentioned them below as per the categorisation (Though, some of the topics fall in more than one categories as per the aspects and approaches behind them):

Adhibhautic

- *Yajnyasamstha* and it's all branches.
- National as well as regional festivals and celebrations in India.
- Introduction to holy rivers and their importance.
- *Dane* and *mahadane* (Giving, bestowing, conferring) in *Hindu sanskriti*.
- Different varieties of the mode of performing a funeral ceremony (*sraadhha*)
- Types of Expiation / atonement / penance (*praayahschita*) as per *sastras* i.e. *smarta, purana* etc.
- Rights and responsibilities and authorities (Code of conduct) as per *varnasrama* system.
- Social study of different caste/creeds and tribes with their peculiarities, languages, family traits and traditions etc.
- Worships : nature and various types
- Other religions in India.
- Different branches of knowledge and art. (Also under Adhyatmic)
- Nature, Animals and birds, their relationship with

humanbeing.
- Regional languages, ascents and literature, folks etc. including *Sanskrit, Pali, Ardhamagadhi, Prakrit* etc.
- Traditions of drama, folks, dances in different regions.
- Sculptures, painting styles, pictures, murals, toys, *patra* (pots) and equipment in India
- Dresses and ornaments in different regions of India.
- Different architectures
- Different games in India
- Different types of tribal / rural musical styles, vocal traditions in India (*gharane*), musical instruments etc.
- National heroes
- Origin and ascent of literature, political systems, kingdoms, technology, sciences, laws in India.

Adhidaivic
- Individual and social traditions of *vaidic, smarta, pouranic dharma* and other religious people.
- Temples in all over India.
- Types of Ordeals (*divya*)
- A holy or sacred places (*tirtha*), lakes and other places of pilgrimage.
- Concept of auspicious and inauspicious days, periods, time *(subha, asubsha)*
- Different self-imposed religious observance (*vrate*) and concluding ceremony (*udyapana*)
- Different prayers to emasculate evil tendencies or enemy.
- *Mantra / tantras* etc.
- Worshiping nature
- Incarnations, saints, *mahatmas* in India and celebrations
- Various cults, sects (*pantha*) traditions - their god/goddesses and worshiping

Adhyatmic
- *Astik / nastik darcana*, philosophy, differences
- Particular Periods under lunar month conjuncture with *graha, nakshatra, tithi, wara.*
- Introduction to *Veda, upaveda, vedanga, sutra, Upanishad* etc.
- *Smruti, purana, uppurana, mahakavya* (ethics)
- Literature of different traditions and cults, panthas – *Buddha, Saiva, Shakta, Vaishnava* etc.
- Ancient sages, *rishis*, noble kings, poets, *acaryas* etc.

Saints their poetry and devotion traditions, devotees

VISUALISING INDIAN HERITAGE
The soul purpose here is to derive a proper system for digitization that will take care of following things:

1. Original information flow reflected in it with respect to the logical way that too mapping out the original manifestation of the human thinking. i.e. at the metaphysical level and

subsequently at meta theory level.

2. Top-to down and vice a versa i.e. ideal plane to notational plane and going back. In other words, visualizing the metaphor to express the information under heritage that is available in print forms or otherwise and that can be classified in a meticulous way or to make it available in the form of metadata.

3. Human-computer interaction is to be evolved in the form of digital library so that, Exactness of the information suitable as per the authentic records; to preserve further and make them available to the users of the system.

Above three layers are at the level of authentic experts in those particular areas. Coordinator or Planner of Heritage Digital Library can properly design a hyper structure of the content as per the metaphors types mentioned above under point 'Purposes of Visual Metaphors (d)'

4. Down to top approach can be adopted by the content creators at this level maintaining the metadata flow.

5. Technical experts (Software developers, Networking experts and Graphic designers, will explore the possibilities of necessary platforms and solutions to cope up with the top to down and down to top approaches, to integrate the content that is available in various forms and languages by taking care of the potential users of the system with their interactions and information needs.

Benefits

Several benefits of lasting nature will accrue by adopting the suggested model here. We mention here some apparent ones:

• Logical model suggested here can also be useful to use recursive way for sub-sub areas under the metadata consideration for digitization purpose by reducing the redundancy in the efforts, by maintaining a standard in content creation, organization and presentation as well as by bringing authenticity to the content. The same may be useful for other cultural/heritage digital library efforts allover the world in their context.

• As India enters the next millennium, she needs to revisit Her heritage which guided her journey through profound several millenniums and this should be done in the modern context of Information Technology to make the eternal values of Indian heritage widely accessible to people engaged in national governance, leadership in all walks of life, to scientists and engineers, to students and teachers at all levels, and to manage in general. It is a firm belief of the author of this paper, who is but echoing the opinions and hope of several distinguished people, that India's eternal values must be preserved, reinterpreted in the current context, enhanced using the new media, as they alone would provide the guiding force for India's future journey.

• Today, in spite of amazing progress in science and technology, and material wealth in some countries, individuals, societies and the world as a whole find themselves directionless as the problems of international conflicts, terrorism, religious fundamentalism, imbalanced developments, material greed, poverty, hunger, and ignorance in several countries, pollution and environmental degradations, and slide of moral values in general continue to challenge societies than ever before. It is a belief of several thinkers, spiritual leaders, and wise men across the world that, India has a unique role to play as a 'torch bearer' of eternal knowledge and human-base for a new vision for the world in the next millennium.

• The Digital Library of Indian heritage will be one of the most comprehensive and also most important Indian content creation exercise and website which will attract sizeable hits from all over the world on world Wide Web (WWW). This project is so large in its entirety that it can become the largest digital library of the world over the next few decades, which will bring Indian technology, National Information Infrastructure (NII), and digital content creation together.

• This project, due to its rich multilingual and multimedia content, will also become a flagship project of multilingual and multimedia technologies. In turn, the challenges of new extension for standards; tools and technologies required for DL will enrich the Multilingual technologies.

• The multimedia creative part of the project it will serve as a large-scale opportunity for low-cost content creation through private entrepreneurship. The effort will also test the use of the icons, templates, tools, and frameworks.

• The basic spirit of one billion Indian people is spiritual. For years to come, a sizable percentage people will not have access to computers or even telephones. This project advances a new idea of bringing IT directly to

masses whose essential cultural fabric in spiritual and religious through the creation of (multimedia) info-pilgrimage centers. This IT application directly touch the chord of masses and make them curious about the advantages in Information Technology and how it will transform their lives in the next millennium. In fact, by creating a multimedia theatre experience for the masses will bring the real benefit of IT to millions of people.

- The project will create a large-scale platform for symbiotic interactions across researchers and students across different disciplines; the IT professionals, creative artists, students and researchers of philosophy, religion, archeology, history, and humanities. This cross-fertilization will percolate computers in traditional fields with new enthusiasm.

- Several spin-off products will come out of such project, (if implemented) new beautiful printed editions of ancient books, new attractive books through DTPs, CDs, DVDs, Web pages, pilgrimage accessories, etc.

- Most importantly, the efforts will contribute to preservation, collation and enhancement of ancient Indian heritage that is scattered in individual possessions, libraries, museums, temples, etc. It will provide an appropriate framework for projecting intellectual properties where they legitimately belong, thus protecting the most precious wealth of India that shines as India's over 9000 years old heritage.

CONCLUSION
To conclude, from the Aristotle's fourfold causal relationship (R11) under classification of causation, above DL model is interpreted as:

1. Knowledge existing under Indian Heritage is the material cause without which Digital Library effort of Indian Heritage will not come into reality. In other words, form without content is an empty. Content without form is blind. Hence, both are complementary to each other.

2. Visual Metaphors are instrumental cause that plays a catalytic role to realize and note the metadata of the content, scope of the content under Indian Heritage knowledge domain.

3. Meta data and Visual Metaphor together help, by showing direction and giving appropriate shape to the people working towards the creation of Digital Library as referred in model. i.e. Planner/ Coordinators, Content Creators and Digitisation Technicians, Authentic Experts, Legal Experts, Programmers/ Tool Developers, Graphic Designers, Networking Experts and other Platform Technical Experts etc. Flow and Interactions among and between all the team can be unveiled.

4. Digital Library is a formal cause to digitize material in specified way with adequate form.

At the end, all the above causes are eliminative for the end users, who are to receive the information as an intact knowledge.

REFERENCES
1. Acharya, Prasannakumar. Glories of India on Indian Culture and Civilisation, 1952.

2. Adam, Nabil R. and Holowczak. Digital Libraries Task Force, In *IEEE Computer*, August 1996, 89-91.

3. Andrews, K. Kappe, F. Strait Jacketing. User Interface Consistency in Large-Scale Hypermedia Systems, In *Computers and Graphics*, 17 (3), March 1993, 219-228.

4. Black, Max. Models and Metaphors, Cornell University Press, New York, 1962, 31.

5. Bose. Consise History of Ancient Indian Sciences, 1952.

6. Carrol, J. M. et.al. Interface Metaphors and User Interface Design, In Helander JI.(Ed.), In *Handbook of Human-Computer Interaction*, Elsevier Science Publisher B.V., North Holland, 1988, 67-85.

7. Chatergy, Sunit Kumar et.al. The Cultural Heritage of India, Vol.1-the early phases, ed.2, 1958, The Ramkrishna Mission Institute of Culture, Calcutta pp.xxxvii.

8. Crane, Gregory. The Perseus Project and Beyond : How Building a Digital Library Challenges the Humanity and Technology, *D-Lib Magazine*, January 1998.

9. Davies, G. Maurer, H. Preece J. Presentation Metaphors for Very Large Hypermedia Systems, In *J. of Microcomputer Applications*, Nov. 1991, 105-116.

10. Dijkstra, E. On the Cruelty of Really Teaching Computing Science, In *Comm. Of ACM*, Dec.1989, 13.

11.Edwords, Paul (Ed). Aristotle's Classification of

Causation, In *Encyclopedia of Philosophy*, The Mac Miller Co. / The Free Press Vol.2., 56-66.

12. Griffin, Stephen M. NSF/DARPA/NASA Digital Libraries Initiative: A Program Manager's Perspective, In *D-Lib Magazine*, July/Aug. 1998.

13. Haradu, Masaru. The Electronic Library, In *Expanded Access to Science and Technology* ed by Wesley Tanaskovic, Ines et al. 1994, The United Nations University, 99.

14. Hartmanis, J. Observations About the Development of Theoretical Computer Science, In *Annals of the History of Computing* 3-1, 1981, 12-51.

15. IEEE Computer Society. A Special issue on Digital Library Initiative, May 1996.

16. Johnson, Gerald J. Of Metaphors and the Difficulty of Computer Discourse, In *Comm. Of ACM*, ACM Press, Dec.1994, 97.

17. Loweler, John M. Metaphor We Compute By, a lecture delivered to staff of the IT Division, University of Michigan, http://www.virtualschool.edu/mon/Academia/metaphors.html.

18. Nabil R. Adam et al. Digital Library Task Force, In *IEEE Computer*, August 1996, 89-93, 101.

19. Ramdasi N.R. and Altekar E. Interfacing Visual Metaphors in Indian Heritage: Puranas, In *Creation and Management of Digital Resources : Caliber 2001*; Inflibnet Centre, Ahmedabad, India, 46-56.

20. Richard Whately. Elements of Rhetoric, 7th edn. London 1846, 280.

21. Shastri, Mahadeo (Pt.). Bharatiya *Sanskriti* Kosh Vol I, 1-10.

22. Steinmetz, A. et. al. Innovative Interface Metaphors of Visual Media, In *CHI-98 Workshop*, 18-23 April 1998.

23. Turbayne, C.M. The Myth of Metaphor, Yale University Press, New Haven, Ct.1962.

24. Vaananen, K. Interfaces to Hypermedia: Communicating the Structure and Interaction Possibilities to the Users, In *Computers and Graphics*, 1(3), 1989, 273-283.

25. Velankar, S. B. Prachin Bharatiya Bhautik Vijnyan, 1985, Keshav Bhikaji Dhavale, Girgaon, Mumbai, 140-141.

26. Wozny, L.A. The Application of Metaphor, Analogy, and Conceptual Models in Computer Science, Interacting with Computers, Vol.1, No.3, 1989, 273-283.

ABOUT THE AUTHOR

Mr. Nagnath R. Ramdasi is Master of Library and Information Science, (M.Lib.I.Sc.) from University of Pune. He has worked as a Librarian (1989-1996) in Centre for Development of Advanced Computing (C-DAC), a prime R&D institute of India in the area of HPCC. He has been contributing in the content creation of CD-ROM title "Shri Saarth Audio-Visual Dnyaneswari"- a well-known commentary on Shrimadbhagavad Gita under C-DAC's National Multimedia Resource Centre at Pune.

Present Research Paper is a partial work of his doctoral research interest in the area of Indian Heritage Content and Digital Library.

E-mail: *ramdasi@cdac.ernet.in*