Digital World of Dharmaśāstric Knowledge Tradition: An Instant Information Retrieval System for Manusmṛiti

Arooshi Nigam[1], Subhash Chandra[2*]

[1,2]Department of Sanskrit, University of Delhi

Abstract: *The primordial evolution of information technology germinates genuine postulates to infuse and reveal valuable knowledge from Manusmṛiti (MS). It is an evolutionary text of Indian knowledge tradition and has remained colossally influential in determining the structure and the function of Indian society. The knowledge thesaurus of MS is primarily contrived only through traditional paper-book methods. We are living in the age of Information Technology (IT). The fantastic growth of information being generated and stored today is all digital and electronically dependent. It makes information an important issue to organize and analyse. The most viable method to derive relevant information today is by using digital consortiums and one such colloquial technique is text mining. It is the most prevalent medium of information access and retrieval. Text Mining is an automated technique that aims to discover high-level information in a huge amount of textual data and present it to the potential user. It searches the procreated digital databases of MS and retrieves relevant information from the user. All dharmaśāstric enthusiasts can peruse the proposed model, linguists, historians and researchers willing to garner accurate information and references in MS. It acts as an e-tool in the field of Sanskrit education and aid a step forward in the digital connotations of Sanskrit.*

Keywords: **Dharmaśāstra, Manusmṛiti, Information Retrieval, Data Mining, Indian Knowledge Tradition, Information Mining, Digital World of Sanskrit.**

1. Global Demand for the Digital World of Dharmaśāstric Knowledge Tradition

Sanskrit as a language can be simple and at the same time versatile. No other language, European, American or others including Indian, can stand up to the challenges of computational Linguistics (CL) which is the blending of traditional language with digital demand. It is an archaic language, yet widely used in Jainism, Buddhism and Sikhism religious cultures. The Sanskrit language has a rich knowledge base and a very prosperous tradition of insightful texts. It stands as one of the oldest existing languages in India, has always been held in high esteem and it served both as a literary as well as a bridge language of ancient and medieval South Asia. A variety of literary texts are composed in Sanskrit, although it is mostly used for religious, philosophical, as well as scientific and technical discourses. Literary resources inherited in the form of Hindu and philosophical texts are widely studied. Sanskrit literature holds the privilege of being used in ancient poetry, dramaturgy, religious and philosophical texts as well as, and various branches of sciences. Sanskrit is the key to passing on ancient traditions and knowledge from one generation to another. The essence of Sanskrit lies in its greatest heritage. Jawaharlal Nehru proclaims Sanskrit as the greatest treasure which India possesses [1]. According to, Macaulay the essence of Indian culture is found in only one language and that is Sanskrit.

The great abundance of literary instances found in Sanskrit is not only authentic but it revives the Indian culture too. Hymns of *Ṛgveda* are the emanation of Sanskrit literature. It encapsulates some of the culturally rich and morally eminent

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* **Corresponding Author:** Dr. Subhash Chandra, Associate Professor, University of Delhi, Delhi, India,

texts such as *Mahābhārata, Gītā, Purāṇa* etc. which are globally recognized for their system of ethics. The epics, poetry or *Mahākāvya* are proven to have found their origin in Sanskrit. The wide variety of art forms and types of crafts like dramatic literature or art of theatricals, music, painting, acting and enacting, the art of dancing and playing of instruments, the art of designing and décor, jewellery designing and art of setting ornaments, the art of practical application of aromatics, needle and thread work, carpentry and many more [2]. *Kalpaśāstra* is the art of rituals. Katha tradition is also found in Sanskrit. *Pañcatantra* is a great example depicting the Katha tradition. On the other hand, Bāṇabhaṭṭa's *Kādambarī* which is a novel about timidities and missed opportunities of a youth leading to tragedy is also unique in its literary form. The tradition of romantic novels traces back to the *champu* novels. Soḍḍalā's *Udayanasundarī* is the best example. Sanskrit presents a huge collection of stories skillfully narrated in Somadeva's *Kathāsaritasāgara*. In the field of literary criticism, the Sanskrit pioneers like Vāmana, Dhananjaya, and Daṇḍī hold an important place. Bhoja's references and quotations depict the refinedness of the Sanskrit language.

Sanskrit not only revives the ancient literature but it is used for scientific purposes also. *Caraka* and *Suśruta's* medicine, Āryabhaṭṭa's work on mathematics, *Bhāskarācāryā's* astronomy, Kauṭilya's *Arthaśāstra* is an ancient treatise on statecraft, economic policy, military strategy, politics and administration [3] and *Pāṇinī's* grammar are landmarks for the modern development of science and logic [4]. *Nirukta* is another form of traditional grammar which is an art of etymology, particularly of obscure words. It consists of aphoristic rules (*sūtras*) for deriving meanings, supplemented with nomenclatures of difficult or rare *Vedic* words. *Śikṣā*, is one of the very prominent six *Vedāṅgas*, is the science of phonetics and phonology of Sanskrit, its aim is the teaching the correct pronunciation of the Vedic hymns and mantras [5]. *Jyotiṣa* elucidates the postulates of astrology that are relevant to the system of modern astrological and astronomical sciences. Prediction of constitutive and exigent events based on analysis of astrological dynamics in a country's horoscope of general transit events such as war, earthquakes, political events, financial positions, elections etc. *Vāstuśāstra* related issues, animals, portents, omens etc. are calculated and estimated on the basis of *Medinī Jyotiṣa*. *Dhanurveda* is proclaimed as the science of archery, *Gandharvaveda* is a reputed treatise on performing arts, encompassing theatre, dance and music [6, 7]. *Āyurveda*, likewise, is the science of life. The word *Āyurveda* itself, consists of the words *Āyuṣa*, meaning "longevity", and *Veda*, meaning "related to knowledge" or "science". Thus, *Āyurveda* denotes the science and postulates of living a healthy long life. Similarly, *Yantramātrikā* is the art of mechanics, *Vāstuvidyā* is the art of engineering, *Raupyāratna Parīkṣā* is the art of testing silver and jewels, *Dhātuvāda* is the art of metallurgy and *Maṇirāgākarajñāna* is the art of mineralogy. It revives the ethos of India because synthesis, harmony and reconciliation comprise the essence of Sanskrit.

The dynamics of Sanskrit development are radically changing in contemporary society. A vast population of Nepal uses Sanskrit as their native language [8]. The Sanskrit literature is declared to be of high quality. Not only do Hindu Carnatic, kirtans and bhajans use Sanskrit but in Mainland China, musicians such as Sa Dingding have written pop songs in Sanskrit [9]. Other than these, over 90 weeklies, fortnightlies and quarterlies are published in Sanskrit. Among them, *sudharmā*, Sanskrit *VartmanPatram* and *VishwasyaVrittantam* are eminent. Sanskrit is sacred not only for Hindus but for Buddhist and Jain traditions also. The Jain texts including *Tattvārthasūtra, Ratnakaraṇḍaśrāvakācāra* are written in Sanskrit. Tibetan Buddhist religious texts and sutras in Sanskrit have reached such an extent where various institutions such as "*satyamevajayate*" in India, "*jananījanmabhūmiścasvargāda'pigariyasī*" in Nepal, "*trī dharmā eka karmā*" of Indonesian Military proudly use Sanskrit phrases in their mottos. Many of India and Nepal's scientific and administrative terms are named in Sanskrit. Thailand and Sri

Lanka have been enormously influenced by Sanskrit and have multiple similarly-sounding words [10]. It has also impacted the Chinese language as Chinese linguists reformed their vocabulary with a multitude of specific words from Sanskrit [11]. The language such as Javanese, Malay etc have been influenced by Sanskrit, Philippines too, has a minor influence from Sanskrit but above all, English, the current modern international language has also been influenced by Sanskrit and has picked up many loanwords from the ancient language (for example 'primitive' from '*prācīna*', meaning historical, 'ambrosia' from '*amarutā*' meaning food of the Gods, 'attack' from '*ākramaṇa*' meaning taking aggressive action, 'path' from '*patha*' meaning road or way, 'man' from '*manu*' meaning a male human, 'nirvana' from '*nirvāṇa*' meaning divine liberation or transcendence, 'door' from '*dvāra*' meaning a doorway, 'serpent' from '*sarpa*' meaning snake etc. The ancient asceticism and healing traditions of Sanskrit scriptures have found their way into modern health and clinical sciences such as aroma therapy. Acquaintance with such literature elevates and widens one's outlook. Devanagari was most suitable as it perfectly satisfied every requirement as an optimal medium for use. These concepts are studied not only by Sanskrit scholars but also by sociologists, experts of management sciences, political scientists, economists, legal experts, *āyurveda ācāryas*, and various science experts globally.

Manusmṛiti (MS) is reckoned as a primordial text of Indian knowledge tradition. It is considered to be the most ancient, valid and authentic compendium. Its position is unprecedented in Indian theological tradition. It has been accepted as a certified scripture and the recognition of its superiority has been indispensable in the Indian knowledge tradition. The *Vedas* have clearly coronated the teachings of Manu as the ultimate welfare of humanity. It is a composite text including all the focal elements of sociology, ethics, economics, politics, administration, philosophy and theology. The influence of MS can be clearly witnessed in the South Asian counterparts as the present legal codes and laws of Burma, Cambodia, Laos and Thailand still have elements of law indigenous to MS and related law compendiums [12]. Many verses in an inscription of Champa matches with the *ślokas* of MS. Similarly, the doctrine of *dharma* known as "*Dhammaṭhaṭ*" in the Burma region is also based on the ancient principles of Manu. The contemporary Burmese government still functions and administers on the basis of the primitive fundamentals of *Dhammaṭhaṭ*. Likewise, the legal laws of Bali are also based on MS.

With the ingress of the internet, the development of advanced digital technologies and the IT boom, information is accessed and exchanged via digital platforms. Sanskrit is wonderfully efficient in terms of its grammar, phonetics, vocabulary and the Devanagari script. Sanskrit literature foregrounded the culture of synthesis and assimilation. It is useful in the field of Computer Science as it is most comprehensible and linguistically symbiotic with the techniques of NLP. The richness of it comes from the fact that everything is predetermined and derivable. The astonishing fact about Sanskrit's recent development is that Rick Briggs in his article stated that NASA has found Sanskrit to be the most compatible with the digital language [13, 14]. It would be helpful in using Sanskrit as a medium for gaining excellence in Computer generations and as a language for the new technology. Clarity and brevity are the hallmarks of the acquaintance of Sanskrit with Computer Science. This is the major reason why contemporary linguists have realized the versatility of this language and are best accepted globally to perform tasks in connotation with the digital world. Hence, this rich knowledge base has led to the global need for Sanskrit. Sanskrit compositions are majorly archived traditionally in the textual format. But, for the world to read and understand, it is imperative that the Sanskrit texts are derived in the digital format. Digitalization of Sanskrit texts such as MS will enhance the accessibility and the Sanskrit knowledge tradition will reach the masses.

2. Problem and Prospective Solutions

The opulent knowledge system composed in the Sanskrit language is grasped and understood by only that section of the population that is traditionally trained in the grammar and linguistics of this primitive language. The accessibility of this knowledge tradition is also limited due to its language and medium barriers. Apart from the linguistics challenge, scholars have also noted the physical impediments of traditional textbook searching methodologies, such as time constraints, lack of enthusiasm for new innovative research ideologies, unvaried search outputs, the process of inquiry is monotonous and tedious, mentally strenuous and physically exhausting.

The access to the knowledge found in MS is very limited in the printed version as instant search is intangible. The hardcopies pose some gruesome challenges as manuscripts are perishable and ephemeral, books are not very durable, to study a particular concept the whole text needs to be scrupulously read, conscientiously scrutinized, it is prone to printing and typing mistakes, it is not feasible to carry the books around and the non-availability of books at numerous instances. Whereas on other hand the digital version of these manuscripts tackles all the above aforesaid problems placidly. IR system grants easy and effortless searching, low-maintenance, high durability, ceaseless and completely error-free.

In the contemporary era of IT and digitalization, with the worldwide influx of internet and technological innovations, the entire world is connected by a click of a button, people of one city are associated with the citizens of another continent, and every individual today, is a world citizen, the world news is generated, accessed and received through web consortiums, traditional classroom teaching methodologies and lecture-based pedagogies have pivoted to digital learning and electronic tools, primitive physical libraries have transposed into digital athenaeums, yet it is cataclysmic that hitherto we do not have any instant information retrieval system or online indexing apparatus based on DS texts, where desired information appertained to this specific knowledge field can be attained. Today, there is a continuous surge in demand for educational materials to be made available online, scholars prefer E-books and PDF versions to burdensome textbooks, but the availability of Sanskrit texts in the form of e-content is extremely scarce.

The accessibility of Sanskrit resources is of utmost importance in India and also in the world for the extensive knowledge discourse of Sanskrit. With advancements in the field of Computational Linguistics (CL) and Natural Language Processing (NLP), there has been a great uplift in the extraction and understanding of ancient languages, their scripts and knowledge. Modern days are of Technology and Performance, both of which relate to the ease of work and effective use of time. Enhancement, amelioration and penetration of computation in different fields made it necessary for the knowledge to be readily available and quickly deliverable. Digital indexing, online reader, and automatic concept mining to hunt relevant information from the pool of content as opposed to time-consuming and physical efforts furnish as prospective solutions for the problems deliberated above. There are many efforts were made to digitize the Sanskrit texts by scholars [15, 16]. But it is not enough for the *dharmaśāstric* knowledge tradition. Thus, the major objective of this paper is to develop a Web-based Search Mechanism and an Instant IR Mechanism for MS. The proposed system justifies the above statement in the 'Indian' context, which will be beneficial for providing a bridge-type connection to modern technology and Ancient Indian knowledge tradition. This system is paramount in heritage computing, cultural and literary preservation of ancient manuscripts and text mining.

3. Literary Tradition of MS and Current Trends

MS is an extraordinary amalgamation of arts and science. It consists of traditional and scientific knowledge of all major fields. There has been a tremendous body of work that is being conducted on various scientific fields with respect to MS such as computational linguistics and spatial data mining, medical sciences, military and mathematical sciences, environmental sciences etc. The philosophical influence of nuances of MS is visible in the field of psychological studies, health and physiological sciences. The concepts of MS have been studied thoroughly, continuously iterated and rigorously researched by scholars globally. The traditional concepts and ethical heritage of MS have often seen a literary revival and now the world is striving forward in the direction of exploring scientific nuances and technological perspectives in the primitive MS. MS encapsulates a wide range of subjects. To intensify our knowledge of traditions, culture, history and heritage, as well as to rehabilitate the prior wisdom on ancient scientific aspects, MS needs to be read and studied assiduously by the Sanskritists, sociologists, experts of management sciences, political scientists, economists, legal experts, *āyurveda ācāryas* and various science experts.

MS an ancient legal text divided into 12 chapters is a primary text of the DS. It is composed of metric verses. It contains special sections on social laws, consumer laws, tribal community laws and related legal procedures. The text consists of a total of 2703 *ślokas*. The first chapter discusses the genesis of the universe, the creation of heaven and land, the conformation of the Veda trio, division of time and centuries, calculations of light-years and eras, the fourfold system of *varṇas* and *āśramas*, duties of four *varṇas* etc. The second chapter explains about features, characteristics and sources of *dharma*, the definition of *śruti* and *smṛti*, geographical mapping of parts of ancient Bharata such as *madhyadeśa* and *āryavarta*, the concept of *saṃskāra*s etc. The third chapter talks about the *brahmacharya dharma* and *gṛhastha āśrama*. The fourth and the fifth chapter elaborates on the *gṛhastha āśrama.* The sixth chapter deals with the *vānaprastha vidhi and saṃnyāsa*, the concept of *mahāprasthānam, mokṣa* (salvation). The seventh chapter talks about the ruler, state-ship and kingdom, duties of the king and its subjects. The eighth chapter deals with *vyavahāra darśana* i.e monetary, financial and fiscal department, revenue and expenditure, commercial activities, oaths and truth, witnesses, 18 types of *vyavahāras* namely; indebtedness, deposits, non-proprietary sale, resurgence, pay exchange, contract default, merchandising rules, border dispute system theft, adultery, frauds in business etc. The ninth chapter discusses the duties of the men and women, division of property, twelve types of sons, *niyoga*, property or inheritance of women known as *strīdhana*, elimination of criminals and treatment of *vaiśyas* and *śūdras*. The tenth chapter liberally discusses the inter-caste marriages and duties of four *varṇas* during emergency times. It condemns the inter-caste marriages, six deeds of *brāhmaṇa,* modes of livelihood for *brāhmaṇa, and* deeds of *kṣatriya* and *vaiśyas*. The eleventh chapter is dedicated to the arrangement of donations, charity and penance. The twelfth chapter describes the penance that a man must observe to repent the sins he had committed either knowingly or unknowingly.

CL is a technical, scientific and engineering discipline concerned with the understanding of written and vocal language from a computational outlook and constructing artifacts that helpfully develop and generate language, either in bulk or in a dialogue setting [17]. Sanskrit Computational Linguistics is an interdisciplinary emerging area of study where the computational model, logic, techniques and principles are applied to the Sanskrit language for linguistic analysis. This field is advancing day by day with increasing automation capacity and began focusing on practical applications in the field of Cognitive Science and Artificial Intelligence. It is thus, an ever-evolving field and the current trends in Sanskrit embedded CL are electronic indexing for Indian heritage texts, digital readers, digital search, and electronic educational tools for studying and exploring Sanskrit-based texts.

Dr. Dhaval Patel has developed a web portal for Sanskrit language technology, consisting of tools such as *Uccāraṇa Nirmāpaka* (Accent Generator), *Kośa Khoja* (Thesaurus/ Dictionary Or Lexical Search) etc. Similarly, The Department of Sanskrit Studies, University of Hyderabad, under the guidance of Prof. Amba Kulkarni developed the lexical tools namely *Amarakośa* and *Dhātuvṛttis*. A search engine for Sanskrit scriptures has also been developed by this centre through which words from Sanskrit texts can be searched [18]. A similar, online indexing and search tool have been developed by the JNU, named an Online Multilingual *Amarakośa* system which is based on the archaic text *Amarakośa*, the Sanskrit thesaurus ascribed to *Amarasiṁha.* It is developed using RDBMS techniques. Any word found in the text of *Amarakośa* can be searched online using this system [19]. Department of Sanskrit, University of Delhi has developed online tools and created an e-learning platform for Sanskrit. It has developed many tools such as for Sanskrit grammar such as *Subanta* [20]*, Sandhi* [21]*, Strī pratyaya* [22], Philosophy such as *Sāṃkhya-Yoga* [23]*, Purāṇa* [24]*, Dharmaśāstras* [25].

The required knowledge can be extracted from MS using technology and online tools to reach out globally. Therefore, digitization and making online available to all can play a very important role to protect and access the Indian knowledge tradition as described in DS texts. Thus, the extent of global access to these texts can be increased and the critically correct knowledge of the subject be available to everyone. In order to give the solution, the major objective of the paper is to digitize the MS texts and make a web-based search system for the same. This will further develop a positive attitude towards Indian intellectual traditions, interpret and analyse DS texts and internalize the given knowledge and pursue it further in their academic courses by gathering more information about thinkers and texts.

4. Global Access of MS and Methodology for Instant Information Retrieval System

This paper is an effort to demonstrate an Instant Information Retrieval System for MS through instant indexing and concept mining from digitalized MS texts. Indexing, in general [26], is a digital procedure of discovering useful information related to that particular term to be found in a document or an extensive collection of documents. It is the set of prescribed procedures for organizing the contents of knowledge traditions for purposes of retrieval and dissemination [27]. The IR can be done either manually or by the means of the machine. The system is available online. After the boom in IT and the development of digital technologies, traditional indexing was replaced by online indexing and search engines etc. In this era of digital networking and global communication, information sources are available in many forms and formats, growing at an exorbitant rate and accessible through various channels. Moreover, recent advancements in Information and Communication Technology (ICT) help in the integration of different information sources and processing them on a larger scale. The process of collecting, storing data and parsing it to provide immediate and accurate retrieval of information, is called digital indexing. Computers are now being increasingly used to aid indexing. Digital Indexers effectively index large electronic document depositories and thus, concoct data to be searchable online. Automatic indexing became essential to maintain the ability to find relevant information. Technological advancements have resulted in an explosion of information and made information quickly and easily available to potential users. Data mining is a part of CL and an eminent theme of IR. In today's time, when the information is exceedingly huge, it becomes implausible to store the information using handwritten or paper methods. It is thus, a prerogative for humans to repertoire the enormous gamut of informative data digitally. This led to the development of digital databases. It was easier to maintain and retrieve information digitally but the problem is how to access the relevant information.

There are many approaches and methods to derive accurate information and a lot of methodologies are applied but the application of disparate retrieval techniques is

formulated according to different areas of study and fields of research. To name a few; Statistical analysis, semantics, association and correlation, frequency method, cluster etc are the most prominent IR techniques. Methodologies applied in this web-based IR system are corpora (Text or Document) cluster [28, 29] and Data association.

This system is developed using corpora (Text or Document) cluster. Firstly the whole data of the MS is digitized and stored in the text file. Then a concept list from the MS text was manually created and the data of MS texts was tagged with a particular concept. Using these associated data sets we applied general searching methods to create an instant index and mine the conceptual information. A python based program is developed to achieve the task.

5. Online Delivery Platform and Highlights of the System

5.1. Online Delivery Platform

An Instant Information Retrieval System for MS is a web-based online system. A web-based system contains two major parts: Front-End and Back-End. The front-end of the system is developed using HTML (Hyper Text Markup Language) along with CSS (Cascading Style Sheets) and JS (Java script). The back-end contains programming language, databases and servers. Python is used as a programming language, data is stored in Text files and Flask is used as a server which is supported by Python [30].

5.2. Highlights of the System

The web-based system is designed in such a manner that it has an interactive data search, which gives the system a very user-friendly and easy-to-navigate approach. It provides the options of keyword searching, conceptual or Phrasal searching for the feasibility of the user through a dropdown menu. The MS instant referencing system is an input-output generating system. It takes input from the user and generates the corresponding output. The researcher can give the input in either roman or Devanagari based upon his or her language convenience. Once the input is provided, multiple exiguous programs work simultaneously to give the output such as; the pre-processor running the initial query at the back end and syncing it with the digital information indexer. The script validator checks the input language, the concept indexer matches the tags of the respective verses with the given input query, meaning the generator furnishes the exegesis of the *ślokas*, and then the following query is searched one by one from different databases and the corresponding result is generated by the output generator. The generated result is formatted according to the user's query input and then displayed on the client's end. Thus, this system is a cohesive mechanism working with the help of multifarious digital components. The major components are User Interface, Preprocessor, Information extractor, Information generator, Meaning generator, concept generator, script validator and output generator.

The system can mine the information from MS in Multiscript (Devanagari and Roman). The system also exhibits output in the searched scripts and translations in English and Hindi. It is web-based, hence widely accessible. The system produces information in two ways, one is instant indexing and the second is concept mining. In some cases, instant indexing does not produce complete information. It is unable to generate those *ślokas* where the searched word isn't visible directly in the verse. In this case, concept mining works.

Conceptual searching is a special feature of this system. Therefore, Information retrieval is quick and error-free. The feature of referencing index is very useful as it provides the researcher with accurate reference numbers of all the *ślokas* of MS [31]. The option of downloading the results as a text file/ pdf is also available at one's disposal.

6. Conclusions and Subsequent Remedy

Digitization of MS and making its availability online can play a very significant role to protect and access the knowledge tradition as described in MS. The extent of global access to these texts can be increased and the critically correct knowledge of the subject is available to everyone. The digital system is formulated uniquely so that it can produce output analogous to the user's query. As previously discussed, since, the system accepts input in the two major scripts namely; Devanagari and roman (IAST), the result is also generated in the corresponding script. The multitude of DS concepts, disparate verses, or words in MS can be easily searched using information mining, online indexing and tagging techniques. Thus, the system dispenses keyword, concept and phrasal searching using the online indexing modules. The result engendered by the system includes complete information regarding the searched query. It includes the *mūla* (original) *ślokas* along with its complete accurate reference. The referencing index exhibits the serial number of the chapter, followed by the verse number of that particular *śloka*. Each verse is hyperlinked to determine the word meanings and complete exegesis. On projecting the cursor over the *śloka*, a bilingual explanation of that verse automatically appears. By clicking on the particular *śloka*, the interpretation of that verse will be obtained in Hindi and English. Deriving complete information of any concept with its original *ślokas*, its bilingual translations and interpretations prove the utility of the developed system.

In the future, it is planned to digitize the other major texts of DS like *Nāradasmṛti, Yājñavalkyasmṛti, Arthaśāstra* etc. and all the concepts mentioned in these *smṛtis* can be searched online using this system. It is further planned to tag scientific concepts namely; environment, military, third gender, management, medical sciences, commerce, economics etc. as propounded in MS. The input-output methods of this system can also be made multilingual such as; Punjabi, Sanskrit, Bangla, Telugu, Tamil, Kannada etc.

The system is developed by the Computational linguistics R&D, department of the Sanskrit University of Delhi. Although this system is currently under development, the prototype of this system has been developed and is under the testing phase which is available at http://cl.sanskrit.du.cin.in. This system will make an insinuating impact on the accessibility of Sanskrit studies on the global platform in the field of science and technology. It will prove to be very useful for teachers, students and especially for researchers in the field of Sanskrit and e-learning, as at present, there are no efficient online tools developed to access Indian knowledge tradition.

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