

# E-Glossary and Search for Technical Terms of Sāṃkhya and Yoga Philosophy

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**Abstract:** In this era everyone wants to acquire information and increase the knowledge over the internet. Due to lack of the matters over the internet related to ancient Indian traditional knowledge system, people are unable to search and obtain the information. Therefore, an initiative has been taken to digitalize the technical terms of Samkhya-yoga philosophy. An E-Glossary and Search for Technical Terms of Sāṃkhya and Yoga Philosophy (SYP) system is also developed. Where anyone can acquire the knowledge of Technical Terms of SYP on a click. Without the knowledge of the technical terms of any discipline, it is very problematic to cognize. The developed system of technical terminology used in SYP will be very helpful to the researcher and students. The aim of the article is to create a complete information system of the technical terms of SYP. As a result, this system displays the technical terms and its definition with complete analysis. Developed system is available online on the departmental website at “http://cl.sanskrit.du.ac.in.” and can be accessed 24\*7 from anytime and anywhere.

**Keywords —** Online Glossary, Sāṃkhya-Yoga Philosophy, Technical Terms, Online Search, Glossary etc.

## I. INTRODUCTION

Glossary is also known as a vocabulary. An alphabetically prepared list of the definitional words in a specific field of information with the explanations for those definitional words is called Glossary. In a simple word, a glossary covers descriptions of thoughts, related to a specific domain of learning. In this paper glossary referees to the SYP technical terms and knowledge. The concept of the glossary is broadly discussed in the Sanskrit tradition. *nighaṅṭu* by Yaska (around 4th c. BCE) is the first word collection of the ancient period. *Nighaṅṭu* is one of the oldest repository of the words that is classified into thematic classifications, often with brief explanations. Particular collections are also called *nighaṅṭava*. In this, the collection of Vedic words has been divided into five chapters. It is considered as the first volume of glossary literature. After this many dictionaries were developed in Sanskrit literature, such as “*Vachaspatyam* by Taranath Bhattacharya: A Comprehensive Sanskrit Dictionary” [8], “*Shabda Kalpadruma* by Sir Raja Radhakanta Deb Bahadur: A Comprehensive Sanskrit Dictionary” [7], “The practical Sanskrit-English dictionary” [10]. *Amarakośaḥ* by Amar Singh [9] etc. These dictionaries are available in the book form need to be digitalized. In online glossary, it is easy to search any words and obtain the information on a click. An e-Glossary of SYP is being created in view of the same objective. The SYP are two important orthodox schools of Indian Philosophy. Their principles could be traced to the earliest available literary sources, the Vedas, which are not

only repositories of ancient Indian wisdom, but also constitute a store house of all orthodox schools of Indian Philosophy. The primary function of the SYP, like other systems of Indian Philosophy, is to find a way out of World, the three-fold pain (*trividhaduḥkha*) and restore *puruṣa* to its original condition of isolation from *prakṛti*. This cannot be achieved in the absence in insight in to the factors that bind *puruṣa* to *prakṛti* and those which contribute to its release [26]. *Sāṃkhyasūtra* is the key text of *Sāṃkhya* philosophy. It has 6 chapters and 527 Sutras. The present collection of the 100 technical terms of *Sāṃkhya* has been collected from the *Sāṃkhyasūtra*. *Patanjalyogadasrahan*, *vyāsabhāṣya*, *tattavavaishardi*, *yogavartika* and *bhojvritti* are the key text of yoga philosophy. The best interpretation of *yogasutra* is obtained in *vyāsabhāṣya* written by *vyāsmuni*. *yogasutra* has 4 chapters and 195 sutras. The 295 technical terms are collected from this text related to yoga philosophy.

Table 1: Data of Technical Terms

Philosophy	Chapters	Formulas	Technical terms
sāṃkhya	6 chapters	527	100
Yoga	4 ( <i>pād</i> )	195	295

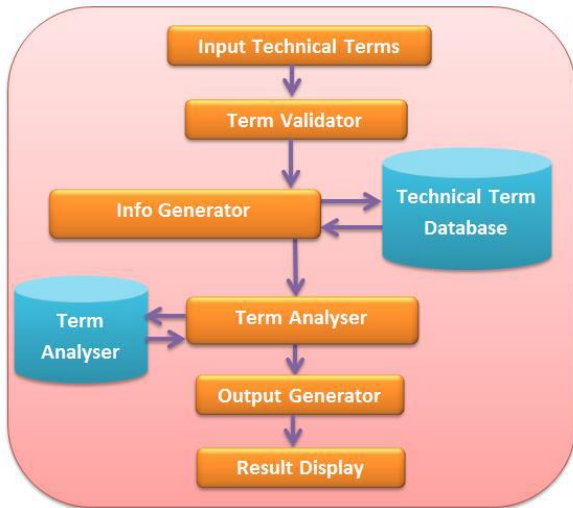


Figure 1: Methodology

There are 395 technical terms are collected from SYP and currently information can be mined for 60 terms and other are being developed. The System accepts the input through an interface. The input may be given in Devanagari Unicode in a text area or may be selected from a given list. After submitting on the button, system prints the result on same page with the detailed reference and analysis as per the key texts. Sample of the input mechanism and result shown in fig 2 and 3.

The paper is divided in to six sections. Section one talk about the brief introduction of the system, glossary, SYP and result. Section two provides brief survey of related researches. Section third elaborate the material used for research and also talk about methodology used for mining the information. Section four explain the features and technical details of the system. Section five describe result and discuss the result. Finally section six give the direction for future research.

## II. REVIEW OF LITERATURE

Today, the demand of technology is enhancing day by day, everyone desires prompt material through the internet even over the smart phone as well. In India the work on Computational linguistics has started in 1980s. But for Sanskrit language, many organizations are working to development such types of system to preserve, digitalize and analyze the Sanskrit texts. The quality in outdated teaching and learning in the field of education is being supported by the E-learning and online learning because of high demand of the information technology. Numerous scholars and organizations have started working on E-learning to demonstrate and teach Sanskrit language. The School of Sanskrit and Indic Studies of Jawaharlal Nehru University, New Delhi, Department of Sanskrit, University of Hyderabad, Hyderabad, IIT Mumbai and Department of Sanskrit, University of Delhi are the key educational organizations for investigation on computational Sanskrit. The School of Sanskrit and Indic Studies of Jawaharlal

Nehru University has been started working in the field of Sanskrit Computational linguistic since 2002. Indian Institute of Technology, Centre for Development of Advanced Computing (CDAC), University of Hyderabad and University of Delhi are the main research institutes which are doing research and development in the filed. Jawaharlal Nehru University has worked on Dictionary of Sāṃkhya, Yoga & Vedanta [15], Yoga-sūtra index [17], Yoga Shabadkosh [20], Medinikosh [16]. These systems are available online. They are also focusing on Sanskrit language analysers [9-10], e-text creation and Sanskrit literature search [11], online indexing for Sanskrit text [12], language generation tools, multimedia based E-learning tools etc. Sanskrit Studies,

Department of Sanskrit, University of Delhi has been also started the work in the field of Computational Sanskrit since 2014. Main highlights of this department are *Swagatam* [21]. *Swagatam* includes various tools *Taddhita* [16] and *Sanādyanta* Analyzer [17], Sanskrit Meter Information System [18], Vedic Literature Search, *Pauranic* Search System [19]. *Sāṃkhya*-yoga online indexing [20] and Verb Formation System [27] etc.

University of Hyderabad, Hyderabad has also initiated research and development in the field [13-15].

Above review of research works clarified that there is no enough development is dine related to online system for analysis of the philosophical terms. However the lexical databases of the each branch of the philosophy are available in printed forms as *paribhāṣā koṣas* (dictionaries) text [10-14]. A list of the philosophical terms is also available for few terms of philosophy [18]. The History and Literature of *Sāṃkhya* of the Encyclopedia of Indian Philosophies is also available [19]. But the online search system for the technical terms of SYP is not available.

## III. MATERIAL AND METHODS

*Sāṃkhya-sūtra* [1] and *Sāṃkhyakārikā* [2], *Yogasūtra* [3], *Vyāsabhāṣya* [4], *Bhojavṛtti* [5] and *Yogavārtika* [6] are selected as primary source data and text for creation of database to produce the information. These texts has also used as prime resources of the research.

Generally data mining methodology has been used for analysis and interpretation mechanism of terminology. Information of the SYP are kept in a database with broad features in UTF-8 Devanagari script. The searching process begins with listing of technical terms stored in the concern database. Module *Info\_generator* access the database to retrieve the information of given input text. The data stored in dictionary format. Where system search in keys, if match with any key then returns with the corresponding value. The information are stored as a value. Here the keyword matching methods are applied to search information in SYP database.

The front end of the system is developed in Python Server Pages (PSP). The python programming code can be mixed in html code in PSP. In back end text files and database are used. Python is used for programming language because due to rich library (in build functions), and easy programming. The Spyce is used for the web server.

#### IV. FEATURES OF E-GLOSSARY AND SEARCH SYSTEM

System for E-Glossary is an online search system is developed for SYP Technical terms. User can search any technical term available in SYP and get complete reference of that term. Information of the wordlist are kept in a database with complete detail in UTF-8 format in Devanagari script.

##### A. Components of the E-Glossary System and their Role in Searching

E-Glossary and Search System is a combination of the various components. The components are User Interface, Term Validator, Info Generator, Term Analyser and Output Generator.

##### A (i). User Interface

The screen shot of the user interface can be seen in fig 3. User can give input gives input through a text area given on the User Interface or through a list shown on user interface as dropdown menu. Currently only Devanagari Unicode are acceptable and the result will also be produced in same format.

##### A (ii). Term Validator

Technical term validator validate the given input whether it is correct technical terms or not with the help of technical term database. The sample of the dataset is shown Table 1.

क्र.स.	योग दर्शन	सांख्य दर्शन
1	अक्रमः	बुद्धिः
2	अविरतिः	अशक्ति
3	चित्तम्	अविवेकः
4	विक्षिप्तम्	पुरुषार्थत्वम्
5	निरुद्धम्	अधिकारि

Table 2: Sample of the technical term database

##### A (iii). Info Generator

After successful validation of input, inputs are sent to info generator for searching in the Technical Term database. The authenticated text from the Technical term validator module produces the basic facts with the help of the technical term database. If facts found then sends the information and input texts both to Term Analyser

otherwise returns to interface with tag “The information is not available till now”.

##### A (iv). Term Analyser

The data obtained from the info generator, Term Analyzer component do the analysis (complete details of the input technical terms) and provide the whole facts with the help of Term Analyser database. If analyzer receives any particulars then sends it to the Output Generator.

##### A (v). Output Generator

Based on facts obtained by the Term Analyser this component arrangements the outcome to show on the web page. And lastly directs to User Interface to show the facts as shown in figure 3. System works step by step with the help of numerous modules and relational database of SYP texts. Complete procedures of the system can be assumed with the help the architecture of the system as shown in Figure 1.

##### B. Searching Method used in the System

Currently system accepts input through text area in UTF-8 format in Devanagari script and prescribed dropdown menu to produce information in same format. User can type searching string/word in the text area then click on the button below after clicking on the button system send the request to the search engine for searching in the SYP technical term database. Sample of the data base is shown below.

#### V. RESULT AND DISCUSSIONS

As an outcome, a systematic description of the technical terms of the SYP is presented through this system. System provides the result with the details includes Name of the terms *pāribhāṣika* in Sanskrit with Hindi translation from the various authentic texts and analysis of the specific terms. The analysis of the terms provides the information of any technical terms belongs to the SYP. This system will be very useful to learn SYP basic terms for instance search over the internet anytime and anywhere.

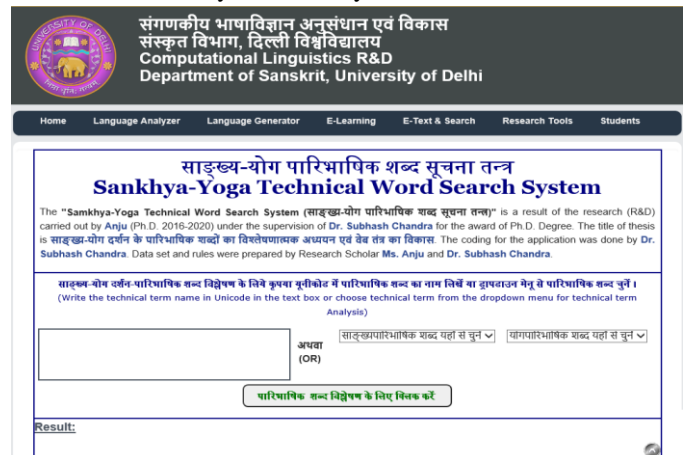


Figure 2: User Interface of Noun Derivational Process System

The information generate by the system includes:

### A. Name of the Terms:

As a result, detailed description of the technical terms of the SYP is presented through this system. System provides the result in tabular format. The first row is assigned for the term names in Sanskrit.

### B. Definition of the Terms:

System also provides the definition of the given technical terms according the various authentic text as mentioned in the material section in Sanskrit.

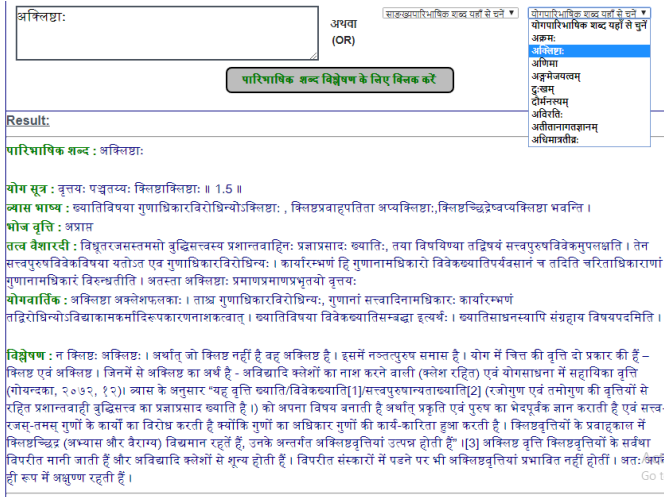


Figure 3: Result

### C. Hindi Translation of the each Definition:

The each definition of the given technical terms according the various authentic text as mentioned in the material section in Sanskrit are hyper linked with the Hindi translation. So user can understand the exact sense of the technical terms.

### D. Analysis of the Technical Terms:

Lastly the analysis of the specific terms are provided. The analysis of the terms provides the detailed information of any technical terms belongs to the SYP. This system will be very useful to learn SYP basic terms for instance search over the internet anytime and anywhere.

## VI. CONCLUSIONS

Technical term is not a word which contain a single information but it is pervasive term in a specific domain or any technical documents or field. The identification is a critical problem for human as well as any application dealing with the analysis, understanding, generation and translation of such documents. The paper has presented a new domain of research and development in natural language processing that is concerned with the representation, acquisition, and recognition of terms in aligned corpora. The system does not deal automatic extraction from the raw texts but it deal with manually aligned corpora. SYP is very essential texts of Indian philosophy. There are lots of technical terms are used in

SYP. There are total 500 sutras in the *sāṃkhyasūtra* contains 100 technical terms and 195 sutras in *yogasūtra* contains 295 technical terms. Therefore total 395 technical terms are extracted from these two philosophical texts. The technical terms and definitions in Sanskrit language from various authentic text books and commentaries with Hindi translation of each definition and complete analysis of the each technical terms extracted and stored the database. The analysis includes the complete information and meaning of the particular terms in various domain and general meaning. System also help to search any technical terms occurred in analysis directly with the hyperlink facility. It was very challenging task to develop such type system because there are no work was done till now.

## VII. FUTURE PLANS

Currently system is developed to produce the information in Hindi language only because mostly Sanskrit is being taught in Hindi medium in Indian universities. The dataset of information easily converted in any language. The structure and modules of system may be used to develop the technical terms of any field. System can be effortlessly adopted for other Indian Philosophy branches e.g. *nyāya*, *vaiśeṣika*, *mīmāṃsā*, *vedānta*, *jaina*, *buddhist* and *cārvāka* etc. Data mining is very essential in research. The methodology and data structure can be used for any system.

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