

COMPUTATIONAL ANALYSIS OF SUKANASOPADESA IN KADAMBARI

Computational linguistic is an inter disciplinary field dealing with the statistical or rule based modeling of natural languages from a computational perspective. A natural language is typically used for communication. Computational linguistic is used to process in natural language Computation linguist often work as members of inter disciplinary team including linguist, language experts & computer scientists.

We need to analyse a Sanskrit text for computational are the following:-

- (1) segmentex (पदच्छेदः) sandhi
- (2) पदपरिचयः (morphological analyzer)
- (3) Compound analysis (समस्तपदपरिचयः)
- (4) Karaka Analysis (Parson)

The Indian grammatical tradition with three schools of Shabdabodha viz, Vyakarana, nyaya, and miimaamsa offer various levels of linguistic analysis which is directly relevant to computational linguistics. Thus both skt and computational linguistics have a lot to offer to each other. Skt rich with many scholarly text in different discipline of studies — poetry, prose, purana and also Ithihasyas.

To understand the skt text with the help of computers, the words have been split manually before feeding the text to Analysis. This kind of analysis is useful for anybody who have some basic knowledge, Sanskrit morphological analysis, and has a good vocabulary in Sanskrit.

Any Indian with good knowledge mother language, and some background of Sanskrit should find this layer of immense. Sanskrit is very rich in Samasa formation as well as its usage. We provide a hiper link to the analysis of Samasa.

SANDHI

For Computational study, first of all we have to identify the various components like Sandhi, Samasa etc. But for a machine it is very difficult to identify such things. Sanskrit is very rich in compounds as well as in Sandhi. However, an analyser for compounds itself requires a basic word analyzer which works on simple words. Similarly a Sandhi Splitter requires a basic word analyzer to decide the meaningful sub units.

As a first step, we have taken up only one task that of building a MOA for simple words. The input text is manually split for Sandhi as well as Samasa. The Sandhi splitting is indicated by 'X' and the constituents of Samasa are separated by — we give below the specifications for the pre-edited text.

Then the question arises, if such a process is done by the human beings themselves then in what way can the machine help in analysis? The person who can split the text can certainly understand do the analysis on her own. The advantage to be considered here is

that a single person can split the text, but several people can have the advantage of the analysis with the help of the machine, because there are very few people who have really mastered the Sanskrit language and can understand the text on their own. So such splitting of the input text by humans helps the machine in further processing.

- 1) कदाचिद्दर्शनार्थमागतमारूढ - विनयमपि → कदाचित् + दर्शनार्थम् + आगतम् + आरूढविनयम् + अपि।
- 2) नाल्पमप्युपदेष्टव्यमस्ति → न + अल्पम् + अपि + उपदेष्टव्यम् + अस्ति।

MORPHOLOGICAL ANALYSIS

It is a device which gives the analysis of a given word. 'A' word here refers to a string of characters separated by a space. This process can be described as similar to the understanding process that takes place in the human mind.

The purpose of language is attained only when the intention of the speaker is communicated successfully to the listener. This is done when their listener is able to understand the meaning of the sentence, because the sentence is the unit from which the intention of the speaker is clearly known. For a human being, meaning from the sentence cognized in this way may be called Padaarthaanavyaya rather than saabdaboodha.

For a human being all this analysis happens subconsciously. We do not notice whether we are really trying to cognise padayhanam or not. But generally a human being will have to undergo the mental process of knowing the padyanam to get at the padaavthynnannam. The opinion of naiya'yikaas with regard to saabdaboodhaa can be quoted from Muktha votes.

पदज्ञानं तू करणम्

द्वारं तत्र पदार्थधीः

शाब्दबोधफलं तत्र शक्तिधीः सहकारिणि।

When we comes to higher application like the machine translation, such analysis is very much essential. For any computer application that involving natural language such as machine translation, question answering system, search engines, Information, Extraction, morphological analysis is the basic step.

Unless and until word analysis if done word sense disambiguation becomes difficult because in a language words come in variety of meanings. There are different meanings for the same word and usually the human being understand the particular meaning from the context and word knowledge.

The morphology of modern European language is relatively simple. But the agglutinating languages have complex morphology. Sanskrit is known for its morphological richness. A staadhyayi deals with word formation rules.

For analysis the word taken from sukanasopadesa is शुक्रनासः for that purpose we have to analyse:-

Pratipadikam; lingam, vibhakthi, vacanam, dhatu, upasargah, purusha, vacana, lakara etc.

For morphological analysis a high degree of knowledge is needed. Since Sanskrit is a classical language and has a rigorous grammar by Panini. The MOA takes a Sanskrit word as an input and assigns it a suitable structure. It extracts the information coded in the word in terms of lexical features like stem or root, gender, number, person etc.

SAMASA TAGGING

The combination of two words are called samasa or compound. There are 4 samasas are to be classified by Panini. Each compound is having subcategories also.

Every language has its own uniqueness. In samasa the information is coded in a very compact way. Normally in traditional Text, Samasas are employed to convey special meanings. Therefore a samasa will convey more than one meaning. Samasas are considered to be an advantage of Sanskrit as several meanings can be coded in a compact way. It gives more than one interpretation, due to which the common man finds it difficult. For resolving these problems a method is proposed a tagging system, which helps to find out the meaning of a samasa in a particular context, to a human as well as a computer. Panini gave rules for analyzing samasa Rule based analysis is also possible in a system. A rule-based system will generate a number of possible answers. Which will make it difficult to analyse the proper intended meaning. We even cannot decide the meaning on a priority base. To avoid this complexity of handling the samasas by the machine. We adopted the tagging system.

ABOUT AUTHOR AND KADAMBARI

Sanskrit language developed certain types of literature in which only one or the other is used as the medium of literary art. There are two patterns of literary art in Sanskrit which are unique in the language. They are the Maha Kavyas or the Grand Epics and the Gadya Kavya or the prose romances.

Gadya has been defined as "वृत्तगन्धाज्झितं गद्यम्" what is not in verse that, is prose, of romances there are two classes Katha and Akhyafika Kadambari is a katha type.

A katha is distinguished by possessing certain catchwords which the author intentionally puts in. The Sahityadarpana, says a katha contains as fine plot in prose, with a verse in the Arya, Vaktra or Aparavaktra metre here and there, a katha is introduced by a salutation in verse.

KADAMBARI

The story of "kadambari" is a very complex one, dealing as it does with the lives of two heroes, each of whom is reborn twice on earth.

The story of “kadambari” is interesting for several reasons. It is a standard example of classical prose. It has enjoyed a long popularity as a romance, and it is one of the comparatively few Sanskrit works which can be assigned to a certain date, and so it can serve as a landmark in the history of Indian literature and Indian thought.

BANABHATTA

Bana is one of the brightest stars in the galaxy of Sanskrit poets. By Sanskrit critics his works were regarded as the finest. Specimens of the Pancali Style of composition. He is the first among the writers of classical Sanskrit prose.

CHARACTERISTICS OF PROSE

Sanskrit language has maintained certain special features which mark out its individuality in sharp outline. In the early languages of man, it is noted that there is a predominance of prose literature and that literature is mainly in the form of the accounts of kings and of matters relating to the wealthy people, gods and teachers and priests loom large in such early literatures outside Sanskrit. It is in Sanskrit that we find the earliest literary art as poetry among the languages of the world. Prose has been perfected as a medium for the presentation of literary art even in the earliest stage of the development of Sanskrit literature.

Prose without the limitation of metre, developed in two ways. There are the prose passages in the form of very short, crisp sentences in addressing the various objects utilized for religious rituals and there is also the free, elegant prose made use of in narrations, in interpretations and in descriptions. Thus, from the earliest times, it is found that the division of language into prose and poetry had no relation to the difference between the art side and the science side in the use of language. Language remained language and the distinction of language into metrical and prose styles had only a relation to the form and not at all to the content which the form is made to include. This art intellect synthesis is a feature that is unique in Sanskrit without a parallel in any other language.

This feature continued in Sanskrit during its entire period of growth. Prose and metrical language were intermingled in the same work. Thus, in the Atharvaveda, there are two books out of twenty that are in prose while the other books are in poetry. The Yajurveda presents the main type of the prose while there are also metrical passages coming into it. The same scheme is followed in the Brahmanas and in the Upanisads.

In the Upanisads, some are in metrical language and other are in prose. In the ithihasas known as the Mahabharata, there are portions in prose and this is also the case with the purana. Called the Bhagavata, In classical Sanskrit, there is a type developed called the campu in which there are prose portion and metrical language interspersed. The dramas also contain prose with a conversational ease along with fine poetry in metrical language.

Sanskrit language developed certain types of literature in which only one or the other is used as the medium of literary art. There are two patterns of literary art in Sanskrit which are unique in the language. They are the Mahakavyas or the grand epics and the

Gadya Kavyas or the prose romances. They are found only within the region of the classical literature and not in the earlier literature known as the Vedas. In the Mahakavyas, the language used in metrical there is a type of Kavyas on poetry in Sanskrit called Gadya Kavyas on poetic art in prose.

In the works on literary criticism in Sanskrit, we do not find any distinction made between the language of prose and the language of poetry. There is nothing called 'poetic license' in the matter of grammar, found in Sanskrit literature. It is the same language that is found whether it is prose or metrical. Perhaps a deviation from the strict rules of syntax may be more patent in metrical language than in prose. But in prose also, such deviations are met with freely.

In the case of poetic art in prose style; there are the two works of Bana and Subandhu which are the most important. Bana has written a romance based on the life of his friend, king Harsa of Kanauj and he has also written the romance called the Kadambari.

Bana was a great and erudite scholar. He gives some information about himself in his historical romance. There is a saying that there is nothing in the world which Bana had not much that everything in the world is what he had munched and thrown out later (बाणोच्छिष्टं जगत्सर्वम्।)

THE INTEREST OF KADAMBARI

Historical interest, so far as that depends on the narrations of historical facts, appears to be entirely lacking, though it may be that at some future time our knowledge from other sources may be so increased that we may recognize portraits and allusions in what seems now purely a work of romance. But in the wider sense in which history claims to deal with the social ideas that belong to any epoch 'Kadambari' will always have value as representing the ways of thinking and feeling which were either customary or welcome at its own time, and which have continued to charm Indian readers. It is indeed true that it probably in many ways does not give a picture of contemporary manners, just as a mediaeval illuminated manuscript often represents the dress and surroundings prior to the time of the illuminator, so as to gain the grace of remoteness bestowed by reverence for the past. In India, where change works but slowly, the description of the court and city life, where all the subjects show by outward tokens their sympathy with the joys and sorrows of their ruler, as in a Greek chorus, is vivid in its fidelity. The quiet yet busy life of the hermits in the forest, where the day is spent in worship and in peaceful toils, where at eve the sunbeams 'linger like birds on the crest of hill and tree' and where night 'darkens all save the hearts of the hermits, is full of charm.

CONCLUSION

In conclusion, it may not be out of place to consider the general conditions of the country and the people as could be made out from the Kadambari. The value of the romance is not in merely that it is a great work of art which gives pleasure to the readers. We understand much about the condition of ancient India from such works. In the Kadambari it is found that the whole of India was unitary nation.

There is no aspect of national life in which we cannot find some ideal to be followed when we read the romance of Bana. This is another great value of the work of Bana

Kadambari is an exception in the style of narration and the development of story. Though the first part is considered to be due to Banabhatta no other works equal this in the whole of Sanskrit literature. So we say that कादम्बरी रसज्ञानात् आहारोऽपि न रोचते।

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Tool Details

Computational Approach of Kadambari

Introduction

'Computational Analysis of **Kadambari**' plans to develop an online tool for analysing **Kadambari Text**. This would help scholars for understanding the **Kadambari** story and methodology in all over the world. The Internet and Information Technology provides a wealth of potential benefits for learners of Ancient texts Methodology, and Sanskrit Grammar. The **Kadambari** Analysis of the online tool has become essential and it can be accessed at any time, from anywhere, for the unlimited number of times and great insight of topics to choose from, so every learner may find something interesting.

Why Computational Analysis?

There are many unsolved issues in Sanskrit language machine processing. Many modern scholars made attempts to improve the performance and usefulness of Sanskrit machine processing. With the growing complexity of academic systems, and urge for globalisation, the online accessibility and Indian science methodology analysis is needed to develop and maintain this tool more and more important.

The **Kadambari** contain many data and logics. This is very difficult to understand with proper Analysis by a human mind. This tool helps to reduce time consumption of human Analysis and improve quality in Analysis. Reduction of ambiguity and complexity in **Kadambari** is the important objective of this tool. Technology is an integral part of achieving a good academic quality and improvement. The Computational Analysis of **Kadambari** is at a critical juncture in the academic world of Sanskrit community.

How to Use the System

Login / Access

To access the **Kadambari** tool, must need an internet connection. Go to the web browser and type <http://dev-kadambari.pantheonsite.io/>

Database of Kadambari Tool

The present tool is used MySQL database. "MySQL is an open-source relational database management system (RDBMS)." This is used to store all the information required to keep the tool working. All digitalised texts information, and a host of other things will be stored in the MySQL database. It is also the world's highest prominent bit of database software with over six million active users in globally.

कादम्बरी - शुकनासोपदेशः

A Computational Analysis Tool

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Figure. 1. Home page of Kadambari Computational Analysis Tool.

कादम्बरी - शुकनासोपदेशः

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Figure. 2. Project Details Page.

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Computational Analysis

1. एवं समतिक्रामत्सु केषुचित् दिवसेषु राजा चन्द्रापीडस्य यौवराज्याभिषेकं चिकीर्षुः प्रतीहारानुपकरणसम्भारसंग्रहार्थमादिदेश।
2. समुपस्थितयौवराज्याभिषेकञ्च तं कदाचिद्दर्शनार्थमागतमारूढविनयमपि विनीततरमिच्छन् कर्तुम् शुकमनासः सविस्तरमुवाच।
3. तात! चन्द्रापीड! विदितवेदितव्यस्य अधीतसर्वशास्त्रस्य ते नाल्यमप्युपदेष्टव्यमस्ति! केवलञ्च निसर्गत एव अभानुभेद्यमरत्नालोकभेद्यमप्रदीपप्रभापनेयमतिगहनं तमो यौवनप्रभवम्।
4. अपरिणामोपशमो दारुणो लक्ष्मीमदः। कष्टमनञ्जन-वर्तिसाध्यमपरम् ऐश्वर्यतिमिरान्धत्वम्।
5. अशिशिरोपचारहार्योऽतितीव्रः दर्पदाहज्वरोष्मा। सततममूलमन्त्रशम्यः विषमो विषयविषास्वादमोहः। नित्यमस्नानशौचबाध्यः बलवान् रागमलावलेपः।
6. अजस्रमक्षपावसानप्रबोधा घोरा च राज्यसुखसन्निपातनिद्रा भवति इत्यतः विस्तरेणाभिधीयसे।
7. गर्भेश्वरत्वमभिनवयौवनत्वमप्रतिमरूपत्वममानुषशक्तित्वञ्चेति महतीयं खल्वतर्धपरम्परा। सर्वविनयानामेकैकमप्येषामायतनम्, किमुत समवायः।
8. यौवनारम्भे च प्रायः शास्त्रजलप्रक्षालननिर्मलापि कालुष्यमुस्याति बुद्धिः। अनुज्झितधवलतापि सरागैव भवति यूनां दृष्टिः।
9. अपहरति च वाल्येव शुष्कपत्रं समुद्भूतरजोभ्रान्तिरतिदूरम् आत्मेच्छया यौवनसमये पुरुषं प्रकृतिः।
10. इन्द्रियहरिणहारिणी च सततमतिदुरन्तेयमुपभोगमृगतृष्णिका, नवयौवनकषायितात्मनश्च सलिलानीव तान्येव विषयस्वरूपाण्यास्वाद्यमानानि मधुरतराण्यापतन्ति मनसः।
11. नाशयति च दिङ्मोह इवोन्मार्गप्रवर्त्तकः पुरुषमत्यासङ्गो विषयेतु।
12. भवाद्दशा एव भवन्ति भाजनानि उपदेशानाम्। अपगतमले हि मनसि स्फटिकमणाविव रजनिकरगभस्तयो विशन्ति सुखेन उपदेशगुणाः।
13. गुरुवचनमलमपि सलिलमिव महद्दुपजनयति श्रवणस्थितं शूलमभव्यस्य। इतरस्य तु करिण इव शङ्खाभरणमाननशोभासमुदयमधिकतरमुपजनयति।

Figure. 3. Computational Analysis Page.

कादम्बरी - शुकनासोपदेशः

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Analysis 1

अन्वयः। >>>:

एवम्, समतिक्रामत्सु, केषुचिद्, चन्द्रपीडस्य, यौवराज्याभिषेकम्, चिकीर्षुः, राजा, उपकरणसम्भार-संग्रहार्थम्, प्रतीहारान्, आदिदेश।

सुधा। >>>:

एवम् = इत्थम्। समतिक्रामत्सु = व्यतीतेषु। केषुचिद् दिवसेषु = कतिपयदिनेषु। चन्द्रपीडस्य = तन्नाम्नः स्वसुतस्य। यौवराज्याभिषेकम् = युवराजस्य कर्म - यौवराज्यम्, तन्निमित्तं योऽभिषेकस्तम् यौवराज्याभिषेकम् - युवराजपदाभिषेकम् (यौवराज्याभिषेक)। चिकीर्षुः = कर्तुं मिच्छुः शिचकीर्षुः। राजा = नृपः। उपकरण-सम्भार-संग्रहार्थम्-उपकरणानां सम्भारः, तस्य संग्रहार्थम् = वस्तुसंभार-संगटनार्थम्। प्रतीहारान् = द्वारपालान्। आदिदेश = आदेशञ्जकार।

सरलार्थः। >>>:

अथ कतिपयदिवसगच्छत्सु चन्द्रपीडस्य राज्याभिषेकार्थमावश्यकवस्तुसंग्रहार्थं राजा प्रतीहारान् आदिदेश।

Figure. 4. Analysis Result of First Line

Find content Edit

Analysis कादम्बरी - शकनासोपदेशः EDIT MANAGE FIELDS MANAGE DISPLAY COMMENT FIELDS COMMENT DISPLAY

Home » Administration » Structure » Content types » Analysis

✖ There is a security update available for your version of Drupal. To ensure the security of your server, you should update immediately! See the [available updates](#) page for more information and to install your missing updates.

[Show row weights](#)

LABEL	MACHINE NAME	FIELD TYPE	WIDGET	OPERATIONS
+ Title	title	Node module element		
+ अक्षरःI >>>	body	Long text and summary	Text area with a summary	edit delete
+ सुधाI >>>	field_sudha	Long text and summary	Text area with a summary	edit delete
+ सरलार्थःI >>>	field_saralartha	Long text and summary	Text area with a summary	edit delete
+ Add new field				
<input type="text"/>		- Select a field type -	- Select a widget -	
Label		Type of data to store.	Form element to edit the data.	
+ Add existing field				
<input type="text"/>		- Select an existing field -	- Select a widget -	
Label		Field to share	Form element to edit the data.	

Figure. 5. Analysis Result Control Field

Content Management System (CMS)

A content management system (CMS) is a software tool that lets users add, publish, edit, or remove content from a website, using a web browser on a smartphone, tablet, or desktop computer. Typically, the CMS software is written in a scripting language, and its scripts run on a computer where a database and a web server are installed. The content and settings for the website are usually stored in a database, and for each page request that comes to the web server, the scripts combine information from the database and assets (JavaScript files, CSS files, image files, etc. that are part of the CMS or have been uploaded) to build the pages of the website.

The combination of the operating system that the CMS runs on, the scripting language it is written in, the database it stores its information in, and the web server that runs the scripts to retrieve information and return it to the site visitor's web browser is known as the stack that the CMS runs on; the commonly used combination of the Linux operating system, Apache web server, MySQL database, and PHP scripting language is known as the LAMP stack.¹

Features of CMSes²

Features can vary amongst the various CMS offerings, but the core functions are often considered to be indexing, search and retrieval, format management, revision control and publishing.

Intuitive indexing, search and retrieval features index all data for easy access through search functions and allow users to search by attributes such as publication dates, keywords or author.

Format management facilitates turn scanned paper documents and legacy electronic documents into HTML or PDF documents.

Revision features allow content to be updated and edited after initial publication. Revision control also tracks any changes made to files by individuals.

Publishing functionality allows individuals to use a template or a set of templates approved by the organization, as well as wizards and other tools to create or modify content.

¹ https://www.drupal.org/docs/user_guide/en/understanding-drupal.html

² <https://searchcontentmanagement.techtarget.com/definition/content-management-system-CMS>

What is Drupal?

Drupal is a flexible CMS based on the LAMP stack, with a modular design allowing features to be added and removed by installing and uninstalling modules, and allowing the entire look and feel of the website to be changed by installing and uninstalling themes. The base Drupal download, known as Drupal Core, contains the PHP scripts needed to run the basic CMS functionality, several optional modules and themes, and many JavaScript, CSS, and image assets. Many additional modules and themes can be downloaded from the Drupal.org website.

Drupal can also run on other technology stacks:

1. The operating system can be Windows or Mac OS instead of Linux.
2. The web server can be Nginx or IIS instead of Apache.
3. The database can be PostgreSQL or SQLite instead of MySQL, or a MySQL-compatible replacement such as MariaDB or Percona.

Other operating systems, web servers, and databases can also be made to work; however, the scripts that the software uses are written in PHP, so that cannot be changed.

What are the reasons for using Drupal?

When building a website, you have your choice of using one of the many existing CMS packages and hosted services, developing your own CMS, or building the site without using a CMS. Here are some of the reasons you might choose to use Drupal:

Building a small, simple site with static HTML pages is not difficult, and you can get a simple site up very quickly. Setting up a site in a CMS generally requires more time initially, but brings you the benefits of on-line editing (easier for less experienced content maintainers), uniformity (harder to maintain using static HTML for larger sites), and the possibility of more complex features requiring a database.

Some CMS software is special-purpose; for instance, there are packages and hosted services that you can use to build a blog or a club membership website. Drupal, in contrast, is a general-purpose CMS. If you are building a special-purpose site, you might choose to use a special-purpose CMS; however, if your site falls even slightly outside the intended purpose, you will probably be better off using a general-purpose CMS rather than trying to adapt a special-purpose CMS.

Building your own CMS-type software can seem attractive. However, using a general-purpose CMS like Drupal as a starting point is usually a better idea, because the basic CMS functionality (such as user accounts and content management) has thousands of developer hours behind it, including many years of user testing, bug fixing, and security hardening.

Some CMS software packages are expensive to purchase a license for. Some are free or have a free version, but have restrictive licenses that do not allow you to make modifications and extensions. You might prefer to use a package (like Drupal) that has a

less restrictive software license, and is developed by a world-wide community. See Section 1.6, “Concept: The Drupal Project” for more on this topic.