



## AN ANALYSIS OF CURRENT TRENDS FOR SANSKRIT AS A COMPUTER PROGRAMMING LANGUAGE

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### ABSTRACT :

*Sanskrit is said to be one of the systematic language with few exception and clear rules discretion. The discussion is continued from last thirty that language could be one of best option for computers. Sanskrit is logical and clear about its grammatical and phonetically laws, which are not amended from thousands of years. Entire Sanskrit grammar is based on only fourteen sutras called Maheshwar (Siva) sutra, Trimuni (Panini, Katyayan and Patanjali) are responsible for creation, explainable and exploration of these grammar laws. Computer as machine, requires such language to perform better and faster with less programming. Sanskrit can play important role make computer programming language flexible, logical and compact. This paper is focused on analysis of current status of research done on Sanskrit as a programming language for . These will the help us to know opportunity, scope and challenges.*

**KEYWORDS :** Artificial intelligence, Natural language processing, Sanskrit, Computer, Vibhakti, Programming language.

### 1. INTRODUCTION

There is at least one language, Sanskrit, which for the duration of almost 1000 years was a living spoken language with a considerable literature of its own Besides works of literary value, there was a long philosophical and grammatical tradition that has continued to exist with undiminished vigor until the present century. [1]

In recent years, Sanskrit language in programming has become a prevalent trend. Sanskrit is a natural language and it can serve as an artificial language [1]. Sanskrit includes economics, astrology, science, medicine and mathematics and many more. The essence of the language is from its grammar rules which were penned by Maharishi Panini in his book "Astadhyayi". Among all the Natural Languages, Sanskrit in its style is identified to be the best language which has minimum deviation. There are 14 formulas given by Panini in Sanskrit language are called 'Siva or Maheshwar Sutras'. These 14 formulas are used to explain Sanskrit in mathematical representation or form. Panini discovered nearly 4000 rules for Sanskrit grammar in Astadhyayi [2]. These formulas given by Maharishi Panini but well explained by Katyayana and Patanjali. It is hard to translate one language into another because words can have several meanings and variations. It is possible only by replacing the words in text by their equivalents and modifying and arranging these words according to grammar. The concept of Karaka and Vibhakti used for parsing Sanskrit text. In Sanskrit vibhakti helps to make any sentence, and there are seven types of vibhakti.

Sanskrit is one of the most efficient Indo-European languages, was born in India and is considered as greatest treasure[3]. The one of the aim of the application of Sanskrit language is to produce high quality programming language which is unambiguous, easy to understand and has fixed logical structure. A number of studies show that only 40% work is done in this field. There was a paper by Rick Briggs makes a case that natural languages are not that difficult to use for computer programming. He cites Sanskrit as an example as its grammar can be easily translated to a form understandable by a computer[6]. There are about 1,025,109[3] words in English language and with the invention of new device and other new word gets added into English language. Unlike English, no new words are invented in this Language. This is because every letter in Sanskrit language has a meaning and every word in Sanskrit describes only the property of an object but not the object itself. By the use of English language it decreases the storage space but Sanskrit does not. It is very tricky to understand the actual meaning of Sanskrit sentences, but a step by step procedure with different techniques is available to find out the morphological analysis of Sanskrit words. It will be helpful for researchers as it provides simple structure to understand the accurate meaning of the sentence.

The main and simple reason to use Sanskrit language in computer is, it has predefined rules and structure, and also strong grammar. Dhatus and Vibhakti in Sanskrit is used to construct the words. There are 2200 Dhatus in Sanskrit language. The ancient Indian grammarian Maharishi Panini described the structure of Sanskrit using rewriting rules, similar in spirit to the Backus Naurform[5].

## 2. PREVIOUS RELATED WORKWORK

In 1985, Rick Briggs explains the possibility and scope of Sanskrit for knowledge representation and artificial intelligence. He focused on three topics in his paper named as semantic net, shastric Sanskrit and equivalence. He clearly defined the sentence formation, their meanings and comparisons [1].

In 2017, Shashank Mani Tripathi explains the significance of Sanskrit in space communication as a computer language at NASA. In 5<sup>th</sup> century B.C. ancient Indian grammarian of the world, Maharishi Panini, provided a book called 'Ashtadhyayi', which has grammatical rules and word structure. He said the Sanskrit is ideal for artificial intelligence. [3]

## 3. TOOLS

**Microsoft Excel** is a spreadsheet program included in the **Microsoft Office** suite of applications. Spreadsheets present tables of values arranged in rows and columns that can be manipulated mathematically using both basic and complex arithmetic operations and functions [14].

## 4. DATA SOURCES

There are several sources of academic databases. But only few were choosed, which are considered as mainstream venues of databases for Sanskrit language:

- ✓ IJARCSSE([www.ijarcsse.com](http://www.ijarcsse.com))
- ✓ IJCSC([www.csjournals.com](http://www.csjournals.com))
- ✓ ICMRP([www.rsjournal.org](http://www.rsjournal.org))
- ✓ IJACEE([www.ijaceeonline.com](http://www.ijaceeonline.com))

## 5. DATA RETRIEVAL

It is compulsory to search all the challenges and best practices associated with Sanskrit language implement phase and the tools used in these phases. There are several synonyms of Sanskrit, here some are included in this search. Here these terms NLP (Natural Language Processing) and AI (Artificial Intelligence) are used as search strings. Search strings that used are as follows:

("Sanskrit in programming language" OR "Sanskrit in Natural Language Processing" OR "Implementation of Sanskrit Linguistics in Artificial Intelligence Programming" OR "An Approach to

Sanskrit as Computational and Natural Language Processing” OR “Sanskrit: Some Insights as a Computer Programming language” OR “Sanskrit : The First Programming Language?”))

## 6. STUDIES SELECTION

Primary studies were included according to the following criteria:

- ✓ Were written in English.
- ✓ Were available online.
- ✓ Were published between 1920 and 2017.
- ✓ Have discussed challenges and solutions regarding Sanskrit language.
- ✓ Have mainly targeted the phasesos Sanskrit language or discussed the problems or soutuions or best tools and techniques.

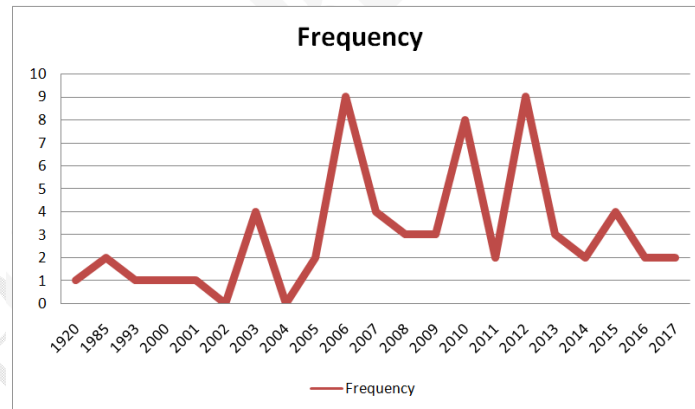
The search string is used to search or find database. The search string has been adapted according to the database.The result of applying search string is shown in table 3:

**Table 3: Result of application of search string of review**

Resources	Search	Primary Selection	Secondary Selection	Final Selection
IEEE Xplore	20	15	12	10
ACM Digital Library	30	20	15	12
Spring Link	10	8	6	3
Total	50	43	33	25

## 7. Result

### 4.1 Year wise distribution of studies



The above graph shows the work towards Sanskrit language i.e. how much work is done during years(1920-2017).

## 9. CONCLUSION

Since 1985, by the continuous studies it is found that the Sanskrit is known as beneficial language for Natural Language Processing, just because of its grammar rules and word structure.

### DISCUSSION ABOUT RESULTS-

- The year wise distribution of studies reveals that the interest in Sanskrit language has increased since 2006.
- There was no work or research did in year 2002 and 2004.

- Till the work is doing by researchers team and continuously the demand of Sanskrit language is going up.

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