

**MULTIMEDIA E-BOOK OF ŚRĪMADBHAGAVADGĪTĀ:
With Special Reference to Chapter 1**

Dissertation submitted to Jawaharlal Nehru University

In partial fulfillment of the requirements

For award of the

Degree of

MASTER OF PHILOSOPHY

DEVENDRA SINGH RAJPUT



SPECIAL CENTRE FOR SANSKRIT STUDIES

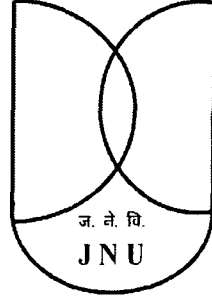
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विशिष्ट संस्कृत अध्ययन केन्द्र,
जवाहरलाल नेहरू विश्वविद्यालय,
नई दिल्ली – ११००६७



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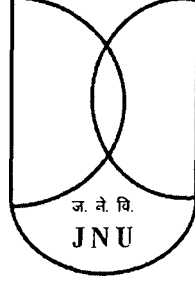
July 29th, 2013

DECLARATION

I declare that the dissertation entitled “**Multimedia E-book of Śrīmadbhagavadgītā: With Special Reference to Chapter 1**” submitted by me for the award of the degree of Doctor of Philosophy is an original research work and has not been previously submitted for any other degree or diploma in any other institution/university.


(DEVENDRA SINGH RAJPUT)

विशिष्ट संस्कृत अध्ययन केन्द्र,
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July 29th, 2013

CERTIFICATE

The dissertation entitled “**Multimedia E-book of Śrīmadbhagavadgītā: With Special Reference to Chapter 1**” submitted by **Devendra Singh Rajput** to **Special Centre for Sanskrit Studies, Jawaharlal Nehru University** for the award of degree of **Master of Philosophy** is an original research work and has not been submitted so far, in part or full, for any other degree or diploma in any University. This may be placed before the examiners for evaluation.

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TO
MY
LOVING
MUMMY & PAPA-JI

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List of Abbreviation

AD	Anno Domini
AIH	Ancient Indian Heritage
ALT	Advanced Learning Technology
ASCII	American Standard Code for Information Interchange
ASP	Active Server Page
ASR	Automatic Speech Recognition
BCE	Before Christ
BORI	Bhandarkar Oriental Research Institute
C	Commentator
CBSE	Central Board of Secondary Education
CD	Compact Disk
CDAC	Centre for development Advance Computing
CDROM	Compact Disc Read-only Memory
CDS	Content Development System
CE	Century
Ch.	Chapter
Chs.	Chapters
CMS	Content Management System
COLING	Computational Linguistics

Comp.	Complete
Cond.	Condition
Cond.	Condition
CTML	Cognitive Theory of Multimedia Learning
DBMs	Database Management Systems
DIT	Department of Information Technology
DLI	Digital Library of India
DRM	Database Right Management
DVD	Digital Video Disk
e-book	electronic Book
ed.	Edition
e-edition	Electronic Edition
e-learning	Electronic Learning
EPUB	Electronic Publication
GB	Giga Byte
GUI	Graphical User Interface
HTML	Hyper Text Mark-up Language
HTTP	Hyper Text Transfer Protocol
IGNCA	Indira Gandhi National Centre for the Art
IGS	International Gita Society
IITM	Indian Institute of Technology Mumbai

Inc.	Incomplete
ISBN	International Standard Book Number
JDBC	Java-based Data access Technology
JNU	Jawaharlal Nehru University
JSP	Java Server Page
LAN	Local Area Network
LMS	Learning Management System
M.Phil	Master of Philosophy
MB	<i>Mahābhārata</i>
MM	Multimedia
Ms.	Manuscript
Mss.	Manuscripts
MySQL	My Structured Query Language
NL	Natural Language
NLI	Natural Language Interface
NLP	Natural Language Processing
NMC	New Media Consortium
OCR	Optical Character Recognition
OEBPS	Open E-book Publication Structure
PCs	Personal Computers
PDA	Portable Digital Assistants

PDF	Portable Document Format
R&D	Research and Development
RDBMS	Relational Database Management System
SBG	<i>Śrīmadbhagavadagītā</i>
Scb.	Subscribe
SCSS	Special Centre Sanskrit Studies
SQL	Structured Query Language
SRS	Software Requirements Specification
TEL	Technology- Enhanced Learning
TTS	Text To Speech
Vol.	Volume
VS.	Vikram Samvat
WAN	Wide Area Network
WWW	World Wide Web

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Transliteration key used in the dissertation

अ	=	a	ड्	=	ḍ	ˆ (Anusvāra) = ṃ
आ	=	ā	ढ्	=	ḍh	: (visarga) = ḥ
इ	=	i	ण्	=	ṇ	
ई	=	ī	त्	=	t	
उ	=	u	थ्	=	th	
ऊ	=	ū	द्	=	d	
ऋ	=	ṛ	ध्	=	dh	
ॠ	=	ṝ	न्	=	n	
लृ	=	ḷ	प्	=	p	
ए	=	e	फ्	=	ph	
ऐ	=	ai	ब्	=	b	
ओ	=	o	भ्	=	bh	
औ	=	au	म्	=	m	
क्	=	k	य्	=	y	
ख्	=	kh	स्	=	r	
ग्	=	g	ल्	=	l	
घ्	=	gh	व्	=	v	
ङ्	=	ṅ	श्	=	ś	
च्	=	c	ष्	=	ṣ	
छ्	=	ch	स्	=	s	
ज्	=	j	ह्	=	h	

झ = jh
ञ = ñ
ट = t
ठ = th

क्ष = ks
त्र = tr
ज्ञ = jñ
ऽ = ,

Introduction

Introduction

Today digital form of learning is emerging rapidly in the field of education and becomes very popular in past few years. The new technology makes study smarter than other sources and provides anywhere anytime learning without having any extra physical material. Now e-books have more attractive features for users such as audio, video or animation, images, tables, charts, graphs and much more related to illustration. Remarkable progress has been recorded in the field of e-learning using by multimedia technologies like Flash, Macromedia etc. for developing MM e-books. Online e-books provide substantial advantages to libraries and their users providing by smart accessing for books, saving of time, wider selection, and immediate updates. Library needs not to care about storage requirements, maintenance costs and staffing time for physical handling and processing of print books. These are very beneficial to preserve our traditional, cultural texts in disaster. Physical books have not a long life in comparison of e books and damage quickly without proper care.

Ancient Indian Heritage Texts are full with knowledge of various domains that is to beneficial today. Śrīmadbhagavadgītā is a text of AIH and very demanding because of its relevance in current time. SBG is the text of Indian tradition has most numbers of commentaries, translations and other works by Indians as well as foreign scholars according to the group of scholars. SBG is a text with great message delivered by Kṛṣṇa of *niṣkāma karma*, motivation, self confidence, patience, self-control, leadership, communication skills, and taking correct steps when called for, positive attitude towards work, planning, achieving goals in life, mutual co-operation, knowledge, justice, determination and many more values can be inculcated among students through Gita. The universal message of SBG provides strength, enhance our eternal power and make clear our goal which helps to solve the problems we are facing today.

Presentation of our knowledge based tradition through technology will make it more interesting and easier for us in this age of technology especially it will be beneficial for non-Sanskrit background peoples. Multimedia presentation of texts of AIH will bring-up, encourage and long time preserve our culture or knowledge. In 21st century acceptance rate of Information Technology in mediums of education is very high so it's a demand of present time.

The proposed research work is based on 1st chapter of *Śrīmadbhagavadgītā* named by *Arjuna-viṣāda-yoga*. There are two reasons to select the chapter. One, *Śrīmadbhagavadgītā* is a large text so developing an interactive and animated version for the whole text can't be completed properly in limited time of M.Phil. Second, this chapter has great scope of animation because there is an introduction of all characters standing in *kurukṣetra* according their characteristics and gestures. This chapter is the base of SBG and makes help to understand confusion of Arjuna's in the ground of war.

The scope of proposed research work is to make a computational system for SBG, which provides e-book and multidimensional search engine. System will be online and free of cost for users and available on Computational Linguistics R&D, SCSS, JNU, website is - <http://sanskrit.jnu.ac.in/sbg/index.jsp> created by Dr. Girish Nath Jha. However SBG is available in various digital form such as e-text, audio, video but full e-book version with highly illustrated MM content is remain to done. In proposed research work such type of MM e-book is designing. This MM e-book provides multidimensional search engine of SBG text. User can search whole text by inputting only single word; alphabet and can select any Adhyay or śloka to read online. System will display rich information about searched śloka. It also displays images, audio, plain e-text, animation and other online links for SBG.

Development of MM E-book and Search engine for SBG:

An MM e-book and dynamic web search engine cum-indexer has been developed under this proposed work. This web application has been developed in the front-end of Apache Tomcat Web server using JSP and Java Servlets. Database is encoded in Devanāgarī Unicode in datafiles along with RDBMS in MS SQL server. To connect the front-end with the database server the MS-JDBC connectivity has been used. The system provides e-book with multidimensional knowledge based search engine of SBG. The system is available on following link: <http://sanskrit.jnu.ac.in/sbg/index.jsp> with input and output in Devanāgarī Unicode. The system can be used as a generic system for AIH texts.

Chapter Description:

The dissertation as a part of Research & Development (R&D) has been divided into four chapters. The first chapter '**Survey of e-learning for Sanskrit Heritage texts**' discusses on e books and make an overview of its tradition, technologies under it and need of these in current scenario. Here benefits of e-books are mentioned, why education demands for it and rate of acceptance is discussed. Chapter discuss on e books in accordance to its interconnectivity with e-learning. After, a discussion on status of Sanskrit and need to present it on e-form was done than survey of current online e-sources for Sanskrit done. E-learning techniques for Sanskrit studies discussed.

In the second chapter '**Śrīmadbhagavadgītā (SBG) in the Digital Age**' history of respective text discussed. Tradition of thinkers, various commentators and modern scholars on SBG has discussed. It is making clear that why the text is too popular in our day to day life? A survey has done of available digital forms of SBG. Discusses on necessity to present the text in such format and describe the special features of text. The purpose to deliver our heritage to new generation also made clear here.

The Third chapter '**Research Methodology**' describes for preparing steps of MM e-book of SBG. The detailed procedure of the research methodologies and predation of database for on line system of SBG is given as follows:-

- ❖ Check the historical evidence of text and select most authentic text of SBG among the available editions.
- ❖ Prepare illustrated content and database for SBG.
- ❖ To develop a relational database system of SBG.
- ❖ Developing Java server engine for search.
- ❖ Developing a web interface for input and display

The authenticity of the selected text made clear in very first and digitations of text, collection and survey of illustration for text has made in this chapter.

The fourth chapter '**Multimedia e-book for Śrīmadbhagavadgītā**' describes the implementation part of the research such as the font-end, Java objects, lexical recourses and how it works? Chapter contains snapshots of the developed system.

Chapter 1

Survey of e-learning for
Sanskrit Heritage texts

Chapter 1.

“Survey of e-learning for Sanskrit Heritage texts”

1.1 E-book: an Introduction

An electronic book is a book length publication in digital form, consisting of text, images or both, and produced on, published through, and readable on computers or other electronic devices. It also called e-book, digital book or even e-edition.¹ According to the Oxford Dictionary of English “an electronic version of a printed book which can be read on a computer or a specifically designed handheld device” is an e-book.² E-books can and do exist without any printed equivalent. E-books are usually read on dedicated e-book readers or general purpose computer tablets. Personal computers and many mobile phones (most smart phones) can also be used to read e-books. In the tradition of e-book many people have offered definitions over the years. Here are a few of them –

“E-books are basically high-tech reading tablets that hold the equivalent of thousands of paper pages. You download text into them, and they display it on built-in screens.” (Robb, 1998, Para. 2)³

“E-book is a vague term which is used to describe a text or monograph which is available in an electronic form. An e-book could be a novel published on a Web site, a short story available to be downloaded as a word processing file or even a diary in a very long e-mail!” (Ormes, Para. 4)⁴

¹ <http://en.wikipedia.org/wiki/E-books> : accessed on 03/07/2013.

² <http://oxforddictionaries.com/definition/english/e--book?q=e-book> : accessed on 03/07/2013.

³ Robb, J. (1998, October 9). *Are digital books good enough to curl up with?* Retrieved March 4, 2010, from CNN.com , site: <http://www.cnn.com/TECH/computing/9810/09/digbooks.idg/index.html>

⁴ Ormes, S. (n.d.). *An e-book prime* [Issue paper]. Retrieved March 4, 2010, from UKOLN Web site: <http://www.ukoln.ac.uk/public/earl/issuepapers/ebook.htm>

“The e-book can be defined variously as: a text in digital form; as a book converted into digital form; as digital reading material; as a book in a computer file format or electronic file of words; or as images with unique identifiers...the word e-book is often used simultaneously to describe content, format, reader software, and reading devices.” (Rao, 2004, p. 364)⁵

An e-book is an electronic or digital representation of a given text, whether scanned, typed, or programmed (for example, using HTML), having virtual “pages”, that are read using e-book reading software, either on a personal computer, a PDA, a smart phone, or on a dedicated e-book reading device.” (Robert Chrystal, 2010)⁶

Any content that is recognizably ‘book-like’, regardless of size, origin or composition, but excluding serial publications, made available electronically for reference or reading on any device (handheld or desk-bound) that includes a screen” (Armstrong, 2008)⁷

At the starting age of e books, around 1970 (the Gutenberg Project) it began with simple text and did not have PDF, HTML, EPUB, hypertext links, illustration, audio visual, or any of other file formats like today have. In the tale of developing e-books commercial version came out since 1980s dominated by the North American university presses. Today we have much smarter technologies like PCs and Internet browsers, PDAs, smart phones, and dedicated e-reader devices, advance search engines. In this format copying, searching, analyzing and comparing with other books has become easy.

There are accessibility and format problems in e books. They need a common stand for it, in this context in 1999; the Open E-book Forum (<http://www.openebook.org/>) released the Open E-book Publication Structure (OEBPS), which later became the EPUB standard. The purpose was

⁵ Rao, S. 2004, ‘*Electronic book technologies: an overview of the present situation*’. *Library Review*, 53(7), 363-371

⁶ Chrystal, Robert, 2010, *The Evolution of e-Books: Technology and Related Issues*,

⁷ Cited in *UKEiG Guide to ebooks, 2011*

to allow more compatibility between reading devices, computers, and other small handheld computers (*Wilson, p. 5*).⁸

Unfortunately, the largest e-book vendors (Amazon.com and iTunes) are still using their own DRM encrypted formats. This makes it impossible for people to purchase a book made for the device of one bookseller and use the book on another device or computer. This problem has been around for e-books since the 1990s: "Finding a desired e-text in a format appropriate for the technology available is a fundamental problem that has plagued the e-book era, despite the existence of the Open E-Book standard." (*Bell, McCoy, & Peters, 2001, p. 1*)⁹

A new form of electronic text named by UNICODE emerged in 1991 and replaced ASCII because it allowed for multi-lingual translation of texts. After this, and after the World Wide Web, electronic resources and devices began to appear quickly, although most of them did not succeed.

People could search the online catalog by author, title, subject, date, or ISBN. The website was offering excerpts from books, book reviews, customer reviews, and author interviews. People could "leaf" through extracts and reviews, order some books online, and pay with their credit card. Books arrived within a week at their doorstep. As an online retailer, Amazon.com could offer lower prices than local bookstores, a larger selection, and a wealth of product information.¹⁰ (*Lebert, 2009, p. 22*)

In 2005, Google stepped to the plate and showed its interest in e-books by announcing it would scan the contents of several of the country's top libraries in an effort to get the entire world's information online and make it searchable.

⁸ Wilson, R. (2001). *Evolution of portable electronic books, Ariadne,2001(29)*. Retrieved March 4, 2010, from Ariadne Web site: <http://www.ariadne.ac.uk/issue29/wilson/>

⁹ Bell, L, McCoy, V, & Peters, T, 2001, In Library Journal online (Ed.), *E-Books go to college*. Retrieved on 12/09/2012 from Library Journal Web site: <http://www.libraryjournal.com/index.asp?layout=article&articleid=ca213862>

¹⁰ Lebert, M., 2009, *A short history of eBooks*, Retrieved on 30/06/2012 from website: <http://www.etudes-francaises.net/dossiers/ebook.htm>

At last, from 2007 to 2010 several new e-reader devices introduced in the market, most of them using the new E-Ink technology, including the Amazon Kindle 2/DX, the Barnes & Noble Nook, the Sony Reader Touch Edition, and the Plastic Logic Que e-reader. These devices show a lot of promise for readers of e-books, as E-Ink offers readers the opportunity to read on a screen.

Finally, Apple planned the release of its new iPod for April 3, 2010.

Microsoft has declared that by 2020, 90 percent of reading material will be delivered in electronic form.¹¹ (Rao, 2004, p. 363)

1.1.1 A multimedia e-book or a typical e-book

Multimedia is a medium with multiple content forms. According to oxford dictionary “use more than one medium of expression or communication or computer applications incorporating audio and video, especially interactively is called multimedia e book.¹² An e book is a downloadable, electronic file which can include digital text, hyperlinks, images and embedded audio and videos.¹³ Multimedia e book is an open Adobe Flash-based e-book format. Today’s, configuration of various popular forms of media is possible only on the basis of technology of Adobe Flash. A Multimedia E-book has a combination of simple text, audio, images, animation, video, and interactivity content forms. When we use some of the more important formats in books like following described then it is called enhanced or multimedia e book.

- PDF (Portable Document Format)
- Applications
- Fixed layout e-books
- Web apps
- Folio (Adobe Digital Publishing)
- Apple ibooks 2 and iBooks Author

¹¹ Rao, S, 2004, ' *Electronic book technologies: an overview of the present situation* '. *Library Review*, 53(7), 363-371.

¹² <http://oxforddictionaries.com/definition/english/multimedia?q=multimedia> accessed on: 03/07/2013.

¹³ <http://maps.playingwithmedia.com/ebook/> accessed on: 30/06/2013.

According to Shavinina and Loarer¹⁴, a common multimedia application consist some Components mentioned above:

- Text should be including notes, captions, subtitles, and other resources such as tables of contents, indices, dictionaries, and help facilities.
- Have rich data such as tables, charts, graphs, spreadsheets, statistics, and raw data of various kinds.
- Sound or audio should include speech, music, atmospheric background noise, and sound effects.
- Graphics with drawings, prints, maps, and posters to images processed or created entirely within a computer.
- Have images (Photographic), from negatives, slides, prints, or even digital cameras which record photographic images directly as computer graphics.
- Animation.
- Videos and moving pictures specifically, digital video, either converted from analogue film and video, or created entirely within a computer.

So there are many multimedia techniques are popular nowadays. E books also has changed it and updated with these media forms. That type of e books is easily acceptable, interesting, communicate friendly with user. In the age of day by day new versions or formats it is too comfortable to adjust by updating and supporting various formats.

¹⁴ Moreno, R., & Mayer, R. E. 1999, *Cognitive principles of multimedia learning: The role of modality and contiguity. Journal of Educational Psychology, 91*, 358–368.

1.1.2 Components of a ‘good e-book’

There is a basic question raises that what characteristics should be of a good e-book? As we know that e books make study and learning process very easy and interesting, in this way it is compulsory to know that what user demand for. Here learner or user is most important in this whole process so the e-book which contains better content (Multimedia content) and have user friendly supporting tools and techniques would be a called a good e-book.

There are some characteristics are mentioned of a good e-book:

- It should be highly interactive.
- Have highly multimedia content like images, sound, video clips, animation, charts, tables, graphics, maps, slides etc.
- Illustration should be including like images, cartoons, drawings etc.
- E-book should be need base, this is an important feature of that because of learning process depends upon level of learners knowledge so it does matter.
- A good e-book accepts user’s feedback and evaluation. that’s very important in e learning that’s why a good e learning system always accept feedback and tries to make it possible what learner demands for.

Other compulsory thing in e-book is to provide a healthy platform to make easier study of e-book. E-book should be in a comfortable and well known format.

1.1.3 Why is e-book needed at all?

Today many academic institutions are already in the process of implementing the use of e-books within learning and teaching to make study more advance. For that institutions are using a range of devices and platforms to enable learners to access and use e-books to support their learning in the age of growing new technologies and smarter versions of PC’s and mobile phones it has became possible to learn online books.

In past few years, the e-book as a medium for delivering content has become popular and entered the mainstream consciousness of the general public. Through popularity of e-books, the general public has gained better understanding of what an e-book is, the advantages that the e-book format can bring to reading, and the issues that can arise when using e-books and e-readers.

Furthermore, increasing usage of mobile devices such as smart phones and tablets has allowed more people to access and use e-books beyond the traditional confines of the home- or work-based computer.¹⁵ Today rate of acceptance and popularity of e-books technology shows its advantage, so we can study that by following points.

1.1.3.1 Advantages of e book:

- Full text search in a single book or a whole library.
- E-book websites can include the ability to translate books into many different languages, making the works available to speakers of languages not covered by printed translations.
- E book is an intimate combination of text, image, audio and video so it has substantial advantage in e learning.
- Depending on the device, an e-book may be readable in low light or even total darkness. Many newer readers have the ability to display motion, enlarge or change fonts, use Text-to-speech software to read the text aloud for visually impaired, partially sighted, elderly or dyslectic people or just for convenience, search for key terms, find definitions, or allow highlighting bookmarking and annotation.
- It provides 24*7availability of books so that user can access anytime anywhere.
- Safe our traditional, cultural books in disaster. Physical books have not a long life in comparison of e books and damage quickly without proper care. Whenever e books can't have above mention issues and can save our tradition for a long time.
- Remote access outside the physical library, full text searching and copying and pasting of text and images.
- Online E Books provide substantial advantages to libraries and their users. Both parties gain from 24*7 access, simultaneous user access, wider selection, and immediate

¹⁵ According to a short online survey by New Media Consortium (NMC) in 2009, most users of e-books during that period considered the desktop computer as their primary device for accessing e-books. Web Source: <http://archive.nmc.org/news/nmc/7317> Accessed on: 12.06.2013

updates, while libraries also benefit from back-end efficiencies, such as a lack of storage requirements, reduced maintenance costs, and reduced staffing time for physical handling and processing of print books.

- Using e book libraries can save money because they do not have to purchase multiple versions of the same book (large-print and regular print). Digital books do not become damaged, or need to be replaced each year.
- An e-book can be purchased/ borrowed, downloaded, and used immediately.
- Available on cheap prices and exists in a low space. On a single DVD or 16 GB memory card 3000 e books can be uploaded.
- E book has mobility because we can have all time anywhere your computer, mobile or other e book reader. It provides our whole library to use us anytime, whenever with physical book it is not possible to have.
- E books have text to speech (TTS) facility through Speech Synthesis techniques in computer. Speech Synthesis Software's are easily available on internet like Adobe Acrobat. Today many e books also have audio versions. This type of technology is very beneficiary for visually challenged and busy routine peoples that will also make eye strain less.
- The major differences between printed books and ebooks are the ability of users to share their notes and annotations with other individuals, groups, or even make their notes and annotations public. This form of sharing has implications for how learners use books to support their study and to make it more interesting. E books make learners able for share and access notes from other learners on their course or at other institutions. The new technology will change how students approach reading recommended texts and could alter their viewpoint because of the bookmarks, notes and annotations they can view as they read the e-book.

1.2 E-learning and multimedia e-books

Electronic learning (e-learning) is a term for all types of technology- Enhanced Learning (TEL), where technology is used to support the learning. Often the medium of instruction is through computer technology, particularly involving digital technologies. E-learning has been defined as “Pedagogy empowered by digital technology”. In some instants no face to face interaction takes place. E-learning is used interchangeably in a wide variety of contexts. In most universities, e-learning is used to define a specific mode to attend a course or programme of study where the students rarely, if ever attend face to face for on campus access to educational facilities, because they study online.¹⁶

E-learning is Computer based learning, online learning, browser based learning, any electronically delivered learning and have video, audio, images etc. It is a subfield of Advanced Learning Technology (ALT) and uses multimedia computer technologies generally driven by web to enhance ‘anywhere anytime’ learning. It is linked with e-governance.¹⁷

Nowadays a great change in our society to recommended the computer, and the computer related technologies as the most variable educational tools, capable to support a constructive and active kind of learning. The multimedia educational technology seems to fill all these challenges of the new economical, social and cultural environment. Computer or other platforms of multimedia provides knowledge as well as fun for user simultaneously like music, games, and online group discussions so that learner does not lose interest. The computer offers major advantages like mentioned here:

- It provides virtually response to the student without any delay.
- It can record, analyze and react to student responses.
- It has extensive capability to store and manipulate information.
- It has the ability to control and integrate a wide variety of media.
- It is able to serve many individual students simultaneously.

¹⁶ Bhowmik, P (2009) “*Evolving e-learning methods for teaching Sanskrit grammar based on CBSE syllabus for 9th and 10th: a critical study*”, PhD, Submitted in SCSS, J.N.U. New Delhi.

¹⁷ Jha, Girish Nath, (2009) “*e-learning & multimedia for Sanskrit*” presented in workshop on ‘*e-learning & multimedia for education*’ in Special Centre for Sanskrit Studies, New Delhi.

On the basis of some principle benefits of learning through new technologies it is proved that multimedia techniques can make learning process too smart and interactive. E-learning is depending on high quality multimedia content. So what can be a highly multimedia content for a good e learning system? A good Multimedia e book can be beneficiary in a good e-learning system.

According to Jha (2009) Dr. Girish Nath Jha's paper "*e-learning & multimedia for Sanskrit*"¹⁸ a good e-learning system should have following points:

- System should be highly interactive with user and take care what user demands for
- Multimedia content like images, graphics, illustration, sound, videos etc make it interesting for user
- Illustrations and simulations
- E learning system should work according to demand of user (Need based) and keep in mind level of user's knowledge.
- Accept user feedback and evaluations so that system can be updated according to learner's demand.
- Administration
 - Content Development System (CDS)
 - Content Management System (CMS)
 - Learning Management System (LMS)

1.2.1 LMS – Learning Management System

- manage the progress and performance of a multitude of learners
- track and store user performance
- track the number of hits to a certain area of the site
- track the amount of time a learner has spent in a certain area of the course

1.2.2 How to ensure good interactivity

- Static v/s dynamic content: dynamic content like moving pictures, video clips can make good interaction among system and users.
- Components

¹⁸ ibid

- appropriate Graphical User Interface (GUI)
- a user-friendly front-end → Menu based or NLI
 - unimodal (written language)
 - bimodal (speech)
 - Multimodal (speech and gesture)
- user information → RDBMS
- well-structured content → RDBMS
- website driven by a compatible web server

1.2.3 How to ensure good Multimedia content

- MM Authoring tools
 - Corel Draw
 - Flash
 - Photoshop
 - MS FrontPage
 - Dreamweaver
- Multi-Media streaming
 - streaming techniques
 - Flash/java applets
- Illustrations
- Animations

1.2.4 Tools for building e-learning systems

- HTML, Java Script
- Server languages like JSP, ASP, ColdFusion
- Databases (like SQL server, Oracle, MySQL)
- Macromedia dream-weaver
- Macromedia flash, Applets

1.2.5 How it is delivered?

- Stand-alone
- On a LAN/WAN

- On the Web

So e-learning and e-books are interdependent and have same purpose of delivering a standard e-content of learning in a smarter way for user. A book, full of multimedia content is necessity of an e-learning and an e-book also demands for a better platform (or delivery system) to present itself in a better form.

Multimedia method of learning and teaching has the potential and functionality to hold enjoyment for users compared to that of a standard textbook. Learning or teaching should be associated with feelings of pleasure and enjoyment instead of boredom or fear.¹⁹

According to Cognitive Theory of Multimedia Learning (CTML), a study says that students who learn from interactive (graphics and narration) learn more deeply and perform better on problem-solving transfer tests than students who learn from non-interactive texts.²⁰

1.3 E-learning and Sanskrit heritage texts

The oldest text of world literature is in Sanskrit so Sanskrit is counted in one of the oldest language of world. In three oldest languages of world Greek, Latin and Sanskrit, the Sanskrit is the only language which has retained its pristine purity. It has maintained its structure and vocabulary even today as it was in the Ancient time. It can be called “language of consciousness”, counting most of India’s spiritual literature. It was a primary language of intellectual communication in Ancient period. The oldest literature of the world, the Vedas, the *Purānas* and the *Itihāsa* which relate to the Indian subcontinent, are still available in the same form as they were known from the very beginning.

Heritage texts are the only and authentic source of our history, culture, philosophy, religion. Ancient Sanskrit literature reflects contemporary life style, social and political system, judicial system, economic structure and many more so it is necessary today to present this great tradition of knowledge towards whole world. This knowledge tradition is very beneficiary for every

¹⁹ Freeman, J., 1996, *The early development and education of highly able young children*. In A. J. Cropley, & D., Dehn. (Eds.), *Fostering the growth of high ability: European perspectives*, Norwood, NJ: Ablex Publishing Corporation pg. 75-85.

²⁰ Moreno, R., & Mayer, R. E., 1999, *Cognitive principles of multimedia learning: The role of modality and contiguity*. *Journal of Educational Psychology*, pg. 358–368.

human that's why everyone can be benefitted. In Indian perspective let we know our ancient thoughts, recognize it and deliver it in new generation. It is very necessary today to transfer values, morals, our culture, tradition and knowledge into our children.

1.3.1 Why e-books for Ancient Indian Heritage (AIH) texts:

Sanskrit is not only a language; it is an ocean of knowledge of various domains. It is a treasury of Spiritual knowledge, philosophy, literature, mathematics, physics, astrology, medicine, economics and almost every area of this phenomenon and also has knowledge of beyond. Now it is compulsory to know that how Sanskrit is useful for human being then it is very simple to judge to present this language of knowledge in e-book form so that it can be approachable for learner. Today many of Sanskrit texts have only few copies in far away in some parts of India's libraries. These texts are too away and waiting for readers and many readers are in search of texts like these, so need is to make digitization of respective texts. In this row all first it has to know the statues and importance of Sanskrit discourse.

1.3.1.1 Status of AIH Sanskrit texts

Sanskrit has some unique features, they are following:

- Language of Intellectual Tradition
- The oldest documented language of the Indo-European family
- No area or domain of knowledge remains out of it
- Unbroken literary, linguistic, philosophical tradition
- Highly precise, rule based, standardized and Sanskrit has formal structure.
- The precise and extremely well defined structure of Sanskrit
- Sanskrit differentiates itself in that it is the only known language which has a built-in scheme for pronunciation, word formation and grammar.
- Panini's grammar is the only complete grammar of any human language (or NL) so far
- The only Natural Language (NL) in the world to have formal model of grammar that useful in computing. Computer needs a formal language to access so Sanskrit has the ability
- Panini's grammar executes like a code, it is able to encode in computer

- Sanskrit has very rich linguistic tradition like concept of vāka (vākasūkta), in vedāngas śikṣā (rules of pronunciation), vyākaraṇa (grammar rules), nirukta (etymology).
- Knowledge representation techniques likes karaka based expectancy and nyāya based specifications.
- Huge body of *Sāhitya* (literature) many of which laid the foundation of Indological studies in the west
- Scientific principles have been hidden in the verses found in the Vedas, Upanishads and the great epics of India.
- Language of humanity that's why teaches us to apply universal approaches
- Inter-disciplinary approaches

1.3.2 Need of e-learning for Sanskrit in digital age of learning

After over viewing on the richness and unique tradition of Sanskrit it seems very compulsory to preserve the rich source of intellectual tradition and spread it. All of this is possible through digital or e-technologies so make e-books for our heritage texts.

1.3.3 Status of Sanskrit in digital age²¹

Major Sanskrit texts are:

1.3.3.1 Sanskrit Wikipedia

- Sanskrit Wikipedia (Sanskrit medium Wikipedia) <http://sa.wikipedia.org>
- Sanskrit wiki source (Sanskrit e-texts)
- Sanskrit dictionary (Sanskrit encyclopedia)
- Sanskrit wiki Books (Sanskrit e-library)

²¹ Jha, Girish Nath, (2010) '*E-learning and Multimedia for Sanskrit*', presented in workshop on E-learning and Multimedia for Education, at Special Centre for Sanskrit Studies, JNU, November 3, 2010 in collaboration with Communication & Information Services, JNU.

1.3.3.2 Sanskrit digital libraries

- DLI project (<http://dli.iiit.ac.in/>) 1022 Sanskrit books (IISc, CMU,NSF,ERNET,MCIT)
- NSF funded, Brown University (<http://www.sanskritlibrary.org/>)
- Clay's project (<http://www.claysanskritlibrary.org>) JJC foundation, NYU Press
- INRIA, Paris (technical texts, tools)
- IGNCA (<http://ignca.nic.in/sanskrit.htm>)

1.3.3.3 Sanskrit e-documents

- Maharshi Mahesh Yogi (<http://sanskrit.safire.com/Sanskrit.html>)
- Avinash Sathaye - Sanskrit documents list(<http://sanskritdocuments.org/>)
- Srinivas Varkhedi – Sanskrit corpus (<http://rsvidyapeetha.ac.in/>)
- Oliver Hellwig (Univ of Berlin)
- Anand Mishra (<http://sanskrit.sai.uni-heidelberg.de/>)
- <http://sanskrit.jnu.ac.in> – 140 samples of ordinary Sanskrit

1.3.3.4 Sanskrit documents

- Tirupati Vidyapeeth
- ASR Melkote
- CDAC- heritage computing group

1.3.3.5 Sanskrit blogs

- JNU students
- Others (<http://sanskritlinks.blogspot.com>)

1.3.3.6 Sanskrit tag-set

- JNU (143 tags for labeling Sanskrit e-text)

1.3.3.7 E-learning resources: static

- Himanshu Pota (<http://learnsanskrit.wordpress.com/>)&
<http://www.ee.adfa.edu.au/staff/hrp/personal/sanskrit/>
- American Sanskrit Institute (<http://www.americansanskrit.com/>)
- Acharya, IITM (<http://acharya.iitm.ac.in/sanskrit/tutor.php>)
- Vasudev Bhatt (http://www.ourkamataka.com/learnsanskrit/sanskrit_main.htm)
- Sanskrit Bharati (<http://www.sanskrita-bharati.org/newsite/index.php>)
<http://sanskritbhasha.blogspot.com/>

1.3.3.8 e-learning resources: dynamic

- **Tutorials**
 - Sudhir Kaicker (<http://www.sanskrit-lamp.org/>)
 - Prof. G.V.Singh (CASTLE project of DoE)
 - Peter Scharf
 - Avinash Sathaye
 - Sanskrit CD (Mahesh Kulkarni, CDAC Pune)
- **Language processing tools**
 - Gerard Huet
 - Amba Kulkarni

- Peter M Scharf
- Girish Nath Jha
- Anand Mishra

1.3.3.9 Sanskrit E-learning R&D at JNU:

Goals

- compare and contrast the current teaching/learning practices for Sanskrit with those of e-learning
- evolve e-learning methodologies for secondary level Sanskrit teaching based on CBSE pattern
- content creation and e-learning modules development for secondary level CBSE pattern
- Organize workshops to train the teachers and the students in selected schools.

1.3.3.10 work done so far

- Based on a questionnaire, collected teacher/student feedback from selected south Delhi schools
- Some grammar and comprehension modules were developed
- The students can learn and practice grammar
- Can read comprehension with machine helping when needed
- DIT funding for multimedia/e-learning for popularizing Sanskrit

1.3.3.11 Required tools and techniques for Sanskrit e- learning

- Preparing lessons, learning modules
 - will require Input-Output tools, editors, spell checkers

~ 21 ~

TH/22/11

- Electronic storage and preservation of Sanskrit corpus
 - Automatic reading of manuscripts (OCR)
- Easy access of texts/knowledge
 - Sanskrit computational lexicography, search engines, indices, glossary etc
 - Textual interpretation
 - Sanskrit-Indian languages Machine Translation
- Learning Management System

1.4 Importance of e-books for Sanskrit (AIH) texts

Sanskrit has a great tradition of texts in every domain and area of knowledge. There is a great tradition of thinkers exist but due to mismanagement and care of ancient texts, today many text not found in original (proper) form. Thousands of manuscripts are waiting for reading or digitizing. So now it is most important to accept new technologies for preserving and presenting our heritage.

1.4.1 To preserve ancient tradition:

Main target for making digital version of heritage texts is to preserve texts of intellectual tradition, thinkers and commentaries. Many of Sanskrit texts today found in damaged condition and only have few copies in all over India so it is compulsory to digitize precious texts of heritage. Automatic reading of manuscripts (OCR) is digitizing manuscripts. We have a great phonology in our *vedas* (*sāmaveda*) and there are only a few scholars remain they can properly pronounce verse of *vedas*. Here idea is that using by e technologies or multimedia tools our textual tradition can be safe and deliverable for new generation.

1.4.2 Make easy learning for worldwide

E-learning tools and techniques will provide a better platform to learn Sanskrit and make easier for new learners of Sanskrit. In the context of smart e books for Sanskrit, software's and tools

will be develop for Sanskrit like Input-Output tools, editors, spell checkers that would make searching, writing, processing very easy. E-books will make accessing comfortable of using by Sanskrit computational lexicography, search engines, indices, and glossary.

1.4.4 Research aspect

Representative text of knowledge of philosophy, linguistic, *āyurveda*, mathematics, astrology, science and many more has become popular today and it is needed today to present those in digital form. Sanskrit has some base areas of research like literature, philosophy, science, language and grammar and computational linguistics and also has interdisciplinary approaches like in Science, Computer science, yoga, Machine translation for Indian languages techniques of textual interpretation (*mīmāmsā* rules) of discourse.

Chapter 2.

Śrīmadbhagavadgītā in the
Digital Age

Chapter 2.

Śrīmadbhagavadgītā (SBG) in the Digital Age

2.1 SBG: an introduction

Śrīmadbhagavadgītā is part of the Indian heritage text MB (epic). As part of MB famous conversation between lord kṛṣṇa and Pāṇḍavas Prince Arjuna in *Bhīṣma parva, Adhyaya* (chapter) 25 to 42 (18 chapters) are known as SBG. SBG comprises 18 chapters and have 700 verse scripture. SBG, being a part of the MB, is also ascribed to sage *Vedavyāsa*. There is dissimilarity in opinions and theories on the date of composition of the SBG. Most of Scholars accept dates from fifth century to second century BCE as the probable range. An eminent SBG scholar Kashi Nath Upadhyaya¹, on the basis of the estimated dates of MB, *Brahmasūtra*, and other independent sources, concludes that the SBG was composed between fifth and fourth century BCE.

Starting point of SBG is the battle field of MB, *Kurukṣetra* ground there Pāṇḍavas and Kauravas have collected for war. There Arjuna gets emotional to see his cousin (Kauravas), teacher Droṇācārya, grandfather Bhīṣma and many more of his relatives. This conversation between kṛṣṇa and Arjuna has great importance for all conscious and unconscious elements (parts) of the universe. Here *Kurukṣetra* is called *Dharmkṣhetra* because the war represents a critical condition like everyone faced in the battle of life and Arjuna is representative of every common man who is living and facing all these conditions.

SBG literally means **Song of the Absolute**. It is a conversation between Arjuna and kṛṣṇa, which took place around 3000 B.C. in a battlefield of *Kurukṣetra*. Here kṛṣṇa represents the Supreme Being and Arjuna represents an ordinary living being like us. Through Arjuna's questions and kṛṣṇa answers, the complete science of *Yoga* is revealed. It is considered a science because it describes the concept of *Yoga* in a systematic step-by-step way.

¹ http://en.wikipedia.org/wiki/Bhagavad_Gita#cite_note-4; accessed on 04/07/2013.

SBG is the book of universal knowledge. This text is called by various names like *Bhagavadgītā*, *Śrīmadbhagavadgītā*, *Gītapaniṣad* because it is the song of lord Kṛṣṇa. SBG is counted in *Smṛti prasthāna* of *Vedānta* philosophical tradition because it is the text of duties and religion (*dharma*) of human beings.

2.1.1 Tradition of Thinkers, Commentaries, Translations and Publications on Respective Text

There are lots of thinkers of SBG who did commentaries on this. Many thinkers commented on this with different aspects, as - *bhakti yoga*, *karma yoga*, *jñāna yoga* etc. Mainly the commentaries are based on this mentioned view but another classification is based on Classical, Modern, Independence movement, Hindu revivalism and Neo-Hindu movements and others.

2.1.1.1 Classical Commentaries

SBG integrates various schools of thought like *Vedānta*, *Sāṅkhya*, *Yoga* and other theistic schools. Therefore, it remains a popular text for commentators belonging to various philosophical schools.

- The oldest and most influential medieval commentary was that of the founder of the Vedanta school of extreme "non-dualism", ādi Śamkara (788–820 A. D.), also known as Śamkarācārya.²
- Rāmānujācharya's commentary chiefly seeks to show that the discipline of devotion to God (*bhakti yoga*) is the way of salvation.³
- Madhvācārya, wrote a commentary *Gītā bhāṣya* on the *SBG*, which exemplifies the thinking of the "dualist" school.⁴
- In the Śaiva tradition, the eminent philosopher Abhinavagupta (10–11th century CE) has written a commentary on a slightly variant recession called *Gītārtha-Samgraha*.⁵ Many

² http://en.wikipedia.org/wiki/Bhagavad_Gita#cite_note-88 : accessed on 07/07/2013

³ http://en.wikipedia.org/wiki/Bhagavad_Gita#cite_note-92 : accessed on 07/07/2013

⁴ http://en.wikipedia.org/wiki/Bhagavad_Gita#cite_note-Zaehner.2C_p._3-90 : accessed on 07/07/2013

others scholars also commented (*bhāṣya*) on this. Nimbārka (1162), Vidyadhirāja tīrtha, Vallabha (1479 CE), Madhusūdan Saraswatī (*gūdārtha dīpikā*), Raghavendra Tīrtha, Vanamali Mishra, caitanya Mahāprabhū (1486 CE), while Dnyanashwar (1275–1296 CE) translated and commented on the SBG in Marathi, in his book *Dnyanashwary*.

2.1.1.2 Modern Commentaries

Sri Aurovindo, Dr.Radhakrishnana, swamy Vivekananda and Ekanath Easwaran are the main commentators of this class. According to the modern problems of life they tried to apply the theory of SBG. Such commentaries are very popular in this era.

2.1.1.3 Independence Movement

In the Independence movement freedom fighters or patriot persons needed indigenious basis for the action. Here SBG provided some aspects. Mainly they get inspiration to fight against injustice which was the one of the greatest purpose to be independent. To be helped by common Indian people, essential duty was to make them vigilant. Till this time SBG had become a basic text of knowledge and action so the term of in justification in society was preferred. Bal Gangadhar Tilak, Mahatma Gandhi and other several nationalists accepted this path.

2.1.1.4 Hindu revivalism and Neo-Hindu movements

Swamy Cinmayananda, Bankim Chandra Chattopadhyay and Sivananda are the famous commentators of this class. These types of commentaries helped the people to be self confident, empowered, and courageous, also to know about the purity, perpetuation, and necessity of Hinduism. Their purpose was to reveal the originality and destroy the rumours of *Sanātana*. SBG provided such glorious terms to get the destination.

2.1.1.5 Scholarly Translations

Charles Wilkins did the first English translation of the SBG in 1785. In 1981 more than 40 English translations were listed by Larson. The SBG was also translated into other European languages. Braille version of the scripture, with the original Sanskrit text and a Hindi commentary was also released by Swamy Ramabhadracharya in 2007.

⁵ http://en.wikipedia.org/wiki/Bhagavad_Gita#cite_note-96 : accessed on 07/07/2013

2.1.1.6 Publications⁶

The total number of verses in SBG has been a controversial topic. Followers of ādi Śamkarācārya accept 700 verses in the SBG because Śamkara commented on these. Here 1 verse of Dhṛtarāṣṭra, 40 of Sanjaya, 80 of Arjuna and 579 of lord kṛṣṇa. Many publications have been included in this. Due to that its number increases.

1. According to Ganpat Krishna ji publication, Mumbai- kṛṣṇa -620, Arjuna-57, Sanjaya-67 and Dhṛtarāṣṭra -1 = total 745 veases.
2. Madras publication also follows this.
3. But Kolkata publication is different from both. It is as per ādi Śamkarācārya.
4. Geeta press Gorakhpur publication supports the Kolkata publication. Here also we have 700 verses. Nothing is clear about 45 extra verses. Half parts of many verses are found in different places.

2.1.2 Text of Universal Knowledge

The main theme of *Vedas* and *Upaniṣad* is delineated in SBG.⁷ *Vedas* and *Upaniṣads* are sources of great knowledge, which helps us liberate and to know ultimate reality. SBG has essence of such knowledge because it is song of the lord. After studying this text no area of knowledge remains to be gained.⁸ SBG delivers a deep knowledge in a very simple manner. SBG says nothing is pure as knowledge.⁹ The SBG is compared to a cow endowed with the rich milk containing the essence of the teachings of the *upaniṣad*. Lord *Kṛṣṇa* is compared to a skilled milkman who brings out that precious milk for the wise people (scholars) and Arjuna is compared to a calf, without which it is not possible to milk the cow easily. The theories and ideas of SBG prove that this text is not only related to specific region or religion but it's preaches are useful for humanity and its relevance is in all times and places.

⁶ Gairola, Vacaspati, 1978, '*Sanskrit Sāhitya kā itihāsa*' Chowkhamba, 3rded, Varanasi.

⁷Sarvopaniṣdo gāvo dogdhā gopālanandanah|
pārtho vatṣ sudhirbhoktā dugdham gītāmṛtam mahat|| *Gītāmahātmyam* 6

⁸ Gītā sugītā kartvya kimanyaiḥ sāstravistaraiḥ|
Yā svyam padmanābhasya mukhapadmādviniṣṛtam|| *Gītāmahātmyam* 4

⁹ Na hi jñānena sadṛśam pavitramih vidhyate... *SBG* 4.38

SBG presents the ambient theory of *yoga*. Here *yoga* indicates to the path (*mārga*) to get the ultimate goal of human life. Here *yoga* means pureness in speech and action. This type of action is called detachment from the results of the action. The Sanskrit word *Yoga* comes from the verb root *Yuj*, which means to link or to connect. Here question is that what is connected with what? Two separated things are necessary for the connection. The text SBG explains that these entities are the individual consciousness and the universal Supreme consciousness and SBG explains that we do become one, but in quality and not in quantity.¹⁰ This oneness is spiritual, not physical. Here eighteen supporting *yogas* –

Chapter no.	Type of <i>Yoga</i> and chapter's name
1.	अर्जुनविषादयोगः
2.	साङ्ख्ययोगः
3.	कर्मयोगः
4.	ज्ञानकर्मसंन्यासयोगः
5.	संन्यासयोगः
6.	आत्मसंयमयोगः
7.	ज्ञानविज्ञानयोगः
8.	अक्षरब्रह्मयोगः
9.	राजविद्याराजगुह्ययोगः
10.	विभूतियोगः
11.	विश्वरूपदर्शनयोगः
12.	भक्तियोगः

¹⁰ Paul, Goutam , 'The Ultimate Science of Yoga' Retrieved website:
<http://www.cs.albany.edu/~goutam/ScYogaCamera.pdf> : accessed on 06/07/2013.

13.	क्षेत्रक्षेत्रज्ञविभागयोगः
14.	गुणत्रयविभागयोगः
15.	पुरुषोत्तमयोगः
16.	दैवासुरसंपद्विभागयोगः
17.	श्रद्धात्रयविभागयोगः
18.	मोक्षसंन्यासयोगः

(Table no. 2.1; Types of *yoga* in *SBG*)

Three primary *yoga* systems among all these *yogas*, are considered to be the most prominent: namely, *jñāna yoga* – the path of knowledge, *karma yoga* – the path of action and *bhakti yoga* – the path of devotion. The first six chapters of *SBG* deal primarily with *karma yoga*, the next six with *bhakti yoga* and the last six with *jñāna yoga*. Except this *yoga*, nothing else is to represent any theory in the universe.

2.1.3 Source of Knowledge of Various Domains

It is not a general text in which a particular topic is focused. It is base of many Philosophical schools or thoughts what become another generator and string. The influence of the *SBG* extends well beyond India and the Hindu religion. Based on the *SBG*, specific models for administration, management, and leadership have been described¹¹. Indian tradition again extolments that *SBG* is the main base of others systems or other systems are the dimensions of *SBG*¹². Some new thinkers of *SBG* explains that these followings are well defined there which are the main source of many *sāstras*- knowledge of life, emotional regulation, control over desires, decisiveness, love of and faith in the God, duty and work, self-contentedness, compassion and sacrifice, insight/humility. Being one of the *prasthāntrayī* (*smṛatiprasthāna*) it is an independent text.

¹¹ Sharma , 1999, Destroy user interface control

¹² *Gītāmāhātmyam* 4

2.1.4 Popularity of the text

As we know this text has been popular from the beginning time. There are a lot of reasons of that. Brevity is one of them. *Ved Vyas* thought that it may be very difficult for the coming generations to read all this. Everybody may be very busy. There may be chances that someone may forget the basic reasons of writing MB. So he tried to cut long story short. To make it short he has to explain at least characters. So in chapter 1 he explained all major characters of the story. He took name of all main important actors of the story and explained about scientific and technical developments of that time unknowingly or knowingly. He also explains the social aspect of war. Another reason is that it's daily practicable. Because it tells about ways of living and to justify you decisions. It tells that sometime we have to stand against our near one due to their wrong or unlawful acts. In that case what we should do and what not?

One another problem with Sanskrit text to be difficult in language is beyond from this SBG. It's also a great fact. Its Sanskrit language is very common, general grammar rules, general metre (*Candas*) words of praxis are the very helpful to understand the main theme this tremendous book.

SBG answers a number of questions about our daily lives like about our behavior with our parents, brothers, sisters, duty of a son, duty of a husband and lot more. This complete book not only tells about men but women also. All these things are interlinked.

War symbolizes the war in the mind of every human being who is so engaged in problems of life that he/she is unable to understand what is right and what is wrong. Here Krishna tells us the moral behavior of a good human being. He explains everything from love to hatred, joy to sorrow, and materialistic life to spiritual life.

This part mention about why is the text too popular and readable. There are some features about the structure of text which makes it very interesting in general public and in scholars. These are following:

1. It is very short text and explains all topics in 700 verses. Very deep thoughts and broad ideas of *upaniṣada* and *Vedas* are collected here in precise form.

2. Very simple and *laukika* Sanskrit is used in this text which is too easy to understand. Hard language of *Vedas* changed into a sweet way.
3. The *anuṣṭupa* metre (*Canda*) is very easy to chant and continue what is used.
4. There are not irrelevant (*pada doṣa*) terms.
5. Theory, thoughts and knowledge of SBG are usable forever, can say beyond time and place.
6. To learn Sanskrit SBG has been practiced because it keeps many more similar examples on the same base and same place. *Paṇinian* system what indicates in a least formula or *sutra* but it needs more practice to follow and observe the many conditions. Such examples are available in the text-

पश्यञ्शृण्वन्स्पृशञ्जिघ्रनश्नन्गच्छन्स्वपञ्श्वसन्।

प्रलपन् विसृजन् गृहणन् उन्मिषन् निमिषन्नपि॥¹³

Here all examples present the more forms of a critical suffix (śatṛ).

7. To understand any language it seeks for a structure. Sanskrit is a case oriented language. Its terms can be kept anywhere in a sentence so *anvaya* is necessary to make it in SOV line. SBG instructs many verses on the base of case to observe the proper meanings of them. Same *vibhakti* of many words are used at same place to know the different forms. Like here -

? ? ? मनसा बुद्ध्या केवलैरिन्द्रियैरपि।

योगिनः कर्म कुर्वन्ति सङ्गं त्यक्त्वात्मशुद्धये॥¹⁴

Here different forms of (*tratiyā vibhakti*) are indicated in three genders in common sequence.

¹³ SBG 5.8-9

¹⁴ SBG. 5-11

8. Its grammar is not tough like other Sanskrit texts. Here communicative language maintains simplicity. Only essential compound words are used to make it easiest.

9. Use of very simple or *laukika* Sanskrit words keep it far from the Etymology. *Bhāṣyas* are done on the purpose not the words. Interesting sounds are the helpful for meditation and devotion.

10. The difficult language of *upaniṣada* and the *Vedas* are kept in simple terms. About the Self (Atman) *Kāthopaniṣada* goes to tough language - हन्ता चेन्मन्यते हन्तुं, हतश्चेन्मन्यते हतम्¹⁵
Instead of this SBG represents it in a normal language - य एनं वेत्ति हन्तारं, यश्चैनं मन्यते हतम्!¹⁶

11. Rich and long tradition of thinking of SBG with many commentaries made it very popular.

2.1.5 Relevance of the SBG

This is human tendency and curiosity to know about we are going to done. So before learning any text it is basic requirement to knowing its relevance. SBG is the most popular text translated in almost languages of world. The knowledge of the text is useful for humanity and not related to any religion, community, place or other particular. Previous point describes importance and popularity of SBG on the basic of its structure. This point is based on relevance of knowledge of SBG then and now. Related points are following:

1. The SBG teaches us to be action oriented not to the goal oriented. Neither be the reason nor the action less of goal. This mentality is the best theory to destroy sorrow.

2. It says to be restlessness. Human should be always full with action. Lord Kṛṣṇa says - he cannot even for a moment remains really inactive. For the qualities of nature will compel him to act whether he will or no¹⁷.

¹⁵ *Kāthopaniṣada*, 1.2.19

¹⁶ *SBG*, 2.21

¹⁷ *SBG* English translation by Purohit Swamy

3. The social system is well explained what is the best model forever. It is based on action. Four categories are defined that indicates four types of action (*Karma*). Lord Kṛṣṇa says –There are four divisions of society were done by me according to the natural distribution of quality and instincts¹⁸. According to the ability of people action is divided. Action is the *dharma* and *dharma* shouldn't be changed¹⁹

4. *Yoga* is defined as path. Again says “*yogaḥ karmasu kauśalam*²⁰”. The duty is accepted should be done well because the *SBG* says duty for duty's sake. Before selecting the duty people should examine their ability, for the liberation *yoga* is necessary and *yoga* needs expertness in action. This theory is relevant to be followed by the youth in this era. Everyone has desire to be established in the high level. According to the ability they aren't selected and it happen the great reason of miseries and frustration. The *SBG* preaches to be desire-less in action not from action.

5. A famous term of *SBG* is (*Sthitaprajña*). In this stags *Yogin* feels beyond doer himself. Here result doesn't effect.

2.2 Need to Present SBG in Multimedia Form

It is very clear to say that *SBG* is counted in one of the most popular book which has its deep in our thoughts, ideas and whole life style for a long time. No book of Indian tradition as *SBG* which has affected thoughts and lifestyle of Indian mind. *SBG* is being always subject of interest for Indian and foreign scholars because of different point of views and its approach in many domains of knowledge. Foreign scholars and specialists of other different fields are showing a great interest to research in respective text.

So there are sufficient reasons to present *SBG* in an interactive form so that text can be beneficial for world-wide learners. Multimedia technologies are able to fulfill demand to make learners friendly and multimedia version of *SBG*. Whenever text of *SBG* has very simple meaning but it has a depth of subject matter.

¹⁸ *Chāturvarṇyam mayā sṛṣṭam guṇakarmavibhāgaśḥ. SBG, 4.13*

¹⁹ *Śreyānasvadharmo viguṇaḥ, SBG, 3.21*

²⁰ *SBG, 2.40*

2.2.1 Easier Presenting of Great Preach of SBG

SBG is translated in probably all languages and most readable spiritual text. As it is above mentioned that SBG have excellence of ideas like as Management, Administration, *Yoga* (mental), psychology, motivation, self confidence, self-control, leadership, and taking correct steps when called for, communication skills, attitude towards work, decision making, planning, correct vision, achieving goals in life, mutual co-operation, knowledge, justice, clarification of aims, determination and many more values can be inculcated among students through SBG.

Now it is needed to present this great knowledge in a simple and interesting way like through charts, graphics, tables, images, audio and video. However the text has some multimedia versions like audios, videos of some parts and simple e-text. Multi-dimensional search engine for *SBG* based on Java servlets on Apache Tomcat and RDBMS techniques can make study of text very interesting. Our mean by Multi-dimensional search engine is to present the text through different types like search by *Adhyāya*, *śloka*, numerical order of text and search by any word (string), meaning. The system makes study too smart. System provides grammatical knowledge of text simultaneously for user.

So multimedia technologies can make the concepts and theories of SBG very simple and make able to study the text for a general public and for who have not Sanskrit background. It would also helpful for interdisciplinary studies.

2.2.2 E-learning Aspect of SBG

SBG is most demanded Sanskrit text for online learning. Online learning system of SBG can be very useful for Sanskrit e-learning because -

1. SBG has very easy Sanskrit words in grammatical point of view so an effective Sanskrit teaching can be done.
2. Meaning of words is very easy to understand,
3. Easy verses (*śloka*) of SBG make purity pronunciation. Almost *verses* are in *anuṣṭupa* metre so good practice of Sanskrit production can be done.

Make need base different types of versions of SBG like e-books, multimedia e-books and Multi-dimensional search engine for good e-learning system of SBG. E-book will make easy

accessibility and approachable for all who need it and not able to read and understand concepts of SBG.

2.2.3 For Research Purpose

This multimedia version of SBG will react as model for all heritage texts. Our text of heritage can be save using by multimedia technologies. This work will provide a new dimension for research in the field of Computational Sanskrit. SBG is always interesting text for foreigner's as part of Indological studies. This version would be world-wide for online study of Sanskrit.

2.2.4 To Entertainment and Delivering our Heritage in New Generation: in Special Case of Children.

Our new generation is up to date with latest technologies. Most of schools in developed countries have been adapted digital techniques of learning. E-books are accepted very quickly today. It is observed that from the very early age children prefer to use digital instruments like cartoon, video games. Here western culture is dominating and replacing our culture and values. So there is an idea to deliver our heritage, culture, morals and values in new generation. Some efforts in this area has very successful like *Ganesa, chota bheem* etc.²¹ SBG is full with idea of duties, morals and values as well as great scope of animation. It presents great story of war like chapter one is full with the scene of war.

2.3 Existing Multimedia forms of SBG

Almost versions of the texts and some famous commentaries are available in various digital-forms. Although most of digital forms of SBG are available only in scanned format but some e-versions are using multimedia based technology like sound, animated images etc. SBG also available in different digital or multimedia forms, these forms can be categorized in following parts:

²¹ <http://www.youtube.com/watch?v=fEgQff6XuBo> accessed on 10/07/2013

2.3.1 Movies on SBG

1. **Bhagvad Gita: Song of the Lord** is a 1993 Sanskrit film directed by G. V. Iyer. The film won Golden Lotus Award in 1993 in best film category.²²
2. **Adi Shankaracharya** is a 1983 Indian film in Sanskrit language directed by G. V. Iyer.²³ The film depicts the life and times of 8th century Indian philosopher, ādi Śamkarācārya, who consolidated the doctrine of *advait Vedānta* in Indian philosophy. It was the first film in India to be made in Sanskrit.

2.3.2. Video versions of SBG

1. http://www.youtube.com/watch?v=20CAZWAL_DE²⁴, a collector's CDROM made for Chimco Infomedia. This CDROM title was a mega project that detailed from the epic poem, *SBG*, recitation all the 700 verses. The CDROM had vivid illustration, original music score, interactivity, animation and much more. For more detail we can access on- <http://www.santanu.biz>.²⁵
2. <http://www.sriurobindosociety.org.in/saspub/sasavcdrom.htm>²⁶, Multimedia CD of SBG prepared by Sri Aurobindo Society. Purpose to preparing a multimedia CD-ROM is to present the SBG in the light of sri Aurvindo based on his commentaries. This CD is useful for spiritual seekers but it has not animation.
3. <http://www.indiamart.com/company/2118511/products.html#srimad-bhagavatam-cd>²⁷, a multimedia CD of SBG of Ten Cantos prepared by Krishna software

²² http://en.wikipedia.org/wiki/Bhagavad_Gita_%28film%29 : accessed on 06/07/2013.

²³ http://en.wikipedia.org/wiki/Adi_Shankaracharya_%28film%29 : accessed on 06/07/2013.

²⁴ Website accessed on 10/09/2012

²⁵ Website accessed on 10/09/2012

²⁶ Website accessed on 09/09/2012

²⁷ Website accessed on 11/09/2012

incorporated, Surat, Gujarat. It has around 500 full-screen colour pictures associated with many of the verses.

4. The Bhagavad Gita - Kids Animation Cartoon Movie – Literature, have cartoon static images.url is- <http://www.youtube.com/watch?v=qTZFolAfels>²⁸

2.3.3. Audio Versions of SBG

1. <http://www.gitainternational.com/hindi-audio.htm>²⁹, by International Geeta Society, all 700 verses of Bhagvad Gita are available in roman script. It is also an e book with introduction, original Sanskrit text and Roman transliteration, a lucid English rendition in two colors, paragraph headings explanation with verses from other religious scriptures, and Index.
2. http://sanskritdocuments.org/links2_gita.html³⁰, prepared by Sanskrit documents.
3. http://www.youtube.com/watch?v=i_U7e6Tpiro³¹, Audio in video text form with Hindi translation.
4. http://www.yatharthgeeta.com/download_eng.htm³², *Yathartha Geeta*, by Shri Paramhansa Swami Adgadanand ji. Recorded in various Indian and foreign languages.

2.3.4. E-texts of SBG

Various Sanskrit texts are available online; some important sources are cited here where SBG [1, 2, 3, 4, 5, & 6] is also available on following links. E-texts of SBG are available scanned and in PDF format.

²⁸ Website accessed on 07/07/2013

²⁹ Website accessed on 11/09/2012

³⁰ Website accessed on 08/09/2012

³¹ Website accessed on 08/09/2012

³² Website accessed on 07/09/2012

1. **IGNCA** (Indira Gandhi National Centre for the Arts) have digital library there SBG is available in PDF format with the commentaries of Ramanuja, Shankara, Shridhara, Vishvanath, Balacharya and Madhusudana Saraswati.³³

2. **Maharshi Mahesh Yogi, Sanskrit e-texts and Stotras,**

Study Sanskrit, read Sanskrit texts, listen to Vedic pundits chant, or read Sanskrit humor. This site contains a wide variety of Sanskrit texts and *stotras* in the pdf format, which can view or print for personal use. Most of the texts are in Devanāgarī script, some with English translation. SBG, *devī Mahātmyam*, all of the *sahasranāma stotras*, and several other texts are also encoded in transliteration. The SBG presented in normal print-size and large print-size, as well as a translation of the first 6 chapters by his holiness maharishi Mahesh Yogi.³⁴

3. **Indology**: under the program of Indological virtual e text archive are available in PDF form, so there is a collection of various Sanskrit typed or e-texts, SBG also.³⁵

4. **Sanskrit web-net**, a collection of various Sanskrit typed or e-texts.

This large-print Devanāgarī edition also including the transliterated text and downloadable as 'Gita-big.pdf,' is designed for (a) readers with bad eyesight, (b) learners of the Devanāgarī script, (c) designers interested in Devanāgarī calligraphy. The Devanāgarī text of this large-print edition is typeset in 24 point "Sanskrit 2003" on 32 point body.³⁶

5. **International Gita Society**

Publish and distributed, free if possible, the SBG in simple and easy to understand languages, and put SBG in libraries, hotels, motels, schools, prisons and other public

³³ <http://ignca.nic.in/sanskrit.htm> : Website accessed on 05/07/2013

³⁴ <http://sanskrit.safire.com/Sanskrit.html#Gita> : accessed on 04/07/2013

³⁵ <http://indology.info/etexts/archive/etext/> : accessed on 04/07/2013

³⁶ <http://www.sanskritweb.net/sansdocs/#GITABIG> : accessed on 05/07/2013

places.³⁷ Spread the basic Non-sectarian Universal teachings of The SBG and other Vedic scriptures in easy to understand languages by establishing branches of the Society in other countries to be named as: International Gita Society (IGS) of that country.

6. Sanskrit Documents

Avinash Sathaye, SBG is available here on PDF, TXT, PS, Critical Word Index ITX etc formats with its commentaries. web link is -

http://sanskritdocuments.org/doc_giitaa/doc_giitaa.html³⁸

7. The Sanskrit Library

<http://www.sanskritlibrary.org/tomcat/sl/>³⁹

8. Rastriya Sanskrit Sansthan, New Delhi

<http://www.sanskrit.nic.in/ebooks.htm>⁴⁰

9. Samskrutam.com⁴¹

Have texts of literature, Sanskrit tutorials, article journals, online group etc. SBG is available as part of MB. It is an effort to spread Sanskrit using the available online technology; and aims to provide an effective source of learning and knowing Sanskrit language and literature.

10. Clay Sanskrit Library

<http://www.claysanskritlibrary.org/>⁴²

³⁷ <http://www.gita-society.com/pdf/sanskrit-verses.pdf> : accessed on 05/07/2013

³⁸ Website accessed on : 05/07/2013

³⁹ Website accessed on : 05/07/2013

⁴⁰ Website accessed on : 12/09/2012

⁴¹ <http://samskrutam.com/sanskrit/about-us.aspx?section=homecontent> : Website accessed on : 12/09/2012

⁴² Website accessed on : 12/09/2012

11. Srivaishnava Cyber Satsangh

Tamil society based on Rāmānuja School of philosophy, provides Sanskrit text online and its Tamil commentary *Adhawin*.⁴³

12. <https://sites.google.com/a/srimadbhagwatgeeta.com/chapter1/>

Accessed on 04/07/2013, above link provides only 1st chapter of *SBG* and English translation of text.

2.3.5. Blogs or online sources

1. <http://krishnabhagwadgeeta.blogspot.in/>

Accessed on 04/07/2013; the online link provides scan plan text of *SBG* in PDF format. Text is downloadable and has Hindi translation.

2. <http://archive.org/details/SrimadBhagavadGitaRahasya-BgTilak-Volumes1And2>

Accessed on 04/07/2013; above online link provides *SBG* of famous freedom fighter Bal Gangadhar Tilak in Sanskrit and English. E-text can be readable online but not downloadable. This e version is in scanned form.

2.3.6 Require Tools and Techniques for This Require Versions

In the proposed multimedia e-book version of *SBG* e learning based, search engine and multimedia technological & methodologies will be used. The detailed procedure of the research is given as follows:-

1. Survey of e content/ e book for Sanskrit. E content would be static and dynamic. Prepare text in html form and design multimedia content.
2. E learning methods for heritage texts.
3. Architecture Web of the System.

⁴³ <http://www.srivaishnava.20m.com/gita/> : accessed on 04/07/2013

4. Front end of SBG indexer.
5. Java Server Pages
6. Apache Tomcat 4.0
7. Java Servlet Technology
8. System Modules
9. Database Connectivity
10. Software Requirements Specification (SRS) and Web design.
11. Integrative and Web launch.

2.4 What is Required to Done in This Area?

It is demand of time to present Ancient Heritage Texts (AIH) of our tradition in an interactive form. E-learning tools, Input-Output tools, Electronic storage and preservation of Sanskrit corpus these are require today. It is proved that our text has such type of ability to learn computer Artificial Intelligence. Today NLP is important area of research in computer science so develop tools and technologies for Sanskrit so it can play an important role in R & D in future.

Chapter 3.

Research Methodology

Chapter 3.

'Research Methodology'

Introduction

The chapter describes steps for preparing Multimedia e-book for SBG. The chapter also touches on the selection of text and its authenticity, collecting database, multimedia content and survey of related work. Steps of system development of this work are also discussed. How can user interface with the search engine? How the input and output works in the system. Which fonts will be acceptable during the use of database system? The chapter introduces the base source, variations of versions and authenticity of text which is used for this particular research and database. This chapter discusses the methodologies which are used in the present research.

3.1 Research Methodology

The multimedia e-book and multidimensional search engine (indexing) for *SBG* will use Comparative, Analytical, Descriptive, Multimedia, E-learning, Technological methodologies.

Here the basic components of these research methods are discussed in a condensed form. Comparative research is applied in comparing two or more disciplines. It is very useful as it allows multidisciplinary approaches.

Descriptive method of research known as statistical research, describes data and characteristics of the phenomenon being studied. It does not examine about how, when, why the characteristics took place, which is done under analytical research. Other used technologies are to be discussed in next chapter in order to define tools and techniques used in this research work.

The detailed procedure of the research is given as follows:-

- ❖ Check the historical evidence of text and select most authentic text of SBG among the available editions.
- ❖ Prepare illustrated content and database for SBG.
- ❖ To develop a relational database system of SBG.
- ❖ Developing Java server engine for search.

- ❖ Developing a web interface for input and display.

3.2 SBG: History of Text

SBG is not an independent text. SBG is a part of MB, described in *Bhīṣmaparva* chapters 25 to 42. *Bhīṣmaparva* has 122 chapters and contains four sub *parva* named (1.) *jambukhandavinirmāṇaparva*, (2.) *bhūmiparva*, (3.) *Śrīmadbhagavadagītā parva* and (4.) *Bhīṣmavadhaparva*. There are various texts named *Gītā* in different parvas of MB and SBG is one of them and this is special one in all of them. Number of other texts of *Gītā* are 15, because these all follow SBG so called *anugītā* some of these are *utathyagītā*, *vāmadevagītā*, *rṣhbagītā*, *ṣadajagītā*, *brahmaṇagītā*, *brahmagītā*, *anugītā* etc.¹

The MB is available in two recensions, the northern and the southern, which are further subdivided into versions according to the scripts in which the text is written. The northern recensions are available in *Śāradā*, *Nepalī*, *Maithilī*, *Bengalī* and *Devanāgarī* scripts. The southern recensions are in *Grantha*, *Telugu*, and *Malayālam* scripts. Among the all complete printed editions of MB, the following three are considered to be of importance - the Kolkata, the Bombay and the Kumbhakonam editions. But none of these can be taken to represent any of the two recensions referred above.

On the basis of the study of the critical editions of the MB, the primary and basic task was to determine the most appropriate and accepted structure and the text to be used for indexing purposes. In this direction the search for the most authentic work on complete MB was carried out and the critical edition of MB of Bhandarkar Oriental Research Institute (BORI), Poona was selected as this work is recognized as the most authentic edition of MB and has been compiled on the basis of comparative study of several different versions.

The history of text-families, recensions, has only recently been probed in *Gītā* studies. The critical edition of SBG is found as part of *Bhīṣma-parva* of MB. The critical edition of *Bhīṣma-parva* speaks of a Northern recension consisting of *Śāradā*, *Kaśmīrī*, *Bengalī* and other *Devanāgarī* Mss. and a southern recension of *Telegu*, *Grantha* and *Malayālam* versions. The

¹ Upādhyāya, Baldev, 2000, *Sanskrit Vāṇmaya kā Vṛhad itihāsa*, Uttarapradesh Sanskrit sansthan, Lukhnow

Mss. of the Śāradā-Kāśmīr tradition are the best for MB as a whole, including *Bhīṣma-parva* yet they are late and secondary as far as *Bhagavad-gītā* is concerned.² Thus the Kashmir text of the epic was fixed sooner than elsewhere. Belvalkar concludes that: If by recension is to be meant merely a version long, current and recognized as authoritative in a given province, then the existence of such a recension of the *Bhagavad-gītā* as being current in Kashmir we are not denying...³

The first parvan published and edited personally was the *Bhīṣma-parvan*, ready for the press in 1941, but published in two issues only in 1946-47, on account of economic difficulties. Belvalkar selected it because it included the Bhagavadgita, the theosophical poem of universal fame, which had been a favorite of his since he was at the University.

In this context in 1945 BORI printed SBG Critically edited by Shripad Krishna Belvalkar, reprinted from *Bhīṣmaparva* part 1 in 1945.⁴ Another version of SBG is with the commentary “*Jñānakarmasamuccaya*” edited by S. K. Belvalkar available in Śāradā Ms.⁵

So BORI edition of MB is followed by most of the publishers and also by Geeta Press Gaurakhpur. Research of critical Studies done on SBG are cited, these are following:

1. The Hindu Gītā: Ancient and Classical Interpretations of the Bhagavadgītā by Arvind Sharma. LaSalle, IL: Open Court Publishing Co., 1986.
2. The Universal Gītā: Western Images of the Bhagavad Gītā: A Bicentary Survey by Erick J. Sharpe. LaSalle, IL: Open Court Publishing Co. 1985.
3. Bhagavad- Gītā: An Exegetical Commentary by Robert N. Minor. New Delhi: Heritage Publishers, 1982.

² Minor, N. Robert, *Bhagavad-Gītā: An Exegetical Commentary*, 1982, Heritage Publishers, Delhi.

³ ibid

⁴ *The Bhagavadgītā*, Critically edited by Shripad Krishna Belvalkar (Reprinted from *Bhīṣmaparvan*, Part I, 1945. pp. xxxii, 108; plates 4. Bhandarkar Oriental Research Institute, Poona,

⁵ Belvalkar, S.K. (editor), *SRIMAD-BHAGAVAD-GITA* with the “*JNANAKAKMASAMUCCAYA*” commentary of Ananda [Vakdhana], Poona.

There is controversy about the total number of stanzas in SBG; Śamkara the oldest commentator on SBG confirmed 700. However there has been some concern in *Gītā-prāśasti* found at the beginning of the forty-third chapter of the *Bhīṣmaparva*. According to this total would be 745 *ślokas*.

3.2.1 Manuscript

It is too difficult to estimate the number of manuscripts of the SBG or MB in existence. There are two main reasons - no complete list of these manuscripts has been compiled and the expression "MB manuscript" as generally used, is ambiguous and may apply to a small manuscript of the SBG alone, as well as to a complete manuscript of the MB, in several volumes. From the descriptive catalogues, published reports, and the lists of manuscripts available in public library in India and abroad, as also from a special search instituted in private library, the existence of more than 125 manuscripts of the *Bhīṣmaparva* (text only) has been so far established, about half of them being written in Devanāgarī, about 20 in Bengali, some 15 each in Grantha and Telugu, over 10 in Malayalam and only one in Śāradā script. There exist, besides these, 125 manuscripts of the text alone, nearly 40 others manuscripts giving the text of the *parvan* together with a Sanskrit commentary: namely Arjuna Mishra's *Bhārārthadīpikī*, some 10 Mss.; Nīlakaṇṭha's *Bhārārthadīpikī*, about 30 Mss.; and two manuscripts of an anonymous commentator. According the catalogue of SBG Mss. found in Vrindaban Research Institute, total 10 Mss. have been found 5 in Bengali and 5 in Nagari script. There are 2 Mss. found in 19th CE.⁶ Manuscripts containing commentaries alone on the *Bhīṣma* are more than 30, there being, besides the 2 commentaries mentioned above, about 10 others, including *Devabodha*. This makes a total of about 200 MSS. of the *Bhīṣmaparva*. Among these manuscripts, only 60 Mss. have been actually procured and collated to S.K. Belvalkar, editor of critical edition of MB

⁶ Hanumantachar, V. (compiler) and Gupta R. D. & Wright J. C. (Editor) 1978, "A CATALOGUE OF SANSKRIT MANUSCRIPTS IN THE Vrindaban Research Institute" Part- 3, Vrindaban Research Institute, Vrindaban.

(*Bhīṣmaparva*). And finally he selected 34 Mss. to constitute the critical apparatus for *Bhīṣmaparva*.⁷

The list of some manuscripts of *SBG* which is found in volume 3 of BORI's edition of manuscripts⁸ is given below:

S.No	Name of MS.	Place	Accession No.	Remarks, Age, Script, Material, Condition
1.	Bhagavadgītā		16944	59 folios, Paper, Devanāgarī, Sanskrit Language.
2.	Bhagavadgītā		18379	3 folios, Paper, Devanāgarī, Sanskrit Language, Contain only <i>Puruṣottama yoga</i> .
3.	Bhagavadgītā (C-śrīdharācārya)		14393	158 folios, Paper, Devanāgarī, Sanskrit Language.
4.	Bhagavadgītā with commentary(Vyāsa)	Jalore fort by ṛṣi motākhyā	19341	27 folios, Paper, Devanāgarī, Sanskrit Language.
5.	Smṛti gītā satīkā 'jñānatattvārtha' (C-madhav)		18829	17 folios, Paper, Devanāgarī, Sanskrit Language.

[Table 3.1: The list of *SBG* manuscripts found in the volumes of critical edition of BORI]

A descriptive catalogue of Sanskrit Manuscripts (Vol. 8) Acquired and deposited in the Sampurnanand Sanskrit University Library (Saraswati Bhavana) Varanasi during year 1791-1950.⁹

⁷ Mani, Diwakar, 2008, "Online Indexing of Ādīparva in Mahābhārata", M.Phil submitted to Special Centre for Sanskrit Studies, Jawaharlal Nehru University, New Delhi.

⁸ Joshi, H. Purushottam & Pandey P. Bhagvatprasad, (compiled), 1998 'An Alphabetical list of Manuscripts in the Oriental Institute', Baroda, Vol. 3.

S. No.	Name of MS.	Writer of Text	Time & Place	Accession No.	Remarks
1.	Bhagavadgītā		1868 AD	50629	Devanagari, 412 G.
2.	Bhagavadgītā			50631	Devanagari, 1-36, 40-74, 76-96 Folios, inc.
3.	Bhagavadgītā with commentary	C- Madhusudana Saraswati		50630	Devanagari, 304 Folios, Commentary- <i>Gūdārthadīpikā</i> .
4.	Bhagavadgītā with commentary	C- Vamana	1778 AD	50632	Devanagari, 284 Folios, Commentary- <i>samaśloī</i> in Marathi Language, Inc.
5.	Bhagavadgītā with commentary	C- Shankarananda Saraswati		50645	Devanagari, 1-65 Folios.
6.	Bhagavadgītā			50648	Devanagari, 10 Folios, Incomplete.
7.	Bhagavadgītā with <i>Bhāṣya</i>	C- shankaracharya		50654	Devanagari, 130-174 Folios, Inc.
8.	Bhagavadgītā-Tīkā	C- Madhusudana Saraswati	1818 AD	50655	Devanagari, 401 Folios
9.	Bhagavadgītā			50661	Devanagari, 401 Folios, Inc.
10.	Bhagavadgītā			50666	Bengali, Tadapatra, 1-16, 23-33, 35-60, 64, 68-74, Inc.
11.	Bhagavadgītā			50672	Devanagari, 1-3, 3-67 Folios, comp.
12.	Bhagavadgītā with commentary			50677	Devanagari, 7 Folios, Inc.
13.	Bhagavadgītā with commentary	C- Śrīdhara		50678	Bengali, 1-11 Folios, Inc. Commentary - <i>Subhodhini</i> on Chs.1-2

⁹ A Descriptive Catalogue of The Sanskrit Manuscripts, Acquired and deposited in the Sampurnanand Sanskrit University Library (Saraswati Bhavana) Varanasi, 1987, Vol. 8.

14.	Bhagavadgītā			50679	Bengali, 42, 57-61 Folios, Inc. on Chs .16-18
15.	Bhagavadgītā with commentary			50680	Bengali, 2-84 Folios, Inc. on Chs. 1-18
22.	<i>Uttaragītā</i> with commentary			50681	Bengali, 2, 2-11 Folios, Inc. on Chs 1-3
23.	Bhagavadgītā with commentary		1795	50682	Devanagari, 1-8,10-12, 14-31, 31-42, 44-143, Folios, Inc.
24.	Bhagavadgītā with commentary			50685	Devanagari, 62 Folios, Inc. Chs. 1-11, Commentary Padapadārthabodhini in Marathi Language.
25.	Bhagavadgītā with commentary	C. Brahmendrayati		50686	Devanagari, 74-124 Folios, Chapter 11-18, C. <i>Padapadārthabodhini</i> or <i>prabodhachandrikā</i> in Marathi Language.
26.	Bhagavadgītā with commentary	C. jñeśvara		50687	Devanagari, 74-124 Folios, com.
27.	Bhagavadgītā with commentary			50693	Devanagari, 1-19 Folios, Inco. commentary <i>Subodhini</i>
28.	Bhagavadgītā with commentary	Śridhara		50713	Devanagari, 1-121, Folios, comp. commentary <i>Subodhini</i> & <i>satīkasāmkyakārikā</i>
29.	Bhagavadgītā <i>sachitrā</i>			50715	Devanagari, 297, Folios, comp. bhavānīsastra-nāma, gurugītā, ganeshstotra, saundaryalaharī etc.
30.	Bhagavadgītā with commentary			50722	Devanagari, 297, Folios, Inc.

[Table 3.2: The list of *SBG* manuscripts found Sampurnanand Sanskrit University Library (Saraswati Bhavana) Varanasi] According to the catalogue *SBG* found in Vrindaban research Institute, some Mss. are described here.¹⁰

¹⁰ Hanumantachar, V. (compiler)and Gupta R. D. & Wright J. C. (Editor) 1978, “*A CATALOGUE OF SANSKRIT MANUSCRIPTS IN THE Vrindaban Research Institute*” Part- 3, Vrindaban Research Institute, Vrindaban.

Sl. No.	Title of Ms.	Author / Commentator/ Scribe	Accession No.	Time	Remarks
1.	Bhagavadgītā		7239		Paper, Devnagari, Comp. poor cond.
2.	Bhagavadgītā		7324		Paper, Devnagari, Good cond. Contains Chapter 1 Inc, along with Gītāmahātmya.
3.	Bhagavadgītā		6989		Paper, Devnagari, Inc. Good cond. contains Chs. 1-13& Commentary 14(inc.) only
4.	Bhagavadgītā		6391		Paper, Bengali, Inc. Poor cond. Contains Chs. 1 (Comp.) & 2 (Inc.)
5.	Bhagavadgītā		6179		Paper, Bengali, Inc. Poor cond. Contains Chs. 13 (Inc.), 14 (Comp.) & 15 (Inc.) only
6.	Bhagavadgītā		4061	V.S. 1945	Paper, Bengali, Comp. Poor cond. Contains also Bhagavadgītā- mähātmya and four miniatures in the middle of Ms.
7.	Bhagavadgītā	Scb. Gannārām	4450-A	V.S. 1856	Paper, Devanagari, Comp. Good cond.
8.	Bhagavadgītā	Scb. Nayanasukha	4098	V.S. 1745	Paper, Devanagari, Comp. Good cond.
9.	Bhagavadgītā		4411-B	V.S. 1883	Paper, Devanagari, Comp. Good cond.

10	Bhagavadgītā	C. Madhusūdana sarasvatī	4431		Paper, Devanagari, Inc. Damaged cond. With <i>Gūdārthadīpikā</i> Commentary
11	Bhagavadgītā	Vidyādhirāja Caṭṭopādhyāya	6561		Paper, Devanagari, Comp. Good cond. With commentary
12.	Bhagavadgītā	C. Śaṅkara		4600	Paper, Devanagari, Inc. Good cond. Contains only Ch.2 (Inc.); with <i>śāṅkarabhāṣya</i> .
13.	Bhagavadgītā	C. Śrīdhara svāmī & Scb. Haradevadāsa	V.S. 1909	7187	Paper, Devanagari, Comp. Good cond. With Subodhinī Commentary
14.	Bhagavadgītā	C. Rāmānuja & scb. Vṛndāvanadāsa	V.S. 1909	7241	Paper, Devanagari, Comp. Good cond.

[Table 3.3: The list of SBG manuscripts found in Vrindaban Research Institute, Vrindaban]

3.2.2 Commentators of SBG

As the rich text of knowledge SBG became the most popular and interesting text in point of view of tradition commentaries. SBG has largest number of commentaries in Indian discourse, various schools of philosophy interpreted according to their own point of view. Another reason is that SBG counted in *prasthānatrayī* so commentators of *Vedantic* tradition also wrote on this. Several commentaries are found on SBG;

Commentaries on SBG are the following:

1. Śamkarda – *Gītātātparyabodhinī*

2. Śrīdhara – *subodhinī*
3. Madhusūdana Saraswatī – *Gūḍārthadīpikā*
4. Nīlakaṇṭha – *bhāvapradīpa*
5. Keśava kaśmīrī – *gītāṣya*
6. AbhinavA Gupta- *gītārtha samgraha*
7. Lokamanya Tilaka – *gītārahasya baldev*
8. Vidyabhushan – *Gītāmṛta bhūṣan*
9. Jñāneśvarī in Marathi language is also very famous one.

Bhāṣya on SBG are the following

1. The oldest commentator (*bhāṣyakāra*) of SBG is śamkara
2. Rāmānuja founder of viśiṣṭādvait wrote *śrībhāṣya*.
3. *dvaitavādī* Mādḥva wrote two commentaries *Gītābhāṣya* & *Gītātātparyanirṇaya*.
4. Vallabhācharya, founder of *Śuddādvaiatvāda* has a commentary on his name on SBG.
5. Nimbārka, the founder of *dvaitādvait* thought of *Vedanta* wrote his commentary “*bhagavadgītā vākyārtha*”. There is also a commentary on this named “*tattvapraṅkāśini*”.
6. Rāmānanda follower of viśiṣṭādvait wrote “*ānandabhāṣya*” on SBG.

3.2.3 SBG Translating into English

English translation and other further works done by foreign scholars in English are following:

- *Bhagavad Gītā*, translation and commentary by Richard Gotshalk published by Motilal Banarsidass, New Delhi, 1985. (1st Ed.) Translated SBG into English without having

Sanskrit text only contains simple textual translation and after wrote separate commentary on it.

- The *Bhagavad Gītā*: Yoga of Contemplation and Action, translation by Georg Feuerstein, Arnold-Heinemann, New Delhi, 1980.
- The *Bhagavad Gītā*: A New Translation, by Kees Bolle. University of California Press, Berkeley and Los Angeles, 1979. This work has Sanskrit text first and then a brief story and reasons for translation of text and translation in the end. It has terms, meanings and choices in the terms for translation. Translation shows different views on SBG like for Hindu and Yogi views.
- The *Bhagavad Gītā in the Mahābhārata*: Text and Translation by J. A. B. van Buitene, University of Chicago Press, Chicago and London, 1981

The book deeply discusses about conversion and theories discussed between Krishna and Arjuna. Have conclusion of yoga and other significant discussed topics.

- ‘*The Bhagvat-Gīta, or Dialogues of Kreesna and Arjoon*’ by Charles Wilkins in Eighteen Lectures; with Notes in London, 1785

3.3 Selection of an Authentic Text of SBG

After all, it is clear that SBG generally used BORI’s edition. Actually all edition makes their authenticities on its own ground and have logics for proving it. SBG is the text in Indian tradition, famous in equally in each form or edition. There is no more controversy among scholars about authenticity of text, because some versions have few textual changes but no change about subject matter. Because of similarity of subject matter there SBG is most popular in point of view of commentaries. Many philosophical schools describe it according to their own views and in modern time the text has been translated as per demands.

So there are no big issues about authenticity. BORI’s edition of MB is also familiar to all and as a part of MB; SBG is also acceptable in the same edition. Here Geeta Press Gaurakhpur’s ‘SrimadBhagavadgeeta’ with Hindi commentary ‘*Sadhak Samjeevani*’ is selected in present

research work. *Sadhak Samjeevani* proved very helpful for Hindi translation of text which is used in current e-book. The language of this edition is very simple, straight and explained with the commentary of Swami Ramsukhdasji in Hindi. The text published from Geeta Press is well known and very easy to understand to all. The other reason to select above text is no issue about copyright. In proposed research work, the text with Hindi translation has been done online, so in this case, there is no issue on copyright of the translation used in this work.

Sadhak Samjeevani is an excellent commentary on Gita by Swamiji. Most revered Swami Ramsukhdasji has searched out many secret and valuable jewels of spiritual ideas from this unfathomable sea of SBG and has very kindly given for the welfare of householders and the public at large studying which they may easily attain highest bliss. Revered Swami ji has written this commentary not for pro-founding any philosophical view-point or for show of his erudition but he has made this fine endeavor for the spiritual benefit of the practicing strivers. This commentary is available in different sizes, languages, and in attractive various forms proved itself as a Guru just like a true guide.

Geeta Press is unit of Gobind Bhawan Karyalaya under the Societies registration act 1860, (presently governed by the Bengal Societies act 1960). The institution strives for betterment of life and the well-being for all. It aims to promote the art of living as propounded in the SBG for peace and happiness and the ultimate uplift of mankind.

3.3.1 Selection of *Arjuna-Viṣādayoga* for Research Work

The proposed research work is based on the 1st chapter of SBG. There are two reasons to select the 1st chapter for the proposed research work. One, SBG is a large text, so developing an interactive and animated version for the whole text can't be completed properly in limited time of M.Phil. Second, This chapter has great scope of animation because there is an introduction of all characters standing in kurukṣetra according to their characteristics, gestures of Arjuna after seeing his relatives against him, setting of army of both sides (*vyūharachanā*) and base of war of MB. This chapter is known as *Arjuna-viṣāda-yoga*; Sanjay describes the live movements of the war of MB to *Dhṛtarāṣṭra* and introduces both army's positions in the *Kurukṣetra*. In this way, this M.Phil work presents a framework (model) for the whole text.

3.4 Digitization of text

Text of SBG prepared in an attractive form to develop a multidimensional interactive search engine and an interactive e-book for readers. Online system provides further search options for user so text made according to demand. The system consists of front end of Apache Tomcat server, programming is done in Java and back-end. The back end of server version contains lexical resources in the form of database tables and text files.

In addition digitizing the text POS tagging information also has been added to make the the database of text rich linguistic point of view. POS tagging also called morpho-syntactic tagging, is the procedure of assigning to each word in a running text a label which indicates the status of that word within some system of categorizing the words of that language according to their morphological or syntactic properties.¹¹

The data file named by geeta_lexicon.txt contains SBG Shloka, SBG Index, MB Index, Hindi translation, Sandhi-splitShloka and Anvayakrama.

BhagavadgitaShloka	BhagavadgitaIndex	MahabharataIndex	HindiTranslation	Sandhi-splitShloka	Anvayakrama
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[Table 3.4 The format of datafile geeta_lexicon.txt]

The above geeta_lexicon datafile contains SBG *śloka* in original form. When a user searches a specific keyword or alphabet on the system, it replies in original form and displays in Unicode Devanagari. Index is the unique identification (id) number of each *śloka* in respective *adhyaayas* of SBG and also has MB reference. If a user searches keyword then following output would come out: the *śloka* with its detailed reference, Hindi translation of *śloka*, sandhi split of *śloka* and *anvaya* of *śloka*.

¹¹ Gopal, M., Jha, G.N. & Giri, A. *Application of BIS Tagsetfor Sanskrit: Case of Verbs and Particles*, Presented in national Seminar on POS Annotation for Indian Languages: Issues & Perspectives, 12-13 December, 2012, CIIL, Mysore.

Sample data collected for the lexicon in text file in Devanāgarī Unicode is following:

धृतराष्ट्र उवाच 1.1p 6023001p धृतराष्ट्र बोले धृतराष्ट्रः उवाच धृतराष्ट्रः उवाच
धृतराष्ट्रः/NS उवाच/KP

धर्मक्षेत्रे कुरुक्षेत्रे समवेता युयुत्सवः। मामकाः पाण्डवाश्चैव किमकुर्वत सञ्जय॥ 1.1

6023001 हे सञ्जय!धर्मभूमि कुरुक्षेत्रमे एकत्रित,युद्ध की इच्छावाले मेरे और पान्डु के पुत्रों ने क्या किया? सञ्जय, धर्मक्षेत्रे कुरुक्षेत्रे युयुत्सवः एव समवेताः मामकाः च पाण्डवाः किम् अकुर्वत ? सञ्जय धर्मक्षेत्रे कुरुक्षेत्रे युयुत्सवः एव समवेताः मामकाः च पाण्डवाः किम् अकुर्वत? धर्मक्षेत्रे/NV कुरुक्षेत्रे/NS समवेताः/KN युयुत्सवः/NV मामकाः/SN पाण्डवाः/NP च/APY एव/A किम्/SN अकुर्वत/KP सञ्जय/NS ॥/PUNC 1.1/PUNC ॥/PUNC

संजय उवाच 1.2p 6023002p सञ्जय बोले संजयः उवाच संजयः उवाच सञ्जयः/NS
उवाच/KP

दृष्ट्वा तु पाण्डवानीकं व्यूढं दुर्योधनस्तदा। आचार्यमुपसङ्गम्य राजा वचनमब्रवीत्॥ 1.2

6023002 सञ्जय बोले-उस समय राजा दुर्योधन ने व्यूहचरनायुक्त पान्डवों की सेनाको देखकर और द्रोणाचार्यके पास जाकर यह वचन कहा॥ दृष्ट्वा तु पाण्डव-अनीकम् व्यूढम् दुर्योधनः तदा।आचार्यम् उपसङ्गम्य राजा वचनम् अब्रवीत्॥ तदा पाण्डव-अनीकम् व्यूढम् दृष्ट्वा तु राजा दुर्योधनः आचार्यम् उपसङ्गम्य वचनम् अब्रवीत् । दृष्ट्वा/KKS तु/A पाण्डवानीकं/NV व्यूढं/NP दुर्योधनः/NS तदा/Aआचार्यम्/NP उपसङ्गम्य/KKS राजा/NP वचनम्/NP अब्रवीत्/KP ॥/PUNC 1.2/PUNC ॥/PUNC

पश्यैतां पाण्डुपुत्राणामाचार्य महर्ती चमूम्। व्यूढां द्रुपदपुत्रेण तव शिष्येण धीमता॥ 1.3

6023003 हे आचार्या!आपके बुद्धिमान शिष्य द्रुपदपुत्र धृष्टद्युम्नद्वारा व्यूहाकार खड़ी की हुई पाण्डुपुत्रों की इस बडी सेनाको देखिये॥ पश्य एताम् पाण्डु-पुत्राणाम् आचार्य महर्तीम् चमूम्।ब्यूढाम् द्रुपद-पुत्रेण तव शिष्येण धीमता॥ हे आचार्या!तव धीमता शिष्येण,द्रुपद पुत्रेण ब्यूढाम् पाण्डु पुत्राणाम् एताम् महर्तीम् चमूम् पश्य॥ पश्य/KP एतां/SNV पाण्डुपुत्राणाम्/NP आचार्य/NP महर्ती/NV चमूम्/NP व्यूढां/NV द्रुपदपुत्रेण/NP तव/SN शिष्येण/NP धीमता/NV ॥/PUNC 1.3/PUNC ॥/PUNC

अत्र शूरा महेष्वासा भीमार्जुनसमा युधि। युयुधानो विराटश्च द्रुपदश्च महारथः॥ 1.4

6023004 इस सेना मे बड़े-बड़े धनुषोंवाले तथा युद्धमे भीम और अर्जुन के समान शूरवीर सात्यकि और विराट तथा महारथी राजा द्रुपद - अत्र शूराः महा-इषु-आसाः भीम-अर्जुन-समाः युधि।युयुधानो विराटःच द्रुपदःच महारथः॥ अत्र भीम अर्जुन समाःयुधि शूराःमहा-इषु-आसा,महारथः युयुधानः,विराटःच द्रुपदःच॥ अत्र/A शूराः/NP महेष्वासा/NV भीमार्जुनसमा/NV युधि/NPयुयुधानः/KNV विराटः/NS च/APY द्रुपदः/NS च/APY महारथः/NV ॥/PUNC 1.4/PUNC ॥/PUNC

धृष्टकेतुश्चेकितानः काशिराजश्च वीर्यवान्। पुरुजित्कुन्तिभोजश्च शैब्यश्च नरपुङ्गवः॥ 1.5

6023005 धृष्टकेतु और चेकितान तथा बलवान् काशिराज,पुरुजित्,कुन्तिभोज और मनुष्यों में श्रेष्ठ शैब्य,पराक्रमी युधामन्यु तथा- धृष्टकेतुः चेकितानः काशिराजः च वीर्यवान्।पुरुजित् कुन्तिभोजः च शैब्यः च नर-पुङ्गवः॥ धृष्टकेतुः चेकितानः च,वीर्यवान् काशिराजः च पुरुजित् कुन्तिभोजः च नर-पुङ्गवः शैब्यः च ॥ धृष्टकेतुः/NS चेकितानः/NS

काशिराजः/NP च/APY वीर्यवान्/NVपुरुजित्कुन्तिभोजः/NS च/APY शैब्यः/NP च/APY
नरपुङ्गवः/NP ॥/PUNC 1.5/PUNC ॥/PUNC

Another data file which provides separate search for chapter 1 with images and description named by adhyaya1.txt consists following format.

BhagavadgitaIndex	MahabharataIndex	BhagavadgitaShloka	Image	Discription
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[Table 3.5 The format of datafile adhyaya1.txt]

The above data provides following search options on 'bhagavadgita search page' and structure is
Adhyaya → Shloka → Details

When a user sends a query related to śloka or Hindi translation of SBG, system replies description or details of śloka and also provide related color image.

Sample data collected for adhyaya1.txt file in text file in Devanāgarī Unicode is following:

1.01 6023001 धर्मक्षेत्रे कुरुक्षेत्रे समवेता युयुत्सवः। मामकाः पाण्डवाश्चैव किमकुर्वत सञ्जय॥
image1.jpg हे सञ्जय!धर्मभूमि कुरुक्षेत्रमे एकत्रित,युद्ध की इच्छावाले मेरे और पान्डु के पुत्रों ने
क्या किया? धर्मक्षेत्रे/NV कुरुक्षेत्रे/NS समवेताः/KN युयुत्सवः/NVमामकाः/SN पाण्डवाः/NP च/APY
एव/A किम्/SN अकुर्वत/KP सञ्जय/NS ॥/PUNC 1.1/PUNC ॥/PUNC

1.02 6023002 दृष्ट्वा तु पाण्डवानीकं व्यूढं दुर्योधनस्तदा। आचार्यमुपसङ्गम्य राजा
वचनमब्रवीत्॥ image2.jpg उस समय राजा दुर्योधन ने व्यूहरचनायुक्त पान्डवों की सेनाको देखकर

और द्रोणाचार्यके पास जाकर यह वचन कहा॥ दृष्ट्वा/KKS तु/A पाण्डवानीकं/NV व्यूढं/NP
दुर्योधनः/NS तदा/Aआचार्यम्/NP उपसङ्गम्य/KKS राजा/NP वचनम्/NP अब्रवीत्/KP ॥/PUNC
1.2/PUNC ॥/PUNC

1.03 6023003 पश्यैतां पाण्डुपुत्राणामाचार्य महतीं चमूम्।व्यूढां द्रुपदपुत्रेण तव शिष्येण धीमता॥
image3.jpg हे आचार्य!आपके बुद्धिमान शिष्य द्रुपदपुत्र धृष्टद्युम्नद्वारा व्यूहाकार खड़ी की
हुई पाण्डुपुत्रों की इस बड़ी सेनाको देखिये॥ पश्य/KP एतां/SNV पाण्डुपुत्राणाम्/NP आचार्य/NP
महतीं/NV चमूम्/NP व्यूढां/NV द्रुपदपुत्रेण/NP तव/SN शिष्येण/NP धीमता/NV ॥/PUNC 1.3/PUNC
॥/PUNC

Third datafile is adhyaya_list.txt which contains a list of adhyāyas (chapters). This file is prepared for Adhyaya button for search on **bhagavadgita search page**. Sample data for the file is the following:

AdhyayaNo. AdhyayaName

- 1 अर्जुनविषादयोगः
- 2 साङ्ख्ययोगः

The last text file in Devanāgarī Unicode made as part of the datafile is geeta_links.txt contains existing online links (url address) for SBG in various forms such as plain e-text, audio, video or animation. Sample data is following:

Online links for bhagavadgita

http://www.youtube.com/watch?v=20CAZWAL_DE&noredirect=1

<http://www.youtube.com/watch?v=qTZFolAfels>

<http://www.gitainternational.com/hindi-audio.htm>

3.5 Illustration of text

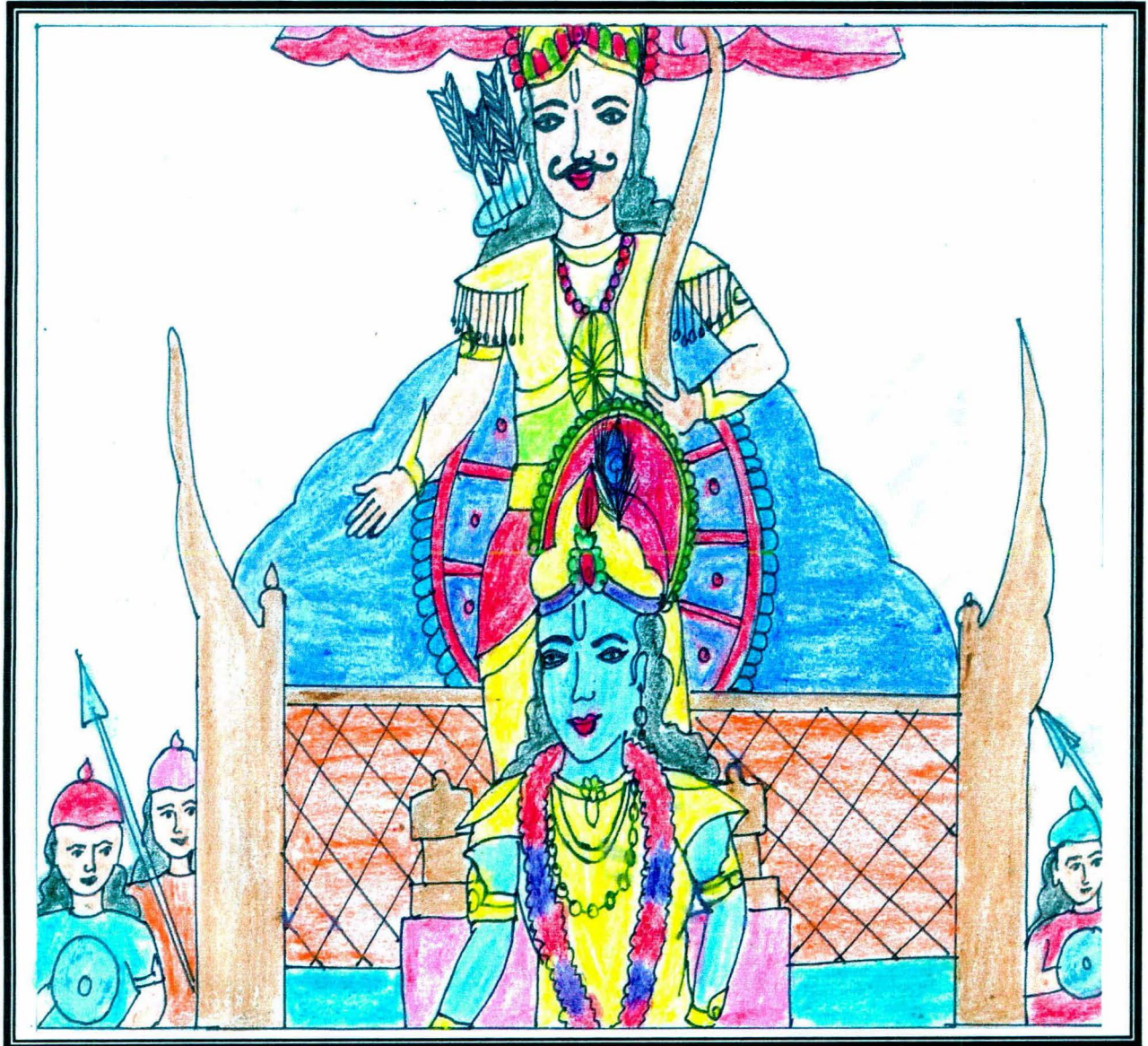
After collecting an authentic database in digital format to develop e book another challenging task was to illustrate multimedia content for SBG. As mentioned above a multimedia e book should contain images, graphics, illustration, sound, videos to provide interactive learning for user. In this way following steps were followed for illustration.

3.5.1 Survey and Preparation of Images

As it is mentioned that chapter 1 '*Arjuna viṣāda yoga*' has much scope for animation. Here about 25 characters other than kṛṣṇa and Arjuna are introduced. So it was a challenging task to draw different images and make distinction among all. For that survey was done on various levels such as:

- Search for online available images and drawings on SBG
- Study on available video or animated versions of SBG like B.R. Chopra's MB.

This survey played important role to understand essence of characters and to draw better expression in images. Pencil sketches of the first chapter were done on paper and then colored. A sample is given below -



[Image 3.1 sketch of Arjuna with Kṛṣṇa]

3.5.2 Digitizing images

Animation needs soft copy of images. Therefore the images were scanned in jpeg format. These scanned images have been used for two purposes - first when we search any *śloka* by 'Search by Adhyaya' and then 'Read whole chapter' in online bhagavadgita search page, result shows related image of the *śloka*. Another use is to prepare animation in Flash software, it needs images for that.

3.5.3 Purpose for a better Multimedia content (animation)

The next step in the row of developing a better multimedia content is to record sound for SBG. It is a challenging task and will be done by our MA students who have clarity in voice and can pronounce verses of SBG according to their metre (*Canda*).

The most challenging task in the proposed research is to develop an animation for proposed text. For that a survey of previous animation of spiritual movies was done such as Bal Ganesha,¹² Chota Bheem¹³ and some others.

Animation of the text is being prepared on the basis of multimedia technologies and updated versions of Adobe Flash. The animated text will available online at <http://sanskrit.jnu.ac.in/sbg> on our website and also as a standalone version subsequently for free distribution.

3.6 Survey of current running e-versions

In addition to preparing an e-book on SBG survey of all current available digital forms of SBG was done which is described in chapter 2. Online data found in three forms as e-text, audio and video which is now available collectively under our website on search page with hyperlink.

¹² <http://www.balganesh.com/> : accessed on 25/07/2013

¹³ <http://www.chotabheemseries.com/> : accessed on 25/07/2013

3.7 Creation of relational database system:

Without creating RDBMS interactivity and cross relationship can't be done meaningfully. Using RDBMS techniques, the most important and core of the present research was to design and develop a database driven knowledge according to the structure of SBG.

It is necessary to discuss in a very brief manner about RDBMS, importance of it and how does it work. A **database** is an organized collection of data. The data are typically organized to model relevant aspects of reality, in a way that supports processes requiring this information. Database management systems (**DBMSs**) are specially designed applications that interact with the user, other applications, and the database itself to capture and analyze data. A general-purpose database management system (DBMS) is a software system designed to allow the definition, creation, querying, update, and administration of databases. Well-known DBMSs include MySQL, PostgreSQL, SQLite, Microsoft SQL Server, Microsoft Access, Oracle, SAP, dBASE, FoxPro, IBM DB2 and FileMaker Pro. A database is not generally portable across different DBMS, but different DBMSs can inter-operate by using standards such as SQL and ODBC or JDBC to allow a single application to work with more than one database.¹⁴

RDBMS stands for **Relational Database Management System**. RDBMS is the basis for SQL, and for all modern database systems like MS SQL server, IBM DB2, Oracle, MySQL, and Microsoft access. A RDBMS is a database management system (DBMS) that is based on the relational model as introduced by E. F. Codd in 1970.¹⁵ The data in RDBMS is stored in database objects called **tables**. The table is a collection of related data entries and it consists of columns and rows. A table is the most common and simplest form of data storage in a relational database.¹⁶ SQL used on a RDBMS to create, search and modify tables. Table creation (by example): Executing the following causes the creation of the Suppliers and Parts database above. So searching is able only using by SQL.

¹⁴ <http://en.wikipedia.org/wiki/Database>: accessed on 18/07/2013.

¹⁵ <http://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm>: accessed on 18/07/2013.

¹⁶ Retrieved online from tutorialspoint, Simply Easy Learning,

Web link is: <http://www.tutorialspoint.com/sql/sql-databases.htm>: accessed on 18/07/2013.

Now after knowing the RDBMS, it is describing here what method for respective text has used. Firstly, systematic tabular formats were created for the structure of SBG. The SBG is divided into *adhyāya* and *adhyāya* are consists of *ślokās*. After fixing the structure of the text, the actual database design was done at MS-SQL server 2005 in Unicode Devanāgarī format.

3.8 Creating Java Server engine for search:

Creating a search engine of SBG was done by using Java- JSP on Apache Tomcat platform. Servlets are Java objects used to extend the capabilities of server that host application accessed via a request- response programming model. Although servlets can respond to any type of request, they are commonly used to extend the applications hosted by web servers. For this type of applications, Java server technology defines HTTP specific servlet classes.¹⁷

3.9 Creating an interactive page for output display:

The front end of the system is live at - <http://sanskrit.jnu.ac.in/sbg/index.jsp>. The main page allows to the user to give their queries in Unicode Devanāgarī format using HTML text box component. Upon clicking the button labeled 'Search bhagavadgita', it passes the request to Java servlet engine for querying the database and matching particular keyword in the database which is stored. After matching the keyword, the output comes with its related reference and is displayed to user in Unicode Devanāgarī format.

3.10 Steps for accessing the database:

The indexing of SBG will provide a dynamic search engine for the users. The system provides three types of search-

- i. By direct search
- ii. By alphabetical search
- iii. By clicking on ADHYAYA → SHLOKA → DETAILS

In the case of direct search on the system, two are three steps to complete the query-

¹⁷ http://www.java.sun.com/j2ee/tutorial/1_3-fcs/doc/servlets.html accessed on 12/07/2013

3.10.1 Primary Step- This system of SBG in its online mode will take a string (word, sentence or a partial string of positive length) of text as input and will give all possible results regarding the queries of a user as an output. For Example, user wants to know about word 'धर्मक्षेत्रे' or about sentence 'अन्तर्यामी भगवान् श्रीकृष्ण ने पांचजन्य नामक तथा अर्जुन ने देवदत्त नामक शंख बजाया', the system will search database. If the search term is found, all its related information will returned in hyperlinked mode at the first page of the system.

3.10.2 Secondary Step- At the second step, the user by clicking any one hyperlinked alphabet for further information will get a complete reference of the related query. All the ślokas will be listed with hyperlink starts with the given alphabet.

3.11 Computer Adaption of SBG:

SBG is the leading text of Indian Philosophy, Yoga and Culture and is the source of ultimate knowledge. The structure of SBG is very easy to implement or design on website such as:

Adhyaya → Shloka

The database prepared for SBG provided various information like both id (SBG & MB) of text, Hindi translation, Anvaya and SandhiSplit. RDBMS technique provide to interlinking of data on MS-SQL server. Textual data is encoded in Devanāgarī Unicode and provides output for users requesting only in this format.

Chapter 4.

E-Text for *Śrīmadbhagavadgītā*

Chapter 4.

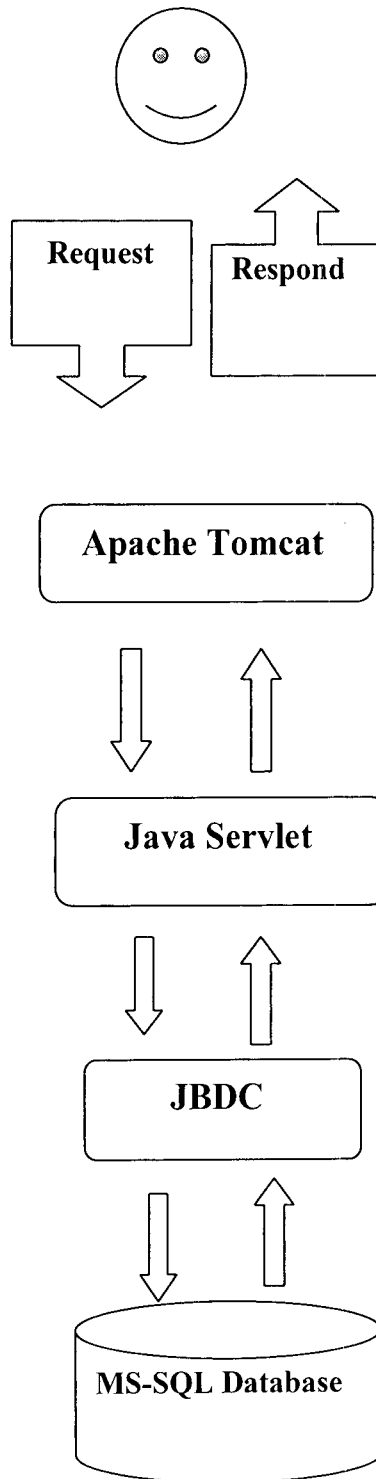
Multimedia e-book for Śrīmadbhagavadgītā

4.1 Introduction

The chapter describes partial implementation of online multimedia e-book of SBG as the part of the present M.Phil. R&D. Methodologies and technologies discussed in the previous chapter to developing e- text with multimedia content, animation and interactive search engine for text has been applied to develop an online computational system. To read an MM e-book a multi-dimensional knowledge based web application of SBG has been developed which will be illustrated in this chapter. The system provides different ways of text learning for user Such as plain text, text with description and description has images and related grammatical properties of given *śloka*, search by any word, by number of *śloka*. Java based technologies like Apache Tomcat, Java Servlet, JSP have been used for developing a computational model of SBG and web designing. Computational model of SBG uses Java/JSP as the front end and RDBMS and text files in Unicode as the backend. The developed system accepts the given input word of SBG text in Devanagārī Unicode UTF-8 format in the text area and gives output in the same format. The prepared system is available on our website under Computational R&D; web address of the system is <http://sanskrit.jnu.ac.in/sbg> . The e-text of SBG will available in three forms on the website. **First**, user can search database directly by providing input in Devanāgarī UTF-8. **Second**, one can search the database by using Devanāgarī alphabets on the website. **Third**, the user can click on *adhyāyas* given in the drop down box on the system. A user can get details with sutras in which it exists by just one clicking on indexed word.

4.2 Architecture of the Multimedia E-Book for SBG

The web application of SBG is developed in front-end of JSP with Java Servlet, Back-end of RDBMS and JDBC connectivity and data files. The web server for Java/JSP is Apache Tomcat 4.0 and the RDBMS used is MS-SQL Server 2005, Database in Unicode scheme. The following model describes the interaction between Multi-tier architecture of the indexing system of SBG.



[Figure 4.1: Programme Architecture]

4.3 Tools and Technologies used to develop the System

4.3.1 Macromedia Adobe Flash

Macromedia started in 1992. Macromedia was an American graphics and web-development software, produced such products as **Macromedia Flash** as well as **Macromedia Dreamweaver**. Adobe Flash Systems (formerly Macromedia Flash) is a multimedia platform originally acquired by Macromedia and currently developed and distributed by Adobe Systems. From 1996 to 2008 Macromedia flash 1, 2, 3, 4, 5, MX, MX 2004, 8, CS3 Professional, CS4 Professional versions are introduced in market.

Flash is a multipurpose software used for the creation of multimedia graphics, animation, viewing multimedia, streaming video and audio and especially executing rich internet applications and web pages. It works on Adobe Flash platform and uses vector based-many individual objects with individual properties and to represent images uses points, lines, curves, and polygons. Used vector graphics by Flash can be scaled to any size without making any change in quality or clarity. Interactive media web pages, animation, games, real-time chat applications, and video conferencing can be done interacting with interfaces such as interfaces. Although the program is chiefly colligated with creating content for the internet, Flash is also applied to create stand-alone CD-ROMS and presentations, animation for television, content for PDAs, interactive television, kiosks and mobile phones.¹ Flash contains a scripting language called ActionScript that allows for interactive Flash animations. ActionScript has some specific features such as fully event-driven, has no need to typing, has Java-similar syntax, and it is object-oriented.

Flash is very useful point of view of animation. Animation drew up with several particular images and each image is referred to as a frame. In Flash these frames are represented by the little rectangular cells in the timeline at the top of the interface. By default Flash contains initially only one frame. It will be demanded to create extra frames when start creating animation. Flash has some advantages such as interactive content, load faster than HTML, not

¹ Hosea, Birgitta, 2006. *The Focal Easy guide to Macromedia Flash 8*, Focal Press, Burlington, USA

by them until Macromedia was acquired by Adobe Systems in 2005.² Dreamweaver is a professional HTML editor for visually designing and managing web pages and sites. Markup languages are sets of directions that determine how a document looks on the WWW. Web browsers are software applications interprets HTML and display documents accordingly.³

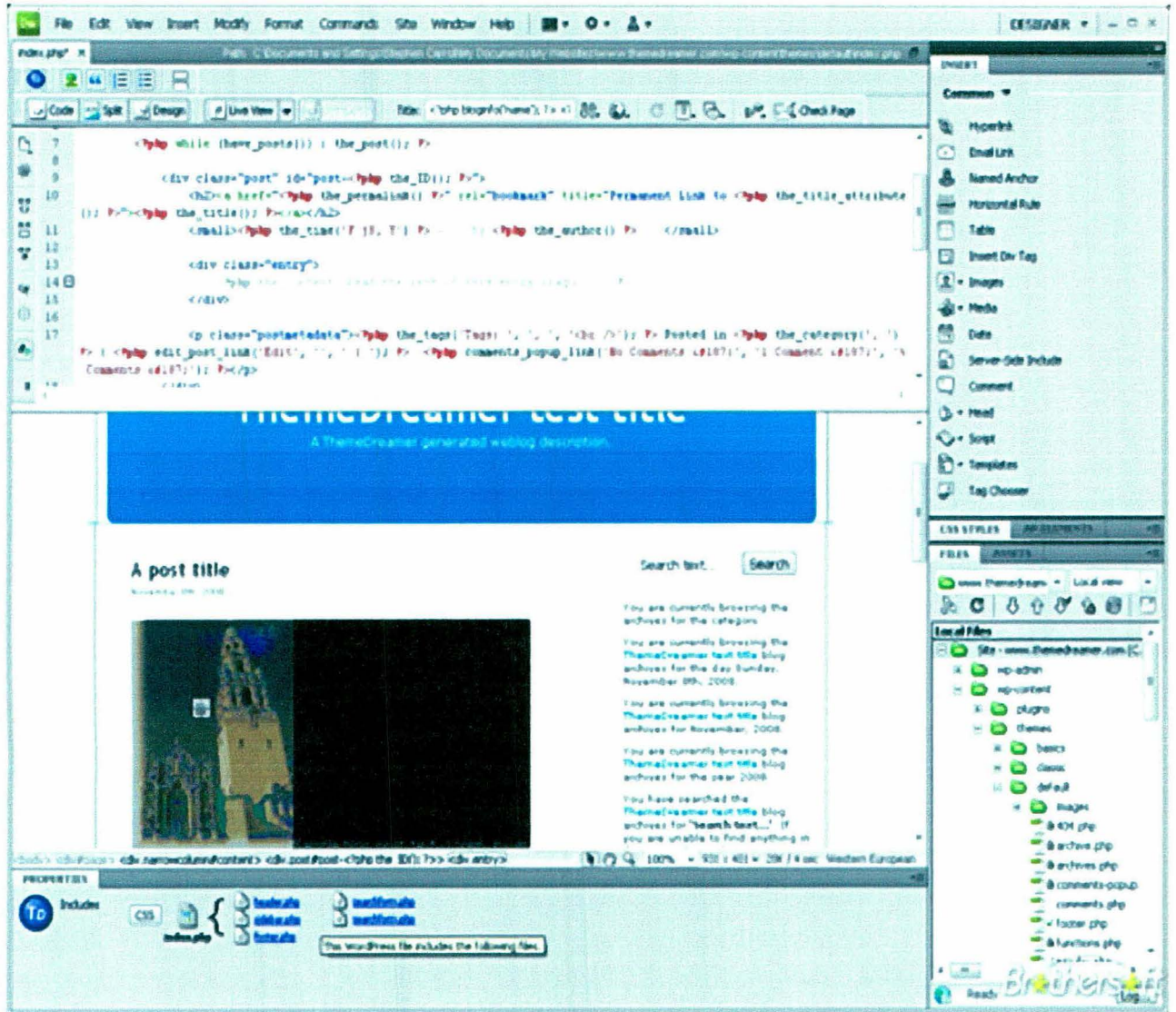
In addition to drawing an interactive web page it is simple to create tables, edit frames, work with layers, and insert Java script behaviors. It provides updating the web site in the server without leaving the program.

In the present research work, animation part of SBG is needed to develop an interactive and smarter web page. In addition to developing web-page, Macromedia Flash will be used to create standalone system. Some versions are considerable here which are used. The design edition features of Dreamweaver 8 allow to quickly adding objects and functionality to pages, without having to program the HTML code manually. Powerful tools of Dreamweaver allow building and handling great web-sites through an intuitive graphical user interface. It integrates perfectly with other leading applications like Fireworks and Flash. It also respects all the latest internet standards. Dreamweaver CC can easily add streamlined HTML5 audio and video on websites and applications. The clean interface and code hints of this software make the procedure of inserting rich media quicker and more effective.

A figure of Dreamweaver software is given here which is showing how database prepared and created web page -

² www.adobe.com/products/dreamweaver/ accessed on 23/07/2013

³ E-book 'Web Designer with Dreamweaver' Retrieved from Stanford University Academic Computing on 22/7/2013



[Figure 4.3: Macromedia Adobe Flash]

4.3.3 Apache Tomcat 4.0

Apache Tomcat is an open source Servlet container developed by Apache Tomcat Foundation (ATF). Tomcat implements the Java Servlet and Java Server Pages specifications from Sun Microsystems. It provides a pure Java HTTP web server environment for Java code to run.⁴ Apache Tomcat includes tools for configuration and management, but can also be configured by editing XML configuration files. Apache Tomcat is developed in an open and participatory environment and released under the Apache License version 2. Tomcat is intended to be a collaboration of the best of breed developers from around the world.⁵

4.3.4 Java Servlet Technology

A servlet is a Java programming language class used to extend the capabilities of servers that host applications accessed via a request- response programming model. Although servlets can respond to any type of request, but they are commonly used to extend the application hosted by web servers. For such applications, Java servlet technology defines HTTP - specific servlet classes.⁶ Java servlet technology provides Web developers with a simple, consistent mechanism for extending the functionality of a Web server and for accessing existing business systems. A servlet can almost be thought of as an applet that runs on the server side without a face. Java servlets make many Web applications possible.⁷

A servlet can almost be thought of as an applet that runs on the server side without a face. Java servlets make many web applications. Servlet have access to the entire family of Java APIs, including the JDBC API to access enterprise databases. Servlets can also access a library of HTTP - specific calls and receive all the benefits of the mature Java language including portability, performance, reusability and crash protection.

⁴ http://en.wikipedia.org/wiki/Apache_Tomcat : accessed on 24/07/2013

⁵ <http://tomcat.apache.org/> : accessed on 24/07/2013

⁶ http://en.wikipedia.org/wiki/Java_Servlet : accessed on 24/07/2013

⁷ <http://www.oracle.com/technetwork/java/index-jsp-135475.html> : accessed on 24/07/2013

4.3.5 Java Server Pages

Java server pages (JSP) is a technology that helps software developers create dynamically generated web pages based on HTML, XML or other document types released in 1999 by Sun Microsystems.⁸ JSP technology provides a simplified, fast way to create dynamic web content. JSP technology enables rapid development of web based applications that are server and platform independent. JSP technology enables Web developers and designers to rapidly develop and easily maintain, information-rich, dynamic Web pages that leverage existing business systems. JSP technology separates the user interface from content generation, enabling designers to change the overall page layout without altering the underlying dynamic content.⁹ To distribute and run Java Server Pages, a compatible web server with a servlet container, such as Apache Tomcat or Jetty is required. The front end of the system is developed in UTF-8 enabled JSP and HTML. The main JSP page allows to user to give input in UTF-8 format using HTML. Just one click upon the button labeled “click here to process”, calls Java object SBG database to process the input. The output returned by Java objects is displayed to the user in Devanāgarī UTF-8 format.

The JSP technology helps to create web based applications by combining Java code with HTML. The web server runs the Java code and displays the result in HTML. It works with the help of Apache Tomcat web server.

4.3.6 RDBMS

RDBMS tool has been defined in previous chapter. Using RDBMS techniques, the most important and core of the present research was to design and develop a database driven knowledge according to the structure of SBG.

4.3.7 Database Connectivity

⁸ https://en.wikipedia.org/wiki/JavaServer_Pages : accessed on 24/07/2013

⁹ <http://www.oracle.com/technetwork/java/javaee/jsp/index.html> : accessed on 24/07/2013

JDBC is a Java-based data access technology (Java Standard Edition platform) from Oracle Corporation. This technology is an API for the Java programming language that defines how a client may access a database. It provides methods for querying and updating data in a database. JDBC is oriented towards relational databases.¹⁰

Sun Microsystems released JDBC as part of JDK1.1 on February 19, 1997. JDBC technology allows to use the Java programming language to develop ‘write once, run anywhere’ capabilities for applications that require access to large scale data. JDBC works as a bridge between Java program and database. JDBC allows multiple implementations to exist and be used by the same application. The API provides a mechanism for dynamically loading the correct Java packages and registering them with the JDBC Driver Manager. The Driver Manager is used as a connection factory for creating JDBC connections.

JDBC connections support creating and executing statements. These may be update statements such as SQL's Create, Inserts, Updates and Delete, or they may be query statements such as Select. Additionally, stored procedures may be invoked through a JDBC connection. JDBC represents statements using one of the following classes.¹¹

4.4 Programming (code) Description

The following code snippet instructs the page to set the language and content encoding input and output in UTF-8-

```
<%@ page  
  
    language="java"  
  
    pageEncoding="utf-8"  
  
    contentType="text/html; charset=utf-8"  
  
    import="java.util.*"  
  
%>
```

¹⁰ http://en.wikipedia.org/wiki/Java_Database_Connectivity : accessed on 24/07/2013

¹¹ Ibid.

The following code imports java.util and user defined Java package named bg (bhagavadgeeta).

```
<%@ page import="bg.*" %>
```

```
<%@ page import="java.util.*"%>
```

```
<%! String key,val, subKey; %>
```

```
<%
```

```
    M bg = new BhagavadGita ();
```

The following code sets the encoding of the page to UTF-8.

```
    request.setCharacterEncoding("UTF-8");
```

The following code sets the path of main database file of SBG, from the search page carries data.

```
    String lexiconPath = request.getRealPath("/")+"WEB-INF/datafiles/geeta_lexicon.txt";
```

The following code defines the path of Lexicon Search.

```
    LexiconSearch ls = new LexiconSearch(lexiconPath);
```

The following code defines dropdown box for direct search and initializes the integers and string.

```
    String searchtype = "direct";
```

```
    int parva = 0;
```

```
    String upaparva = "";
```

```
    int adhyaya = 0;
```

```
    int akhyana = 0;
```

```
    int shloka = 0;
```

```
String ddfocus="parva";
```

```
String token="";
```

```
String adhName="";
```

```
int c=0;
```

Following code draws the text box and search button for the Direct search..

```
String searchstr="";
```

```
String bgShl="", gitaRef="", mahaRef="", bgTrans="", bgSandhi="", bgAnvay="", bgTagData="";
```

```
String gitaShl="", gtRef="", mhRef="", gitaTrans="", gitaSandhi="", gitaAnvay="", gitaTagData="";
```

```
String display_format = "Bhagavadgita Shloka\tBhagavadgita Reference\tMahabharata Reference\tHindi  
Translation\tSandhi-split Shloka\tAnvayakrama\tTagged Shloka";
```

The below code obtains the different values of the search queries-

```
try{  
  
    ddfocus = request.getParameter("ddfocus");  
  
}  
  
catch(Exception e){  
  
    ddfocus="parva";  
  
}  
  
System.out.println("ddfocus="+ddfocus);
```

<center>

The below code draws the text box and search button for the exact search query-

```
<table valign=top align=center border=2 cellspacing=1 cellpadding=1 width=100%>
```



```

<font size=3>
<a href=ibasic.jsp?searchtype=alphabet&itext=&#2384;>&#2384;</a> </a>&nbsp;&nbsp;&nbsp;
<a href=ibasic.jsp?searchtype=alphabet&itext=&#2309;>&#2309;</a> </a>&nbsp;&nbsp;&nbsp;
<a href=ibasic.jsp?searchtype=alphabet&itext=&#2310;>&#2310;</a>&nbsp;&nbsp;&nbsp;
<a href=ibasic.jsp?searchtype=alphabet&itext=&#2311;>&#2311;</a>&nbsp;&nbsp;&nbsp;
<a href=ibasic.jsp?searchtype=alphabet&itext=&#2312;>&#2312;</a>&nbsp;&nbsp;&nbsp;
<a href=ibasic.jsp?searchtype=alphabet&itext=&#2313;>&#2313;</a>&nbsp;&nbsp;&nbsp;
<a href=ibasic.jsp?searchtype=alphabet&itext=&#2314;>&#2314;</a>&nbsp;&nbsp;&nbsp;
<a href=ibasic.jsp?searchtype=alphabet&itext=&#2319;>&#2319;</a>&nbsp;&nbsp;&nbsp;
else { %>

```

```

<% if (searchtype.equals("alphabet") && searchstr !=null && searchstr.length(>0){ %>

```

```

<h2>Results for '<%=searchstr%>' </h2>

```

```

<%

```

```

LexiconAlphaSearch las = new LexiconAlphaSearch();

```

```

Hashtable alphaSrchHT = las.getShloka(lexiconPath, searchstr);

```

```

//System.out.println("alphaSrchHT="+alphaSrchHT);

```

```

if(alphaSrchHT.size()!=0 && alphaSrchHT!=null){

```

```

Enumeration en = alphaSrchHT.keys();

```

```

while(en.hasMoreElements()){

```

```

String subShlk = (String)en.nextElement();

```

```

String shlkDesc = (String)alphaSrchHT.get(subShlk);

```

```

if(shlkDesc.indexOf("\t")>-1){

```

```

~ 77 ~

```

```

        bgSh1 = shlkDesc.substring(0, shlkDesc.indexOf("\t"));
String bgStr1 = shlkDesc.substring(shlkDesc.indexOf("\t")+1, shlkDesc.length());

        if(bgStr1.indexOf("\t")>-1){

                gitaRef = bgStr1.substring(0, bgStr1.indexOf("\t"));

String bgStr2 = bgStr1.substring(bgStr1.indexOf("\t")+1, bgStr1.length());

                if(bgStr2.indexOf("\t")>-1){

}

else{

gitaRef = bgStr1;

mahaRef = "";

bgTrans = "";

bgSandhi = "";

bgAnvay = "";

bgTagData = "";

}

}

else{

bgSh1 = shlkDesc;

gitaRef = "";

mahaRef = "";

```

```

        bgTrans = "";

        bgSandhi = "";

        bgAnvay = "";

        bgTagData = "";

    }

    %>

<ahref="ibasic.jsp?bgShl=<%=bgShl%>&gitaRef=<%=gitaRef%>&mahaRef=<%=mahaRef%>&bgTrans=<%=bg
Trans%>&bgSandhi=<%=bgSandhi%>&bgAnvay=<%=bgAnvay%>&bgTagData=<%=bgTagData%>&searchtype
=alphabet&itext=<%=searchstr%>"><font          size=3          face="Times          New
Roman"><b><%=subShlk%></b></font></a><br>

    <%}

    }else{

        String msg = las.getMsg();%>

<font size=3 face="Times New Roman" color=red><b><%=msg%></b></font>

        <%}

        %>

        <%}%>

<% } %>

```

Following code defines Adhyaya search

```
<font color=#1B67AD size=4><b><u>SEARCH BY Adhyaya</u><b></font>
```

```
<table>
```

```

<tr>

        <td><b>Adhyay</b><br>

        <select name="parva">

<option value=1 <% if (parva==1){ %> selected <% } %> >&#2309;&#2343;&#2381;&#2351;&#2366;&#2351;
&#2407;
&#2309;&#2352;&#2381;&#2332;&#2369;&#2344;&#2357;&#2367;&#2359;&#2366;&#2342;&#2351;&#2379;
&#2327;&#2307;</option>

<option value=2 <% if (parva==2){ %> selected <% } %> >&#2309;&#2343;&#2381;&#2351;&#2366;&#2351;
&#2408;
&#2360;&#2366;&#2329;&#2381;&#2326;&#2381;&#2351;&#2351;&#2379;&#2327;&#2307;</option>

```

Following code gives description about the class and method called for direct search.

```

<%

        System.out.println("parva="+parva);

String shlokaFilePath = request.getRealPath("/")+"WEB-INF/datafiles/adhyaya"+parva+".txt";

String adh_listFilePath = request.getRealPath("/")+"WEB-INF/datafiles/adhyaya_list.txt";

String imagePath = request.getRealPath("/")+"bhagavadgitaFiles/adhyaya"+parva;

        BhagavadGita bg = new BhagavadGita();

        Hashtable shlKHT = bg.getShlokaDescription(shlokaFilePath);

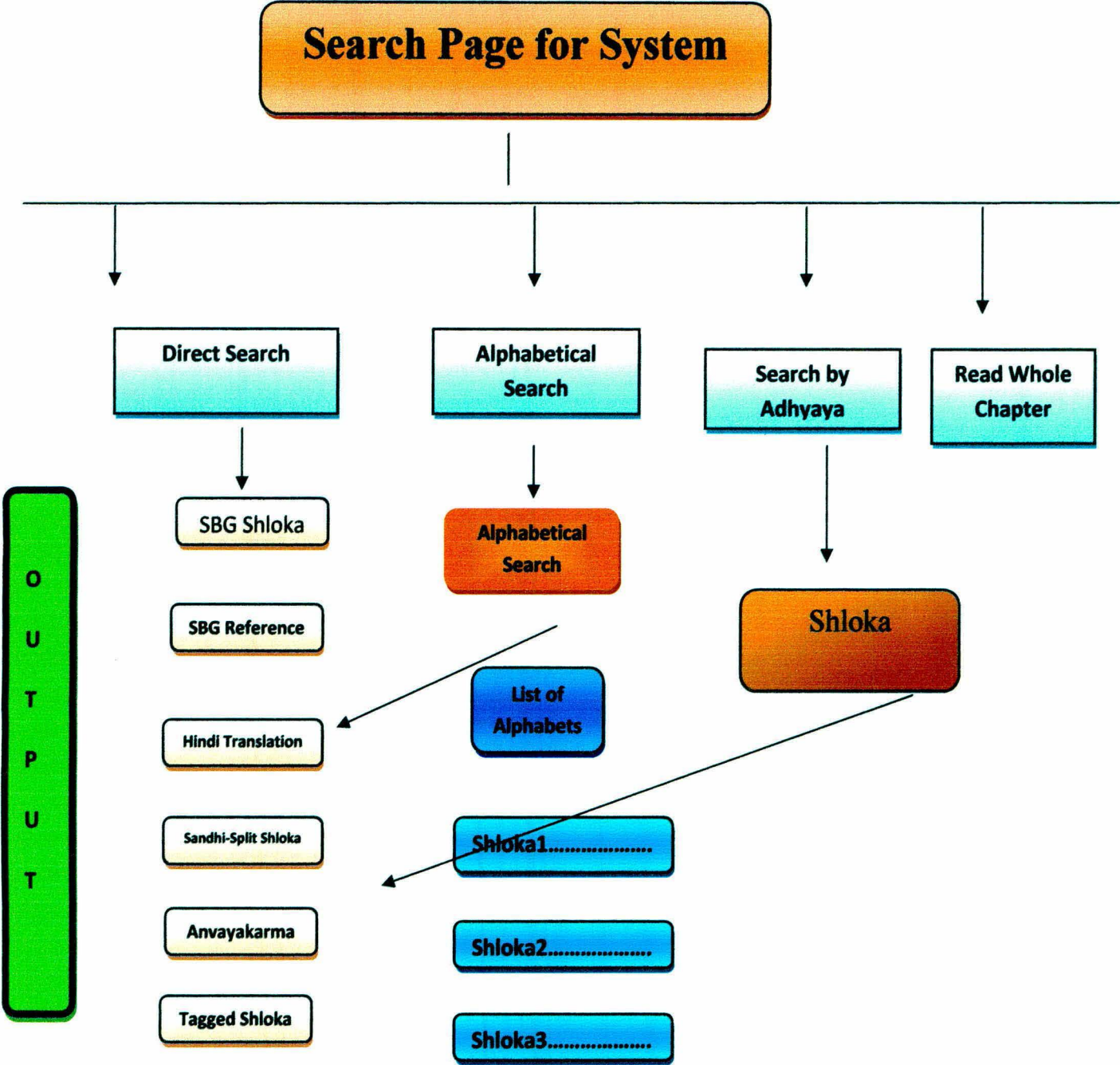
        Hashtable adhyHT = bg.getAdhyayaName(adh_listFilePath);

```

4.5 How to Use the System

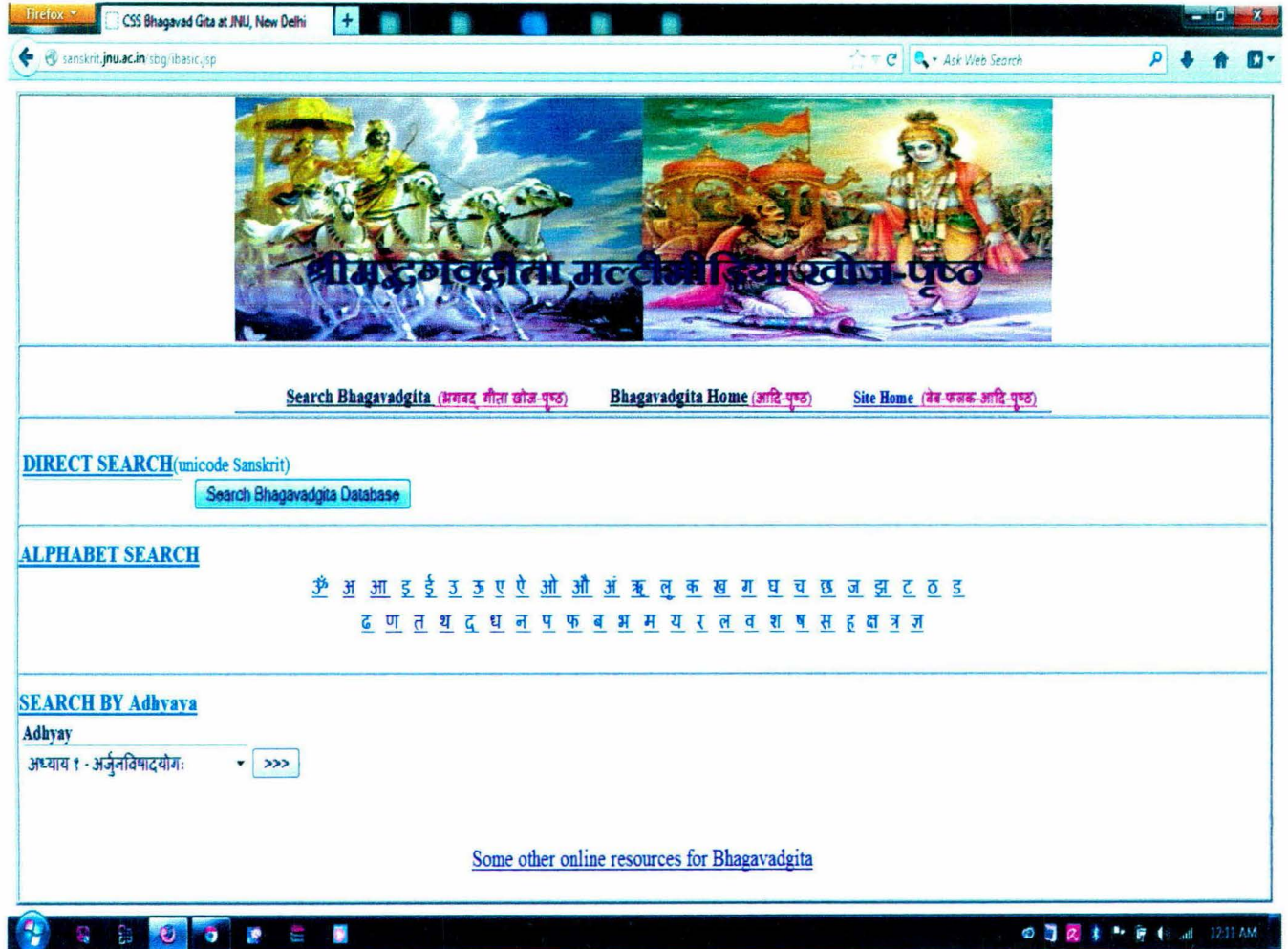
In the present research work, Multimedia e-book of SBG has been developed with some features currently under development. The e-book is available on our website under the 'Computational Linguistics R&D Special centre for Sanskrit Studies, J.N.U, link is <http://sanskrit.jnu.ac.in/sbg> . To access on system, a user can simply log on to the above URL and use any Devanāgarī mechanism as Baraha to provide the input in the search box. Input is acceptable in three ways i.e.

input any word of related database, select input word through alphabetical category or select input word from drop down box. Given chart is expressing the structure of input:



[Figure 4.4: Chart of structure of search engine]

Search starts from this page as above mentioned that it accepts input in three steps. The system does search from the data stored in datafiles as part of programming. Input text will be in Devanāgarī utf-8.



[Snapshot 4.2: Search page for SBG e-book and Search engine]

The first search button **Direct Search** have a drop down box to input word. It provides multidimensional search for SBG. If user input any word in Hindi or Sanskrit for searching than system replied information about whole *śloka* related to the given word. Output have rich information i.e. Sandhi-Split, Anvaya, Tagging.

Search Bhagavadgita (अथर्व गीता खोज-पुस्त) Bhagavadgita Home (आदि-पुस्त) Site Home (वेब-पृष्ठ-आदि-पुस्त)

DIRECT SEARCH(unicode Sanskrit)

पाञ्चजन्यं Search Bhagavadgita Database

Results for 'पाञ्चजन्यं'

Bhagavadgita Shloka	Bhagavadgita Reference	Mahabharata Reference	Hindi Translation	Sandhi-split Shloka	Anvayakrama	Tagged Shloka
पाञ्चजन्यं हृषीकेशो देवदत्तं धनञ्जयः। पौण्ड्रं दध्मौ महाशङ्खं भीमकर्मा वृकोदरः॥	1.15	6023015	अन्तर्यामी भगवान् श्रीकृष्ण ने पांचजन्य नामक तथा अर्जुन ने देवदत्त नामक शंख बजाया और भयानक कर्म करनेवाले वृकोदर भीम ने पौण्ड्र नामक महाशंख बजाया।।	पाञ्चजन्यम् हृषीकेशः देवदत्तम् धनञ्जयः पौण्ड्रम् दध्मौ महा-शङ्खम् भीम-कर्मा वृक-उदरः	हृषीकेशः पाञ्चजन्यम्, धनञ्जयः देवदत्तम् भीम-कर्मा वृक-उदरः पौण्ड्रम् महा-शङ्खम् दध्मौ॥	पाञ्चजन्यं/NS हृषीकेशः/NS देवदत्तम्/NS धनञ्जयः/NS पौण्ड्रं/NS दध्मौ/KP महाशङ्खं/NP भीमकर्मा/NV वृकोदरः/NS ॥/PUNC 1.15/PUNC ॥/PUNC

ALPHABET SEARCH

[Snapshot 4.3: Direct search page for SBG e-book and Search engine]

Second Search option makes alphabetical search, as below in this chart all the characters of Devanāgarī are listed in utf-8 and hyperlinked. When any alphabet is clicked by user the *śloka*s fragments starting with related characters are displayed. These hyperlinked *śloka*s are connected to the database of direct search so the same information is provided by this.

The screenshot shows a web browser window with the address bar displaying 'sanskrit.jnu.ac.in/sbg/basic.jsp?searchtype=alphabet&text=त'. The page content includes a banner image with the text 'श्रीमद्भगवद्गीता मल्लिकार्जुनसंवाह-पृष्ठ'. Below the banner, there are three navigation links: 'Search Bhagavadgita (अमरवद गीता खोज-पृष्ठ)', 'Bhagavadgita Home (आदि-पृष्ठ)', and 'Site Home (वेब-फलक-आदि-पृष्ठ)'. The 'DIRECT SEARCH' section has a search button labeled 'Search Bhagavadgita Database'. The 'ALPHABET SEARCH' section displays a grid of Devanagari characters: 'ॐ अ आ इ ई उ ऊ ए ऐ ओ औ अं ऋ लृ क ख ग घ च छ ज झ ट ठ ड ढ ण त थ द ध न प फ ब भ म य र ल व श ष स ह ळ व्र ज'. Below the grid, the search results for the character 'त' are listed: 'Results for 'त'' followed by 'तन्नापरयत्स्थितान्यार्थः पितृनय...', 'ततः शङ्खारच...', 'तस्मान्नाही वयं...', 'ततः श्वेतैर्हयैर्युक्ते...', and 'तस्य सञ्जनयन...'.

[Snapshot 4.4: Alphabetical search page for SBG e-book and Search engine]

On alphabetical search after click on hyperlink of any *śloka* it results the all information's as above in direct search.

The screenshot shows a Firefox browser window with the address bar displaying the URL: sanskrit.jnu.ac.in/sbg/basic.jsp/bgShl=ततः श्वेतैर्हयैर्युक्ते महति स्यन्दने स्थितौ। माधवः पाण्डवश्चैव दिव्यौ शङ्खौ प्रदध्मतुः. The search results are for the character 'त'.

Results for 'त'

- [तत्रापरयत्स्थितान्पार्थः पितृनय...](#)
- [ततः शङ्खाश्च...](#)
- [तस्मान्नार्हा वयं...](#)
- [ततः श्वेतैर्हयैर्युक्ते...](#)
- [तस्य सञ्जनयन्...](#)

SEARCH BY Adhyaya

Adhyay
अध्याय १ - अर्जुनविषादयोग: >>>

Results

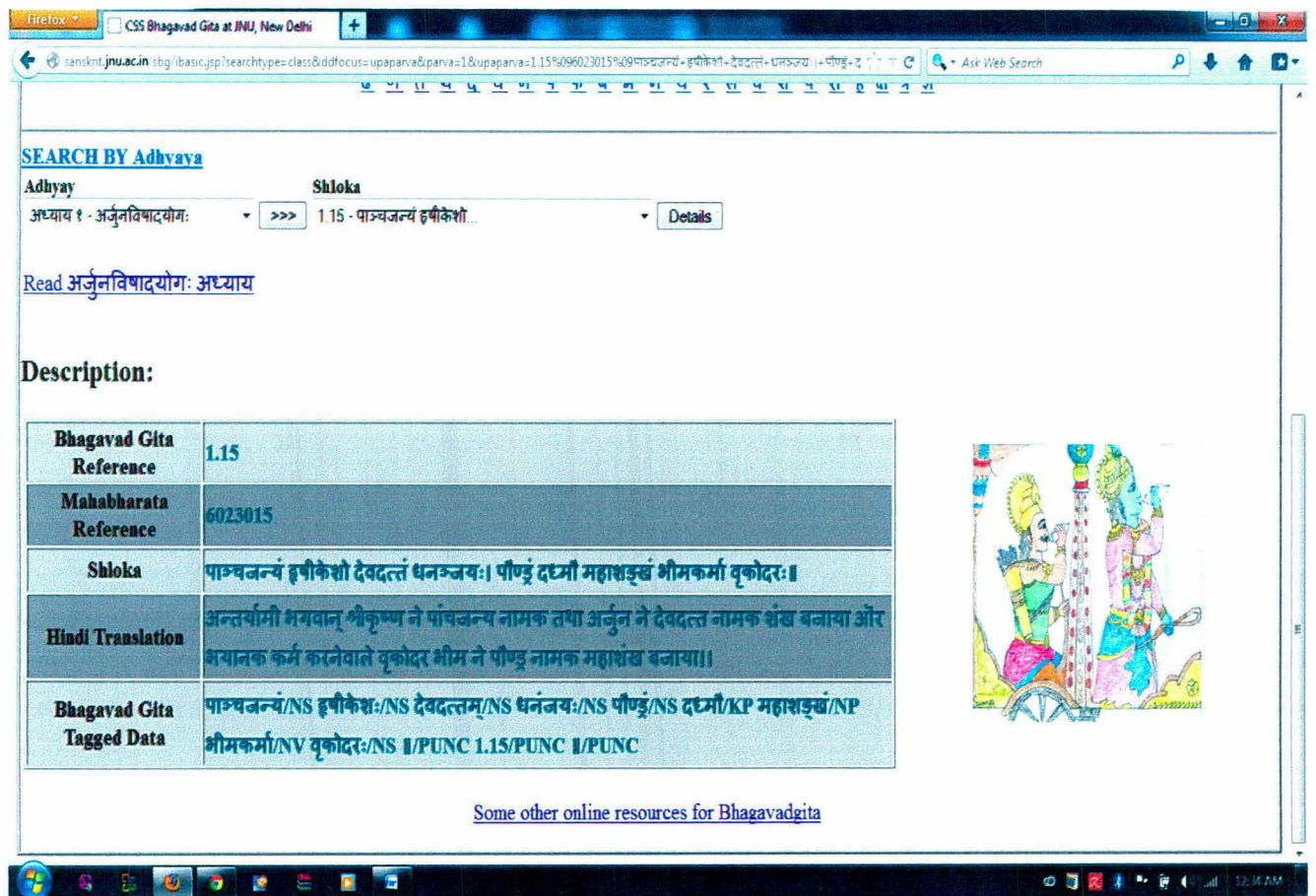
Index Search for त alphabet

Shloka:	ततः श्वेतैर्हयैर्युक्ते महति स्यन्दने स्थितौ। माधवः पाण्डवश्चैव दिव्यौ शङ्खौ प्रदध्मतुः॥
Bhagavad Gita Reference:	1.14
Mahabharata Reference:	6023014
Hindi Translation:	उसके बाद सफेद घोड़ों से युक्त महान रथ पर बैठे हुए लक्ष्मीपति भगवान् और पाण्डुपुत्र अर्जुन ने दिव्य शंखों को बड़े जोर से बजाया॥
Sandhi-split Shloka:	ततः श्वेतैः हयैः युक्ते महति स्यन्दने स्थितौ माधवः पाण्डवः च एव दिव्यौ शङ्खौ प्रदध्मतुः
Anvayakrama:	ततः श्वेतैः हयैः युक्ते महति स्यन्दने स्थितौ माधवः पाण्डवः च एव दिव्यौ शङ्खौ प्रदध्मतुः॥
Bhagavad Gita Tagged Data:	ततः/A श्वेतैः/NV हयैः/NP युक्ते/KN महति/NV स्यन्दने/NP स्थितौ/KN माधवः/NS पाण्डवः/NP च/APY एव/A दिव्यौ/NV शङ्खौ/NP प्रदध्मतुः/KP ॥/PUNC 1.14/PUNC

[Snapshot 4.5: Alphabetical Hyperlink search page for SBG e-book and Search engine]

A smart search has made by Adhyaya searching. Here reading of SBG is very easy because it have three steps to accessing the text; these are list of Adhyaya, and have list of *śloka* under it and last is details about particular *śloka*. In very starting user can select Adhyaya from the box then *śloka* from the list given in box and after clicking on *śloka* the multimedia information will display.

After clicking and selecting the chapter by Adhyaya button, it provides another link also named by “Read....Adhyaya” to read the whole text in e format. This version display plain text of SBG with including *śloka*, Hindi translation and images. This is e-book of SBG.



SEARCH BY Adhvaya


Adhyay: अध्याय १ - अर्जुनविषादयोग: >>> Shloka: 1.15 - पाञ्चजन्यं हृषीकेशो... Details

[Read अर्जुनविषादयोग: अध्याय](#)

Description:

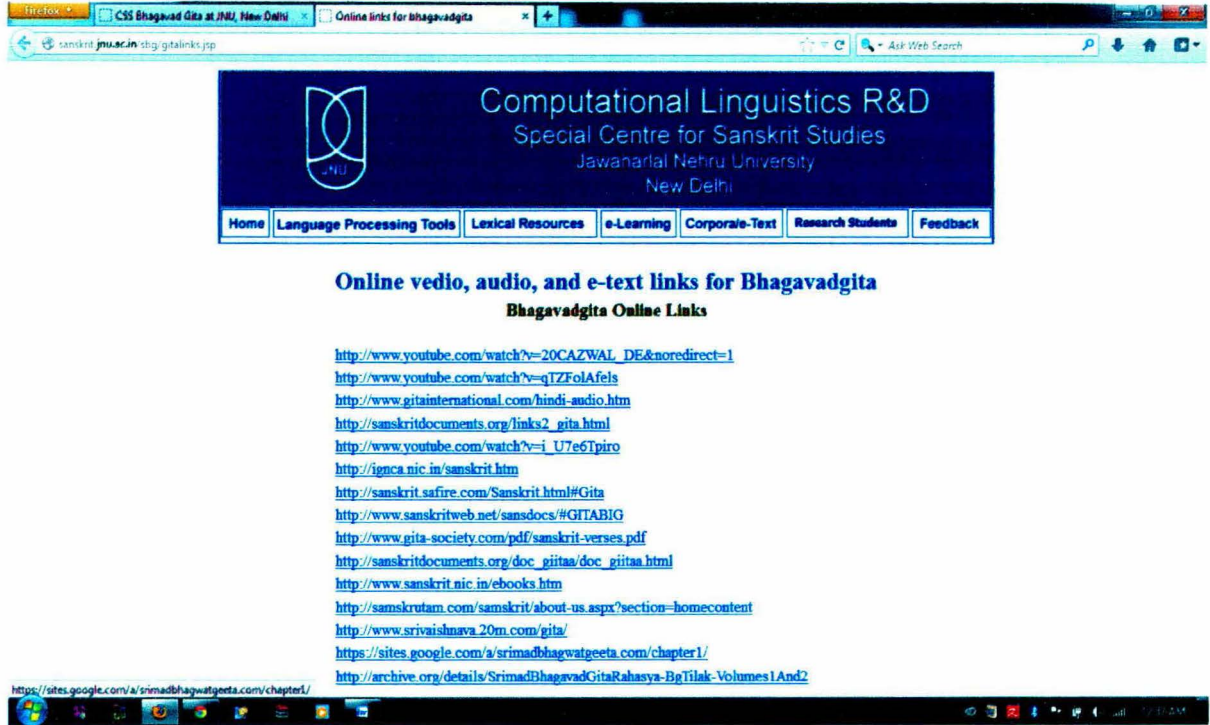
Bhagavad Gita Reference	1.15
Mahabharata Reference	6023015
Shloka	पाञ्चजन्यं हृषीकेशो देवदत्तं धनञ्जयः। पीण्डुं दध्मी महाशङ्खं भीमकर्मा वृकोदरः॥
Hindi Translation	अन्तर्यामी भगवान् श्रीकृष्ण ने पांचजन्य नामक तथा अर्जुन ने देवदत्त नामक शंख बजाया और भयानक कर्म करनेवाले वृकोदर भीम ने पीण्डु नामक महाशंख बजाया।।
Bhagavad Gita Tagged Data	पाञ्चजन्यं/NS हृषीकेशः/NS देवदत्तम्/NS धनञ्जयः/NS पीण्डुं/NS दध्मी/KP महाशङ्खं/NP भीमकर्मा/NV वृकोदरः/NS ॥/PUNC 1.15/PUNC ॥/PUNC

[Some other online resources for Bhagavadgita](#)



[Snapshot 4.6: Adhyaya search page for SBG e-book and Search engine]

Some important online sources where SBG is available in e-text, audio or video form are listed and hyperlinked in this page.



[Snapshot 4.6: Online e-sources for SBG text]

4.6 Front end of SBG indexer

The MM system of SBG works on Apache Tomcat web server. Some information about Apache Tomcat is discussed below-

Apache Tomcat is an open source Servlet container developed by Apache Tomcat Foundation (ATF). Tomcat implements the Java Servlet and Java Server Pages specifications from Sun Microsystems. It provides a pure Java HTTP web server environment for Java code to run. Apache Tomcat includes tools for configuration and management, but can also be configured by

editing XML configuration files. Tomcat is intended to be a collaboration of the best of breed developers from around the world. ¹²

¹² <http://apache.org/> : accessed on 20/07/2013

Conclusion

Conclusion

The present work is an R&D effort at the M.Phil. level for developing an multimedia e-book and multidimensional search system of *Śrimadbhagavadgītā* (with special reference to chapter one, *Arjuna-Viśādayoga*). For completion the research work a wide study on e-books or digital learning technologies was done. On the starting stage data collection and survey about e-books, multimedia technologies, modern learning systems and benefits of e-books or e-learning were done. After, status of Sanskrit language and its importance in various domains of knowledge was evaluated. A parallel study for Multimedia learning technologies and Ancient Indian Heritage Texts as a source of knowledge was done. Study resulted approach that can applied and useful to each other. The idea was made to develop multimedia e-learning system for AIH texts. It is too beneficial to preserve our rich texts of knowledge. It provides new dimensions for study of Sanskrit. In this context *Śrimadbhagavadgītā*, one of the most popular text of Indian ancient heritage, selected by me. The text has richness in knowledge because it have such type of message which satisfied every person. Today almost new sectors like business, administration, psychology, management and many more refers study of SBG and carried out lots of thoughts of the text. Now it is necessary to provide our AIH texts in an attractive form by new technologies such as e-book.

After survey of both domains, database was collected by the help of M.A. Students of our centre. The process of making an online system was started by evolution of tools and techniques like as JSP for front end and Java for Servlet objects and Apache tomcat for web server was studied and an online interface was developed which is available online on - <http://sanskrit.jnu.ac.in/sbg> .

The system (or e-book) provides following facilities for user.

- The system allows accessing online anytime and making available a Multi- dimensional search engine.
- User can search smartly or can say search engine provides user-friendly search.
- This system has dynamic input mechanism. One can search by direct typing the input word, selecting input word through alphabetical category or selecting the input word from drop down box.
- It provides e-book of SBG that contains plane text, translation and image of related *śloka*.

- After searching any word, system display output with a rich information of text like Anvayakrama, Sandhi-split, POS categories of word.

Limitations of system

Current system have illustration only for chapter one because of limitation of research duration. System also not connected with other lexical resources as other are.

Future Research and Developments

The present system for SBG text has a tremendous potential to develop e-books for AIH texts. The system will proved a role model to developing the online e-books for our heritage texts.

Animation system of SBG will prove very beneficial for our new generation, especially for children.

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