A Modern Grammar of Hindi

A Formal Approach

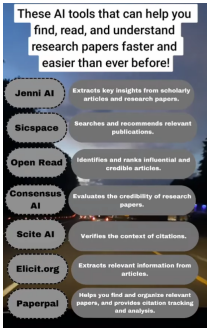
Vivek Tripathi

Indian Institute of Technology (BHU) Varanasi

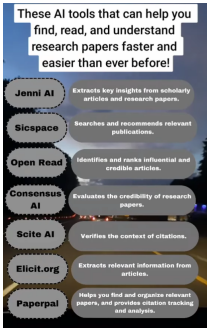
January 19, 2025

Outline

Who is this?


These AI tools that can help you find, read, and understand research papers faster and easier than ever before!
Jenni AI
Extracts key insights from scholarly articles and research papers.
Sicspace
Searches and recommends relevant publications.
Open Read
Identifies and ranks influential and credible articles.
Consensus AI
Evaluates the credibility of research papers.
Scite AI
Verifies the context of citations.
Elicit.org
Extracts relevant information from articles.
Paperpal
Helps you find and organize relevant papers, and provides citation tracking and analysis.

Who is this?



- Donald Ervin Knuth
- American computer scientist and mathematician
- Professor Emeritus Stanford University
- 1968: The *Art of Computer Programming* was published (First)
- 1974: Turing Award
- 1976: Second edition was published
- 1978: Written and design TEX
- A typesetting system or the formatting system

Now, Who is this?

Now, Who is this?

- Leslie Lamport
- American computer scientist
- 1985: Created LaTeX
- 2013: Turing Award
- The current standard version LaTeX2e

Why LaTeX?

- Superior typesetting quality (esp. of mathematical expressions)
- Microsoft Word is WYSIWYG (What You See Is What You Get)
- LaTeXis a very different style of working
- Focus on content rather than formatting
  - consistent formatting of elements
  - no need to remember margins, spacing (before / after), font size, etc.
  - no need to manually number sections, tables, figures, footnotes, citations, references, etc.
  - Automatic creation of table of contents, index, etc.
- **Free** software
- LaTeXis widely used in academic writing

But. . .

Disadvantages

- Not WYSIWYG
- Need to remember formatting commands. Although IDEs make it easy
- Floating tables and figures can be hard to place

Hello World!

```
\documentclass[12pt,a4paper]{report}
% This is a comment that says where the preamble is
\begin{document}
     Hello World!
\end{document}
```

Document types

- `article`: papers, articles, etc.
- `book`
- `report`: technical reports, booklets, theses, etc.
- `memoir`: more flexible, well-documented replacement for book / report
- `letter`
- `beamer`: presentations (like this one)
- `IEEEtran`
- `llncs.cls`
- `acm_proc_article-sp.cls`

Common errors

- Undefined control sequence (usually mis-spelt commands)
- Missing $ inserted (not in math mode)
- Runaway argument (no closing })
- Too many }'s (no opening {)
- File not found (missing packages, wrong paths, etc.)

Small LaTeX Document Structure

```
\documentclass{article}
\usepackage{amsmath} % For math symbols and environments
\usepackage{graphicx} % For including images
\usepackage{enumerate} % For different list styles
\begin{document}
% Title and Author
\title{A Simple LaTeX Document}
\author{Your Name}
\date{\\today}
\maketitle
\tableofcontents
\section{Introduction}
```

Document Structure

- Document classes: `article`, `report`, `book`, `beamer`, etc.
- Begin and end document with `\begin{document}` and `\end{document}`.

Lists

- Create unordered lists using \begin{itemize}.
- Example:

```
\begin{itemize}
  \item The first item
  \item The second item
  \item The third etc
\end{itemize}
```

Lists

- Create unordered lists using \begin{itemize}.
- Example:

```
\begin{itemize}
  \item The first item
  \item The second item
  \item The third etc
\end{itemize}
```

- The first item
- The second item
- The third etc

Lists

- Create ordered lists using \begin{enumerate}.
- Example of an ordered list:

```
\begin{enumerate}
  \item The first item
  \item The second item
  \item The third etc
\end{enumerate}
```

Lists

- Create ordered lists using \begin{enumerate}.
- Example of an ordered list:

```
\begin{enumerate}
  \item The first item
  \item The second item
  \item The third etc
\end{enumerate}
```

1. The first item
2. The second item
3. The third etc

Roman Numeral Ordered List

- You can create an ordered list with Roman numerals using \begin{enumerate}[I].
- Need to add \usepackage{enumerate} package.
- Example:

```
\begin{enumerate}[I]
  \item One
  \item Two
  \item Three
  \item Four
\end{enumerate}
```

Roman Numeral Ordered List

- You can create an ordered list with Roman numerals using \begin{enumerate}[I].
- Need to add \usepackage{enumerate} package.
- Example:

```
\begin{enumerate}[I]
  \item One
  \item Two
  \item Three
  \item Four
\end{enumerate}
```

I. One
II. Two
III. Three
IV. Four

Nested Lists Example

- You can create nested lists using different environments like \begin{enumerate}, \begin{itemize}, \begin{description}.
- Example:

```
\begin{enumerate}
  \item Ph.D.
  \begin{itemize}
    \item First Year
    \item Fifth Year
    \begin{description}
      \item[SOTA:] Ha ha ha
      \item[Pre-PhD:] Hi
    \end{description}
  \end{itemize}
  \item B.Tech.
\end{enumerate}
```

Nested Lists Example

- You can create nested lists using different environments like \begin{enumerate}, \begin{itemize}, \begin{description}.
- Example:

```
\begin{enumerate}
  \item Ph.D.
  \begin{itemize}
    \item First Year
    \item Fifth Year
    \begin{description}
      \item[SOTA:] Ha ha ha
      \item[Pre-PhD:] Hi
    \end{description}
  \end{itemize}
  \item B.Tech.
\end{enumerate}
```

1. Ph.D.
   - First Year
   - Fifth Year

   SOTA: Ha ha ha
   Pre-PhD: Hi
2. B.Tech.

Font Effects Example

- You can create a variety of font effects using different commands like `\textit`, `\textbf`, etc.
- Example:

```
\textit{words in italics}
\textsl{words slanted}
\textsc{words in smallcaps}
\textbf{words in bold}
\texttt{words in teletype}
\textsf{sans serif words}
\textrm{roman words}
\underline{underlined words}
```

Font Effects Example

- You can create a variety of font effects using different commands like `\textit`, `\textbf`, etc.
- Example:

`\textit{words in italics}`	*words in italics*
`\textsl{words slanted}`	*words slanted*
`\textsc{words in smallcaps}`	WORDS IN SMALLCAPS
`\textbf{words in bold}`	**words in bold**
`\texttt{words in teletype}`	`words in teletype`
`\textsf{sans serif words}`	sans serif words
`\textrm{roman words}`	roman words
`\underline{underlined words}`	underlined words

Inline Math Mode Example

- You can write inline math expressions by enclosing them in `$...$`
- Example:

LaTeX Code

```
This is an inline math expression:  $a^2 + b^2 = c^2$
```

Output

This is an inline math expression: $a^2 + b^2 = c^2$

Equation Array Example

- You can create aligned equations using the `eqnarray` environment.
- Example:

```
\begin{eqnarray}
  a & = & b + c \\
  & = & y - z
\end{eqnarray}
```

Equation Array Example

- You can create aligned equations using the eqnarray environment.
- Example:

```
\begin{eqnarray}
  a & = & b + c \\
  & = & y - z
\end{eqnarray}
```

$$\begin{aligned} a &= b + c && (1) \\ &= y - z && (2) \end{aligned}$$

Online Equation maker

https://editor.codecogs.com/

Figure Example in LaTeX

```
\begin{figure}
  \centering
  \includegraphics[width=0.7
\textwidth]{pic/Knuth.jpg}
  \caption{An example figure.}
\end{figure}
```

Figure Example in LaTeX

```
\begin{figure}
  \centering
  \includegraphics[width=0.7
\textwidth]{pic/Knuth.jpg}
  \caption{An example figure.}
\end{figure}
```


Figure: An example figure.

Tables

- Create tables using the `tabular` environment.
- Example of a table:

```
\begin{tabular}{ l c r }
  1 & 2 & 3 \\
  14 & 25 & 36 \\
  147 & 258 & 369 \\
\end{tabular}
```

Tables

- Create tables using the `tabular` environment.
- Example of a table:

```
\begin{tabular}{ l c r }
  1 & 2 & 3 \\
  14 & 25 & 36 \\
  147 & 258 & 369 \\
\end{tabular}
```

1	2	3
14	25	36
147	258	369

Multicolumn Example

- You can create tables in LaTeX using the `tabular` environment.

```
\begin{tabular}{ l c r }
 \multicolumn{3}{c}{Heading} \\
 1 & 2 & 3 \\
 14 & 25 & 36 \\
 147 & 258 & 369 \\
 \cline{1-2}
\end{tabular}
```

Multicolumn Example

- You can create tables in LaTeX using the `tabular` environment.

```
\begin{tabular}{ l c r }
 \multicolumn{3}{c}{Heading} \\
 1 & 2 & 3 \\
 14 & 25 & 36 \\
 147 & 258 & 369 \\
 \cline{1-2}
\end{tabular}
```

Heading		
1	2	3
14	25	36
147	258	369

Multirow Example

- You can merge rows in a table using the \multirow command.

LaTeX Code:

```
\begin{tabular}{ |c|c|c| }
 \hline
 \multirow{3}{*}{Merged} & A & B \\
 \cline{2-3}
 & C & D \\
 \cline{2-3}
 & E & F \\
 \hline
\end{tabular}
```

Output:

Merged	A	B
	C	D
	E	F

Table Example

```
\begin{table}[h!]
 \centering
 \begin{tabular}{|c| c | l|}
 \hline
 Col1 & Col2 & Col2 \\
 \hline
 1 & 6 & 87837 \\
 2 & 7 & 78 \\
 3 & 545 & 778 \\
 4 & 545 & 18744 \\
 5 & 88 & 788 \\
 \hline
 \end{tabular}
 \caption{captions here}
 \label{table:1}
```

Col1	Col2	Col2
1	6	87837
2	7	78
3	545	778
4	545	18744
5	88	788

Table: captions here

Try later

ID	Year			SN
	1	2	3	
	4	5	6	

Try later

ID	Year			SN
	1	2	3	
	4	5	6	

https://www.tablesgenerator.com/