



## VISION AND MISSION OF THE INSTITUTION

### Vision

To be one of the premier Institutes of Engineering and Management education in the country

### Mission

- To provide Engineering and Management education that meets the needs of human resources in the country
- To develop leadership qualities, team spirit and concern for environment in students

### Objectives

- To achieve educational goals as stated in the vision through the mission statements which depicts the distinctive characteristics of the Institution
- To make teaching-learning process an enjoyable pursuit for the students and teachers

## VISION AND MISSION OF THE DEPARTMENT

### Vision

To be a premier department of learning in Information Science and Engineering in the state of Karnataka, moulding students into professional Engineers

### Mission

- Provide teaching-learning process that develops core competencies in Information Science and Engineering to meet the needs of the industry and higher education
- Create an environment for innovative thinking and self-learning to address the challenges of changing technology
- Provide an environment to build team spirit and leadership qualities to succeed in professional career
- Empathize with the societal needs and environmental concerns in Information Science and Engineering practices

## Ilya Sutskever



*Ilya Sutskever is a Russian-Israeli-Canadian machine learning computer scientist who is one of the founders and chief scientists of OpenAI. He has made many notable contributions to the field of deep learning. He is the co-inventor of AlexNet, a convolutional neural network, with Alex Krizhevsky and Geoffrey Hinton. Sutskever is also one of the many authors of the AlphaGo paper. Ilya, Oriol Vinyals, and Quoc Le invented sequence-to sequence learning. After graduating in 2012, Sutskever spent two months working as a postdoctoral fellow at Stanford University under Andrew Ng. He then returned to the University of Toronto and joined Hinton and new research firm, DNN Research, which is adjacent to Hinton and research group. Four months later, in March 2013, Google acquired DNN Research and hired Sutskever as a Google Brain scientist. At Google Brain, Sutskever collaborated with Oriol Vinyals and Quoc Viet Lee to create a sequence-to-sequence learning algorithm. He is also a co-inventor of AlexNet and has worked on TensorFlow. In late 2015, he left Google and became the founder and chief scientist of the newly founded OpenAI. In 2023, he announced that he will lead OpenAI and a new project called "Superalignment, which tries to solve the targeting of super-intelligent people.*



*B. N. M. Institute of Technology*

**An Autonomous Institution under VTU. Approved by AICTE.**

Post box No. 7087, 27<sup>th</sup> Cross, 12<sup>th</sup> Main, Banashankari II Stage, Bengaluru-560070, INDIA

Ph: 91-80- 26711780/81/82 Email: principal@bnmit.in, www.bnmit.org

## Message from the Editorial Team

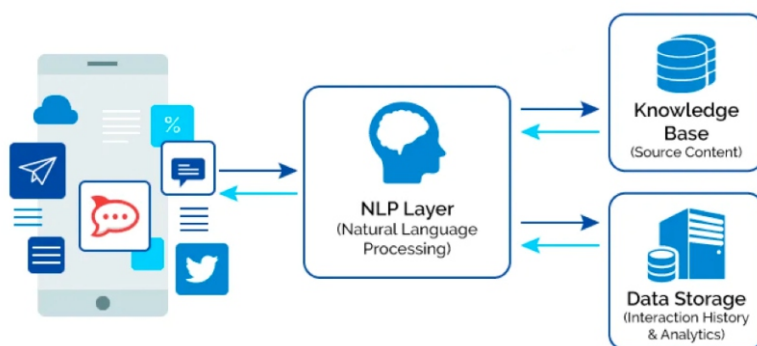
Greetings from the editorial team! It gives us immense pleasure to present the Second issue of the Eighth volume of our department newsletter 'INSPIRE'. We feel privileged to present our theme “Natural Language Processing”, and provide a forum to exchange ideas. Natural Language Processing is a machine learning technology that gives computers the ability to interpret, manipulate, and comprehend human language. Organizations today have large volumes of voice and text data from various communication channels like emails, text messages, social media newsfeeds, video, audio, and more. They use NLP software to automatically process this data, analyze the intent or sentiment in the message, and respond in real time to human communication. The edition will inspire you to be a part of the change that technology can bring to this world. We hope you enjoy reading this issue as much as we have enjoyed presenting it.

## About the Department

The department was established in 2001 with an intake of sixty students. The department has been accredited by the National Board of Accreditation (NBA) for the academic years 2022-23, 2023-24 and 2024-25. Since its inception, the department has forged a path of technical excellence and innovative teaching methods. It comprises highly qualified, research-oriented teaching staff, committed to instilling moral values among students, in addition to providing cutting edge technical knowledge. The department has well equipped laboratories with state-of-the-art computational facilities.

Students are encouraged to participate in technical events and to conceptualise innovative ideas. The department is associated with many professional societies such as IEEE, CSI, BITES etc. The Information Science & Engineering Association (ISEA) regularly organises technical events for the benefit of students.

## Natural Language Processing



### HOW does NLP WORKS?

Using text vectorization, NLP tools transform text into something a machine can understand, then machine learning algorithms are fed training data and expected outputs (tags) to train machines to make associations between a particular input and its corresponding output. Machines then use statistical analysis methods to build their own “knowledge bank” and discern which features best represent the texts.

### NLP TOOLS

**Python and the Natural Language Toolkit (NLTK):** The Python programming language provides a wide range of tools and libraries for attacking specific NLP tasks.

**SpaCy:** In most cases, SpaCy is faster than NLTK, but it has only a single implementation for each NLP component. It represents data as an object, simply the interface to build applications.

**PyTorch-NLP:** PyTorch-NLP has just been around for a little over a year, yet it already has a tremendous community. It's a fantastic tool for quick prototyping.

**OpenNLP:** It is hosted by the Apache Foundation and also can integrate with other Apache projects, like Apache Flink, Apache NiFi, and Apache Spark, easily. It covers all the common processing components of NLP.

### Email filtering:

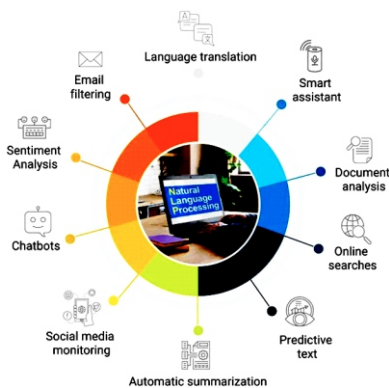
Here Natural Language Processing comes to work. It identifies and filters incoming emails into “important” or “spam” and places them into their respective designations.

## Language-Translation

Natural Language processing helps us by translating the language with all its sentiments.

### Smart Assistants

We have advanced enough technology to have smart assistants, such as Siri, Alexa, and Cortana. NLP not only helps them understand the language but also in processing its meaning and sentiments and answering back in the same way humans do.



### Online Searches

It helps search engines understand what is asked of them by comprehending the literal meaning of words and the intent behind writing that word, hence giving us the results, we want.

### Predictive Text

A similar application to online searches is predictive text. It is something we use whenever we type anything on our smartphones. Whenever we type a few letters on the screen, the keyboard gives us suggestions about what that word might be and when we have written a few words, it starts suggesting what the next word could be. These predictive texts might be a little off in the beginning.

### Automatic Summarization

NLP can not only summarize the meaning of information, but it can also understand the emotional meaning hidden in the information. Thus, making the summarization process quick and impeccable.

### Sentiment Analysis

The daily conversations, the posted content and comments, book, restaurant, and product reviews, hence almost all the conversations and texts are full of emotions. Understanding these emotions is as important as understanding the word-to-word meaning. We as humans can interpret emotional sentiments in writings and conversations, but with the help of natural language processing, computer systems can also understand the sentiments of a text along with its literal meaning.

### Chatbots

With the increase in technology, everything has been digitalized, from studying to shopping, booking tickets, and customer service. Instead of waiting a long time to get some short and instant answers, the chatbot replies

instantly and accurately. NLP gives these chatbots conversational capabilities, which help them respond appropriately to the customer's needs instead of just bare-bones replies.

Chatbots also help in places where human power is less or is not available round the clock. Chatbots operating on NLP also have emotional intelligence, which helps them understand the customer's emotional sentiments and respond to them effectively.

### References:

1. Robinson, Peter (2008). Handbook of Cognitive Linguistics and Second Language Acquisition. Routledge. pp. 3–8. ISBN 978-0-805-85352-0.
2. Lakoff, George (1999). Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Philosophy. Appendix: The Neural Theory of Language Paradigm. New York Basic Books. pp. 569–583. ISBN 978-0-465-05674-3.
3. Strauss, Claudia (1999). A Cognitive Theory of Cultural Meaning. Cambridge University Press. pp. 156–164. ISBN 978-0-521-59541-4.
4. "What is Natural Language Processing? Intro to NLP in Machine Learning". GyanSetu!. 2020-12-06. Retrieved 2021-01-09.

*Aishwarya N  
1BG21IS003  
IV Semester, ISE*

## Role of Natural Language Processing in Big Data

The term "big data" indicates the expanding volume of multi-source, organized and unstructured information that is too enormous for conventional applications to handle. It is no longer just a buzzword. Viktor Mayer-Schönberger and Kenneth Cukier's 2013 book "Big Data: A Revolution That Will Transform How We Live, Work, and Think" defines big data as "the ability of the society to harness massive amounts of information in novel ways to produce useful insights or goods or services of significant value" in terms of its usefulness. Today, every organization, regardless of industry, depends on massive amounts of text data. For instance, a law firm works with a lot of research, old and new legal transaction records, notes, email correspondence, and a lot of specialized and governmental reference material.

A pharmaceutical corporation will have a lot of information and data about clinical trials, doctor notes, patient information and data, patent and regulatory information, and the most recent studies on rivals. Natural language processing for big data offers the chance to utilize the content that is present in particularly large and expanding stores of content to reveal patterns, connections, and trends across various sources of data because these types of information are largely composed of language.



### Interactions:

Natural language processing methods are currently in use in a number of widely used interactive applications, including Apple's Siri on smartphones, online banking facilities, retail self-service systems, and 3 certain automatic translation services. Users can ask inquiries in common English and get prompt, precise responses. Customers benefit from having access to businesses they do business with anytime and wherever they choose, while businesses benefit from minimizing the number of calls handled by traditional live assistance by realizing savings.

It is possible to use natural language processing (NLP) for big data to automatically find pertinent information and/or summarize the content of documents in order to gain insight from vast amounts of data. Users can interact with the information via search using queries that are unique to them rather than being constrained by needing to select or understand the "right" terms to obtain what they're looking for. All downstream operations that depend on timely information are sped up, and its usage for real-time, actionable business intelligence is made possible by faster, more detailed information access.

International Data Corporation predicted that by 2020, there will be about 44 trillion gigabytes of digital information in existence worldwide (according to the IDC Digital Universe Study, by 2020, 1.7 megabytes of

new information will be produced every second for every person on the planet).

The potential in 44 quadrillion megabytes is enormous. Natural language processing for big data will be a crucial component to have in your analysis pipeline regardless of where you use it, in order to fully realize the value of this information for insight, decreased expenses, and better productivity.

**Chiraag L**  
1BG21IS021  
IV Semester, ISE

## Voice Assistants

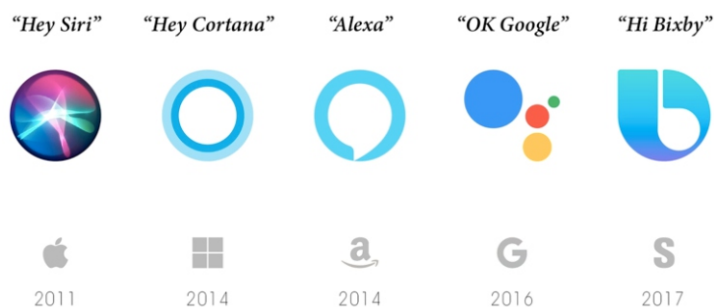
Siri, Cortana, Alexa, and Google Assistant are a few examples of voice assistants that communicate with computers by listening for keywords. They capture user voice input and deliver it to specialized servers where it is processed and translated into commands. There are an increasing number of voice-activated systems, with Apple's Siri being the most well-established. Natural language processing improvements have made it possible for voice assistants to react more swiftly to instructions and inquiries. Scientists have trained voice assistants to hear and interpret user requests in increasingly natural and relevant ways as personal computers grow more affordable and powerful.

For instance, saying "Remember where I parked," "I parked here," "I left the car on 6th street," or "the car is in the south lot" will all have the same effect when asking Google Assistant to recall where one parked their vehicle. Google will keep track of where the user parked the vehicle and can answer appropriately if prompted later. Questions like "where did I park," "where did I leave the car," and "do you remember where I parked" all elicit the appropriate response when asked in a natural manner by the user. The user annoyance of early speech recognition systems, which required predefined phrases and patterns in order to function, is avoided with natural language processing.

Although each voice assistant currently on the market has its own special capabilities, they all have some things in common and can do the same fundamental things.

- Send and read text messages; call people; send and read emails; respond to simple informational questions (e.g., "What time is it? What does the weather look like? What is the cup's ounce capacity?").

- Create calendar entries, alarms, and timers.
- Create lists, set alarms, and perform simple math operations.
- Manage the playback of media from connected services like Spotify, Pandora, Netflix, Google Play, iTunes, and Amazon.
- Control Internet of Things-enabled appliances, including locks, lights, alarms, and thermostats.
- Tell stories and jokes.



By interacting with other applications via voice commands, they can add capabilities like playing Jeopardy, buying drinks, and calling Uber or Lyft. Alexa from Amazon has Jeopardy abilities, while Assistant from Google is behind in these areas. Using web services like Tasker and IFTTT, users can develop their own abilities.

### Security and Privacy:

Because voice assistants may read private data like emails and calendars, they pose security threats. While Apple is training Siri to identify user voices, Google has enhanced its Assistant software to add voice printing. Attacks involving broadcast media and ultrasonic orders are also possible against Amazon's Alexa. Due to the constant listening required by voice assistants, privacy is still another big worry. Concerns include data theft, information leaks, and invasions of children's privacy.

### Potential Future Uses:

Voice assistants have the potential to revolutionize user interaction with computers, bridge information gaps, and even help with dementia and reading instructions. They can also read books and long-form documents, revolutionize translation, and help with library promotion and management. Libraries can create skills for voice assistants to list events, code additional features, and act as virtual tour guides in gallery or exhibit spaces. Basic training and lending of these devices could help patrons experiment with them in their homes.

*Medam Naga Akshai*

*1BG20IS029  
VI Semester, ISE*

## NLP's Magic in Extracting Knowledge from Unstructured Data

In the age of information overload, unstructured data, such as social media posts, emails, and online articles, presents a goldmine of untapped potential. Extracting meaningful insights from this vast sea of text has long been a challenge, but the advent of Natural Language Processing (NLP) has revolutionized the game. NLP, a branch of artificial intelligence, utilizes advanced linguistic analysis and machine learning algorithms to unlock the hidden knowledge buried within unstructured data, empowering organizations to make informed decisions.

At the core of NLP lies its ability to comprehend and process human language. By employing techniques like tokenization, part-of-speech tagging, and named entity recognition, NLP algorithms break down text into its elemental components, enabling computers to analyze and interpret it.

This foundational understanding forms the basis for extracting knowledge from unstructured data. Unstructured data, characterized by its lack of predefined organization or structure, holds immense value. Within this untamed wilderness lie invaluable customer feedback, market trends, and vital business insights.

NLP serves as a guiding light, navigating the uncharted territory of unstructured data and transforming raw text into actionable intelligence. Before embarking on analysis, NLP applies pre-processing techniques to prepare the text for extraction.

Methods such as stop word removal, stemming, and lemmatization eliminate noise and standardize the text. Normalization techniques handle language variations, while addressing special characters and symbols ensures accurate interpretation of textual data. NLP excels at extracting valuable information from unstructured data.

Techniques like entity extraction reveal relationships between people, organizations, and locations, shedding light on crucial connections. Taking it a step further, event extraction identifies and comprehends key events and their attributes, enabling a deeper understanding of actions and occurrences within the text. Text Classification and Topic Modeling: Text classification is a powerful application of NLP that categorizes text into predefined classes or labels.

Whether it's sentiment analysis, spam detection, or topic classification, NLP algorithms analyze textual features and patterns to make accurate predictions. Topic modeling techniques, like Latent Dirichlet Allocation (LDA), uncover hidden thematic structures within extensive textual datasets, facilitating the identification of prevailing themes and trends. Text Summarization and Document Understanding: Extractive and abstractive text summarization techniques distill lengthy documents into concise summaries. Extractive methods identify and extract the most salient sentences or phrases, while abstractive methods generate new sentences that encapsulate the essence of the text. Document understanding involves analyzing textual documents to identify key concepts, sentiment, and themes, facilitating quick and comprehensive knowledge extraction.

*Sai Bindhu G  
1BG20IS045  
VI Semester, ISE*

## **Chat Bot's using Natural Language Processing**

Chatbots have emerged as powerful tools in transforming human-computer interaction. Through the use of natural language processing (NLP), chatbots can understand and respond to user queries in a conversational manner. In this article, we will explore the high-level concepts behind chatbots using NLP and how they are revolutionizing the way we interact with technology. One of the key advantages of chatbots using NLP is their ability to provide a conversational user experience. Instead of relying on rigid menus or command-based interfaces, users can interact with chatbots using natural language, just as they would with a human. This enhances user engagement, makes interactions more intuitive, and allows for a more personalized and human-like interaction.

### **Intent Recognition and Understanding:**

NLP-powered chatbots excel at understanding the intent behind user queries. Through techniques such as intent classification and entity recognition, chatbots can determine the purpose or goal of the user's request. For example, a chatbot in a customer support setting

can identify whether the user wants to inquire about a product, track an order, or report an issue. This enables chatbots to provide relevant and context-aware responses. Contextual Understanding and Personalization:

NLP enables chatbots to understand the context of a conversation and tailor their responses accordingly. By analyzing the user's previous interactions, chatbots can provide more personalized and contextually relevant information. For instance, a chatbot in an e-commerce setting can remember a user's preferences, past purchases, and browsing history to make product recommendations or assist with specific inquiries.

### **Language Generation and Natural-sounding Responses:**

NLP techniques like language generation allow chatbots to generate responses that sound natural and human-like. Advanced language models, such as transformer-based architectures, can generate coherent and contextually appropriate replies. This helps create a more engaging and interactive conversation, enhancing the overall user experience.

### **Continuous Learning and Improvement:**

Chatbots powered by NLP can learn from user interactions and improve over time. By leveraging machine learning algorithms, chatbots can analyze user feedback, track performance metrics, and adapt their responses accordingly. This iterative learning process allows chatbots to continuously refine their understanding, accuracy, and ability to provide meaningful and helpful responses.

### **Applications Across Industries:**

The impact of chatbots using NLP extends across various industries. From customer support and virtual assistants to healthcare, finance, and e-commerce, chatbots are transforming the way businesses interact with their customers. They provide instant assistance, personalized recommendations, and 24/7 availability, leading to improved customer satisfaction and operational efficiency.

*Shrayanth S  
1BG20IS052  
VI Semester, ISE*

## Event Details

### 1. Industrial Visit to ISRO-U R Rao Satellite Centre

The Department of ISE organized an Industrial visit to ISRO-U R Rao Satellite Centre, Bangalore on 4<sup>th</sup> August 2023 in association with BITES for 4<sup>th</sup> semester students. Various images of India taken at different angles from the satellites for the purpose of geographical/weather study were seen. Latest images of the moon obtained from satellites were also shown. Different electronic devices used in satellite and space communication were explained. The 'clean room' concept for assembling of satellites was shown to us. A video depicting the moon mission of "Chandrayaan" was also displayed.



*ISRO-U R Rao Satellite Center, Old HAL Airport Road, Bangalore*

### 2. Technical talk on “STAY AHEAD IN THE AGE OF DIGITAL & AI DISRUPTION”

The Department of Information Science & Engineering, BNMIT in association with Indian Society for Technical Education (ISTE) Student Chapter, BNMIT conducted Technical Talk on “STAY AHEAD IN THE AGE OF DIGITAL & AI DISRUPTION: A Strategic Approach” by Mr. Vinay Sampath Kumar, Engineering Leader, Salesforce, Bangalore. followed by FCD Memento Distribution function for 105 FCD holders in the VTU examination for the academic year 2021-2022 and 2022-2023 on 29<sup>th</sup> April 2023.



*FCD Students of Information Science & Engineering during the talk by Mr. Vinay Sampath Kumar, Engineering Leader, Salesforce, Bangalore.*

### 3. Workshop on Blockchain Technology & its Applications

The Department of ISE organized workshop on “Blockchain Technology & its Applications”, BNMIT in association with Institution of Engineers (IE) Student Chapter, BNMIT on 16<sup>th</sup> May 2023. The Resource Person Dr. Gururaj H L, Associate Professor, Department of Information Technology, Manipal Institute of Technology, Bengaluru focused on the basics of block chain like the Secure Hash Algorithm, Blockchain Mining, Consensus Protocol, Ganache.



*Workshop on “Blockchain Technology & its Applications” by Dr. Gururaj H L, Associate Professor, Manipal Institute of Technology, Bangalore*

## Achievements of Students

1. Sushmita S, Sparsha Bindu B S, Dr. S Srividhya, "Areca Nut Disease Detection Using Image Processing", Journal of Emerging Technologies and Innovative Research (JETIR) UGC Approved – Journal Impact factor: 7.95 Volume 10 Issue 5, 11-May-2023.
2. Manasa S, Mrudula S, Dr. S Srividhya "Smart Cradle for Baby Monitoring" an International Journal of Intelligent Systems and Applications in Engineering, Volume 11, no. 3, July 2023, pp.412-6 Retrieved from <https://ijisae.org/index.php/IJISAE/article/view/3182> (Q4 Journal).
3. V Madhuri, Varsha Subramanya, Dr. Saritha Chakrasali "AlgoWise-Algorithm Visualizer" in International Journal of Emerging Technologies and Innovative Research, JETIR, May 2023, Volume 10, Issue 5, pp 1437 – 1441, ISSN-2349-5162.
4. Akshay Cavale (1BG21IS005) has successfully completed the course Get Started with AI on Azure, Use Automated machine learning in Azure Machine Learning, and Microsoft Azure AI Fundamentals: Get Started with Artificial Intelligence on January 15, 2023 at Microsoft.
5. Avinash Rajendra Deshpande (1BG20IS011) has completed Course on Programming Fundamentals using Python - Part 1 in Infosys springboard on Saturday, December 24th 2022.
6. Narmada M. (1BG19IS030) has successfully completed the online Course Introduction to Big Data and Hadoop Provided by Great Learning Academy in November 2022.

## Achievements of Staff

1. Dr. S. Srividhya, Dr. Varalatchoumy M "Wheelchair and pc volume control wheelchair and pc volume control using hand gesture" the IEEE International Conference on Advances in Electronics, Communication, Computing and Intelligent Information Systems (ICAECIS-23) 19th -21 April 2023 Conference: 2023 International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE).
2. Dr. S. Srividhya gave an invited talk on, "Robotic Process Automation" on 7th March 2023 held at Paavai Engineering College.
3. Dr. Jagruthi H has received an appreciation for evaluating ideas presented in Internal – KAVACH 2023. Cybersecurity Hackathon conducted by the Department of AIML on 11/4/2023.
4. Dr. S. Srividhya received a fund of Rs.93,000/- for conducting ATAL FDP on "Machine Learning in Infotainment Systems".

## Editorial Team

### Students

- Sahil Singh, VI Sem
- Shrayanth.S, VI Sem
- Naga Akshai M, VI Sem
- Sai Bindhu G, VI Sem
- Chiraag L, IV Sem
- Akshay Cavale, IV Sem
- Aishwarya N, IV Sem

### Faculty

- Ms. Yashaswini B V - Assistant Professor
- Ms. Sudeshna Pandey - Assistant Professor, English

### Layout & Design

- Sri. Anand P M - System Manager
- Sri. Arun K - Instructor