AIML Magazine

2023-24

IPS ACADEMY

Institute of Engineering and Science , Indore(M.P.)

A UGC Autonomous Institute,

Affiliated to Rajiv Gandhi Proudyogiki Vishwavidyalaya , Bhopal (M.P.)

Message from our Principal

Technical Education is the most potential instrument for socio-economic change. Presently, the engineer is seen as a high-tech player in the global market. Distinct separation is visible in our education between concepts and applications. Most areas of technology now change so rapidly that there is a need for professional institutes to update the knowledge and competence. Institute of Engineering and Science, IPS Academy is a leading, premium institution devoted to imparting quality engineering education since 1999. The sustained growth with constant academic brilliance achieved by IES is due to a greater commitment from management, dynamic leadership of the president, academically distinctive and experienced faculty, disciplined students and service oriented supporting staff.

The Institute is playing a key role in creating and ambiance for the creation of novel ideas, knowledge, and graduates who will be the leaders of tomorrow. The Institute is convinced that in order to achieve this objective, we will need to pursue a strategy that fosters creativity, supports interdisciplinary research and education. This will also provide the students with an understanding and appreciation not only of the process of knowledge creation, but also of the process by which technology and knowledge may be used to create wealth as well as achieve social economic goals.

I am delighted to note that the engineering graduates of this institute have been able to demonstrate their capable identities in different spheres of life and occupied prestigious position within the country and abroad. The excellence of any institute is a measure of achievements made by the students and faculty.

All the Best.

Dr. Archana Keerti Chowdhary
Principal

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Message from our HOD

Today we find that information technology has become overwhelmingly pervasive, while its parent, computing science, has become correspondingly hard to find. While many CS educational institutions have shifted focus from core CS. This is the single most important attribute of the education offered here. Our department has remained true to the vision on which it was founded.

There are several ways to present the canonical core of computer science. Over the years we have developed a distinct style and method that bridges the theory - practice divide while remaining grounded in the core. Technology changes rapidly, especially in the field of computing, whereas the science, if it changes at all, does so much more gradually. Our understanding is that persons who are clear and thorough about the fundamentals can adapt to rapid changes in technology relatively easily. We want the education imparted to our students to be the basis of a life time of learning.

Our Department has produced hundreds of professionals and has established a name for itself in the country and abroad. They have consistently excelled in the highly competitive industrial environment, Best Employer/ awards in top-ranking companies. I attribute this success to the winning combination of a dedicated faculty that works hard at imparting quality education, a well-planned syllabus and last but not the least, our students.

Learning is a continuous process and does not end with the acquisition of a degree, especially because steady and rapid advances in computing technologies shorten the life of tools and techniques prevalent today. Therefore we do not aim to make our students walking manuals of any language or package. Instead, they are given a strong foundation in computer science and problem-solving techniques and are made adaptable to changes. We believe that this approach to teaching- learning, coupled with practical experience gained during Industrial Training in reputed organizations, equips our students to handle the challenges posed by the software industry

Dr. Neeraj Shrivastava
HOD Computer Science and Engineering Dept.
IPS Academy, Institute of Engineering & Science

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (CSE-AIML)

UNVEILING THE FUTURE OF TECHNOLOGY: WHERE INNOVATION MEETS INTELLIGENCE

The Department of Computer Science and Engineering with a specialization in Artificial Intelligence and Machine Learning (CSE-AIML) continues to serve as a hub of innovation and emerging technology. In an era where AI and ML are reshaping industries across the globe, the department remains dedicated to equipping students with the skills, knowledge, and mindset needed to lead and innovate in this dynamic landscape.

Ved Kumar Gupta
Asst. Prof , Branch Coordinator

Vandana Dubey
Asst. Prof

Vasudha Sharma
Asst. Prof

Yogita Barse
Asst. Prof

Aditi Barse
Asst. Prof

Pritbha Singh Tomar
Asst. Prof

Sachin soni
Asst. Prof

Abhilasha Vyas
Asst. Prof

Vision and Mission

Attaining global recognition in computer science and engineering education , research and training to meet the growing needs of industry and society.

Provide Quality education , in both the theoritical and applied foundations of computer science and train students to effectively apply this education to solve real world problems

State-of-the-Art Infrastructure

Our vision is to cultivate a new generation of engineers and researchers who are not only proficient in the core principles of AI and ML but are also capable of applying these technologies to solve real-world problems. We aim to bridge the gap between theoretical knowledge and practical application, equipping our students with the skills to excel in a competitive, ever-evolving landscape.

Curriculum

The CSE-AIML curriculum is meticulously designed to provide a strong foundation in both computer science and the specialized domains of AI and ML. Students are introduced to essential concepts such as data structures, algorithms, and programming languages, followed by advanced courses in machine learning, deep learning, natural language processing, computer vision, and more. Our curriculum is continuously updated to reflect the latest trends and developments in the industry, ensuring that our graduates are always ahead of the curve.

Research and Innovation

Research is at the heart of our department. Our faculty members are engaged in groundbreaking research projects, ranging from developing intelligent systems for healthcare to creating autonomous agents for complex decision-making processes. Students are encouraged to participate in these projects, providing them with invaluable hands-on experience and the opportunity to contribute to the field's advancement.

Industry Collaboration

We believe that strong industry ties are crucial for the holistic development of our students. The CSE-AIML department collaborates with leading tech companies, startups, and research institutions to provide students with internship opportunities, industry projects, and guest lectures. These collaborations ensure that our students gain exposure to the latest industry practices and understand the practical applications of AI and ML technologies.

Achievements and Future Aspirations

Our department takes immense pride in the remarkable achievements of our students and faculty. Some of our notable accomplishments include:

Smart India Hackathon (SIH) Winner:

Our talented students have showcased their innovative thinking and problem-solving skills by winning prestigious competitions like the Smart India Hackathon. Their solutions have addressed real-world challenges, earning them recognition at the national level.

A Baja Participation:

Continuing their tradition of excellence, our students have also actively participated in the A Baja competition. Their performance in this highly demanding event underscores their commitment to engineering excellence and innovation.

M Baja - Best Debutant Team Award:

Our students' technical expertise and teamwork were recognized when our department's team won the "Best Debutant Team Award" at the M Baja competition. This award highlights our students' ability to excel in competitive environments and deliver outstanding results.

E Baja Participation:

Our students have also extended their participation to the E Baja competition, showcasing their adaptability and enthusiasm for tackling challenges across various domains of engineering.

Faculty Achievements

Asst. Prof. Yogita Barse Successfully completed the HPC Master Training Program held at CDAC Pune in association with AICTE, showcasing a commitment to enhancing expertise in high-performance computing and its applications.

The AICTE-SANKALP initiative, launched by the All India Council for Technical Education (AICTE), aims to foster awareness and build skills in High-Performance Computing (HPC) among students and faculty in technical education. This program, implemented in collaboration with C-DAC Master Trainers, aligns with the objectives of the National Supercomputing Mission (NSM), a Government of India initiative focused on advancing HPC capabilities.

One of our esteemed faculty members had the privilege of participating in this transformative initiative. Through intensive training sessions, they gained incredibly valuable insights into cutting-edge HPC technologies, including supercomputing architectures and their applications.

These achievements reflect the department's dedication to fostering a culture of excellence, innovation, and teamwork. As we look to the future, we are committed to building on these successes and empowering our students to achieve even greater heights. Whether it's through academic pursuits, research endeavors, or industry collaborations, we aim to continue leading in the field of AI and ML.

Workshops and Collaborations

At IPS Academy, IES Indore, we believe in providing our students with opportunities that go beyond traditional classroom learning. Through strategic workshops and collaborations, we aim to equip our students with the skills and knowledge they need to excel in today's competitive world.

One of our most significant collaborations is with IIT Bombay, where we have integrated the Spoken Tutorial Certification program for our AI/ML students. This collaboration allows our students to gain valuable, industry-relevant skills through hands-on training in cutting-edge technologies. The recent success of all our AI/ML students passing the Spoken Tutorial Tests with flying colors is a testament to the effectiveness of this collaboration.

In addition to this, we regularly organize specialized workshops that focus on emerging technologies, programming languages, and professional development. These workshops bring industry experts and academics to the campus, providing students with firsthand insights into the latest trends and practices.

By fostering such collaborations and organizing hands-on workshops, we are not only enhancing the academic experience but also preparing our students for successful careers in the tech industry.

AIML Students Shine at HackSangam 2024

The students of the AIML department at IPS Academy recently showcased their talent and innovation at HackSangam 2024, a dynamic hackathon organized by the IES IPS Tech Club.
Among the participants was Team Bug Busters, a team of AIML students who brought their skills and creative thinking to the hackathon. Their enthusiasm was infectious, and their dedication was evident as they tackled complex challenges, ultimately creating a solution that was not only innovative but also practical. Team Bug Busters demonstrated both the spirit of teamwork and the technical prowess that the AIML branch prides itself on.

In addition to the participants, the AIML department was well-represented among the organizers. Aniket Singh, a third-year AIML student, took on the role of Overall Technical Head for the event. His responsibilities included overseeing the technical execution and ensuring a seamless experience for participants. Aniket's leadership was instrumental in coordinating the technical resources, troubleshooting on the fly, and guiding the organizing team toward a successful hackathon experience. His commitment to the AIML branch and his exceptional management skills set a strong example for aspiring

Volunteering at G20 Summit, Indore

In July 2023, Indore, Madhya Pradesh, hosted the G20 Labour and Employment Ministers' Meeting (LEMM), a graceful event under India's G20 Presidency. The summit focused on critical global employment issues, including much-needed addressing skill gaps, platform economy and sustainable social protection financing. While Prime Minister Narendra Modi did not attend the Indore meeting in person, he delivered a heartwarming video message emphasizing the importance of collaborative efforts in shaping the future of work

A dedicated team of volunteers from AIML played an instrumental role in the summit's success, gaining invaluable insights into event management. They learned the intricacies of coordinating large-scale international events, including logistics planning, delegate management, and cultural programming.

Their involvement provided hands-on experience in problem-solving, effective communication and teamwork, which are highly essential skills for orchestrating high-profile events such as the G20 Summit. This exposure enhanced their organizational abilities and deepened their understanding of global diplomatic engagements. One of the most important skills learned was leadership and working with a team.

TEDX IPSA 2024

On March 2, 2024, IPS Academy, Indore, hosted its first-ever TEDx event, TEDx IPSA 2024. This historic occasion brought the global TEDx platform to the academy, making it an unforgettable experience for both students and faculty. The theme for the event, "Seek", inspired the attendees to explore new ideas, challenge existing norms, and dive deeper into knowledge. TEDx IPSA 2024 featured a series of thought-provoking talks, engaging discussions, and visionary speakers, all united by the goal of sparking curiosity and encouraging innovation.

Hardik Saini - Lead of Design :
As the Lead of Design, Hardik Saini was responsible for crafting the visual identity for TEDx IPSA 2024. From conceptualizing the event's logo to designing the event's posters, brochures, and stage decorations, Hardik ensured the event's visual aesthetics were cohesive, impactful, and aligned with the theme of the event.

Aniket Singh - Production Lead :
Aniket Singh, in his role as Production Lead, managed the technical side of the event, ensuring smooth operations of sound, lighting, and all audio-visual setups. His role required immense attention to detail and coordination, as he worked behind the scenes to guarantee that every technical aspect was flawless.

Abhivyakt Bhati - Hospitality Team Member
Abhivyakt Bhati served as a crucial member of the Hospitality Team, where he focused on ensuring that all speakers and guests were well taken care of.

Articles

From Pokémon Go to 3D Mapping:

How Niantic Turns Gameplay Data into AI-Powered 3D Maps

So, Niantic, the folks behind Pokémon Go, have done more than just make a fun game.They're changing the game (literally and metaphorically) with AI and computer vision.They're building the future of 3D maps and augmentedreality (AR), creating a world wherethe real and digital worlds mix in ways we never thought possible.

Training a 3D World with Real-Time Data

Imagine every move you make in a game helping build a huge, ever-changing 3D map of the world. That's exactly what Niantic's up to. They're taking real-time gameplay data and using AI to make a 3D map that gets smarter the more you play. Every move players make helps level up this map, making it more detailed and accurate.It's not just a game; this thing's constantly updating with machine learning and computer vision, learning from millions of players across the globe. Every step you take? Yup, it's making the map smarter and more responsive.

Making Maps Smarter with Visual Positioning

Now, this next level isn't just about GPS—it's about using images and visual cues from theworld around us to map everything out in real time. With tools likeScaniverse, Niantic isimproving the accuracy of its 3D maps, making ARexperiences a whole lot more immersive.But the impact? It's bigger thangaming. This tech is shaping the future of smarter cities,more responsive environments, and a more connected world.

What Do You Think?

It's crazy to think how Niantic is pushing the boundaries between gaming, AI, and computer vision, right? Pokémon Go was just the start, and now we're talking about creating a digital world that updates as we move through it. Every step, every scan, it's all feeding into this ever-evolving, AI-powered map.

So, here's the big question: How's this going to change the way we experience the world? Will these AI-driven digital spaces become just as important as the physical world? This techis only going to get more advanced, and the possibilities are endless. It's up to us to think about where this thing could go.

Article by: Ashley Mathias
3rd Year, CSE-AIML

Articles

2025, the year of AI Agents!

I'm sure we all remember the release of ChatGPT and how it took the world by storm. Since that day life has been made easier for a whole bunch of people, from writing essays to finishing code. It gave us a glimpse at imagining how a futuristic world should be like.

Then came Devin, the fear-inducing maniac for developers who were sure it would take their jobs. All companies rushing to try it out and developers getting anxiety attacks (heck even I was one of them!).

Luckily, Devin turned out to be a flop, and returned the life and hope back into our bodies. But it did create a demon in everyone's heart that they will be replaced some day. Well, it may be here.

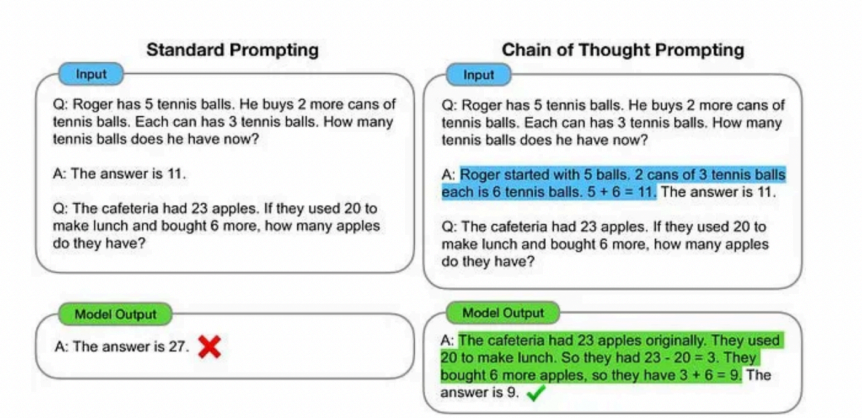
Welcome to 2025! Also referred to many people by the year of AI Agents! AI Agents are about to take over, so let's make sure you're up to date about it!

First of all, what is ChatGPT?

It is simply a Transformer as well as a Large Language Model (LLM). What do LLMs do? They are reactive. Thats it. All they can do is react to information provided to them, therefore being unable to think by themselves. They, sadly, do not have a mind of their own for complex tasks. But just look at how much ChatGPT3 and ChatGPT4 achieved with just that: drafting emails, writing stories, and even debugging code.

How do we improve this?

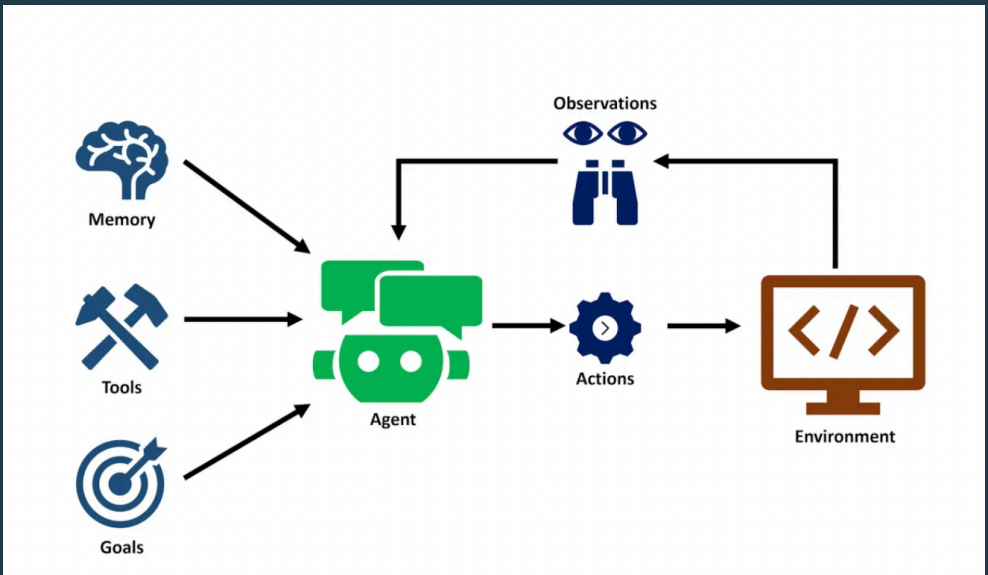
Chain of thought [CoT paper] was introduced for LLMs to reason among themselves. Instead of giving straightforward answers, they develop the ability to think! In this concept of chain-of-thought, LLMs reccieved the ability to reason step-by-step and solve complex problems with actual thoughts! This improved the performance of these LLMs by folds (so did the cost for computation power) and we stepped into a broader field of achieving AGI.



Comparison Between Standard Prompting and CoT Prompting | Image Source: Wei et al. (2022)

Now, we can finally discuss about AI Agents.

AI Agents are simply LLMs with some kind of access to the real world. As you might know LLMs are trained on data. It takes time to process and train a large language model, especially pre-proccessing the data (you wouldn't want answers from bad reddit posts right?), this includes all models such as ChatGPT, Claude, Llama, etc. Real-time knowledge would require continuous scraping, processing and training which is exhaustive on people and well as moola!
Now isn't this kinda bad? If I want to know some details of something that is happening right now, how do I do that? What if I want information about a recent research paper and understand only that? That is where allowing LLMs to understand our input is useful. Many top companies already did this, especially with ChatGPT where you can upload images or any documents.



The difference with AI Agents is that Agents can interact directly with the outside world. For example, ChatGPT's feature Search implements this by searching about it on the web and taking the search as its input. As Hugging Face quotes it:
Agentic programs are the gateway to the outside world for LLMs.

From this, you should have been able to understand what is Agentic AI, how did we reach here and how to build one yourself! If you have any questions don't forget to ask about it in the comments!

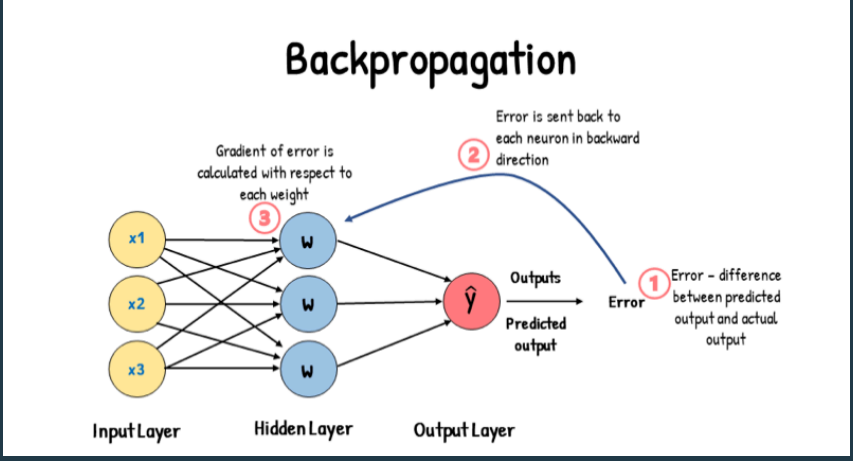
Article by: Abhivyakt Bhati
2nd Year, CSE-AIML

Articles

Back Propagation & its applications

Artificial intelligence (AI) has evolved greatly over the years. Deep learning plays a key role in progress. One of the key algorithms behind deep learning's success is back propagation. It is a basic technique used to train artificial neural networks. It allows the network to learn from data and improve over time. In this article, we'll explore how it works, its importance and real-world applications.

Backpropagation is an optimization and supervised learning algorithm and is used to train Artificial Neural networks. Now why is it an optimization algorithm? Answer to this is it helps adjust the weights and biases of neurons in a network to minimize the difference between predicted and actual outputs.



A Real-Life Example of Backpropagation-

Okay , now let me show you a real life example where backpropagation is used and you all might have or can experience it.

It is used in banking sector in handwriting recognition . Many banks use automated handwriting checking systems which can read & recognize handwritten texts on cheques, slips, etc. Let's get into the process-

- Scanning- First step in the process is scan the document and recognize the text. Then it converts all the texts into an image.
- Feature Extraction- The neural network extracts key features from the handwriting such as strokes, curves, and spacing.
- Network Training- the network is trained using backpropagation algorithm where the network learns from hundreds and thousands of handwriting as training dataset to improve accuracy.
- Output- the network predicts the written text or numbers.
- Verification- The predicted output is then verified with bank's records.

6. Final Step- once the text is verified, the transaction is processed forward without any human intervention.

• One more daily-life utilization of backpropagation algorithm can be seen in virtual assistants like Google Assistant, Siri, Alexa. These AI-powered assistants use deep learning models trained through backpropagation to recognize and process speech.

Other applications include-

• Image Recognition- it is used in convolutional neural networks (CNNs) for detecting objects.
• Natural Language Processing (NLP)- used in speech recognition and chatbots.
• Medical Diagnosis- helps in detecting diseases by image representation.
• Autonomous Vehicles- Improves decision-making in self-driving vehicles.
• Recommendation Systems- improves recommendations according to the user behaviour and likes on streaming platforms.

Industrial And Sectorial Applications-

Backpropagation is widely used in various industries and sectors, including healthcare, finance, E-commerce, automation, manufacturing, education, etc.

Few example where Backpropagation algorithm employed in India-

- COVID-19 Infection Prediction- Indian researchers used backpropagation in ANNs to predict and forecast the trends of infection of COVID-19 during 2021-22 Wave. These models used data from January to October 2021 for training.

- Rainfall Forecasting:Accurate monsoon predictions are crucial for India's agriculture. Studies have demonstrated that backpropagation neural networks can effectively forecast long-range monsoon rainfall over specific Indian regions, offering valuable insights for farmers

Conclusion

This concept is crucial for AI and represents the capability of neural networks to learn from mistakes and enhance the accuracy with each passing iteration. Understanding backpropagation thus acts as a gateway to delve further into more complex AI techniques and neural network architectures.

Article by: Aadeesh Singhai
3rd Year, CSE-AIML

Articles

Sentiment Analysis

In today's virtual world, people convey their reviews, thoughts and feelings online more than ever before. The responses or comments of users often carry an emotion which are hidden in their texts. Many companies and organizations are seeking ways to figure out the thoughts and the responses of customers in order to outperform and grow their businesses. This is where sentiment analysis comes into force.

Sentiment analysis is a technique in artificial intelligence and machine learning which helps in understanding the human feelings expressed in texts. It can be understood as a way to classify pieces of writings into positive, negative or neutral.

How does Sentiment analysis work ?

1. Text input : It begins by collecting text to analyse. This could be social media comments, tweets or product review.
2. Breaking down the text : This process is known as 'tokenization', where computer breaks the texts into smaller pieces to acknowledge better.
3. Labelling the words : The model then understand each word and assigns it a sentiment.
4. Analysing the context : Advanced sentiment analysis not only deals with individual words it also understand whole context.
5. Final classification : Based on the analysis, the model determines the overall statement behind the text.

Authentic instances of Sentiment Analysis:

- Upgrading Customer experiences: Businesses call upon the feedbacks that their users or customers provide, it helps them in interpreting what people liked and what annoys them. This helps them improve their products and services. Whenever a customer reviews a product, sentiment analysis helps by identifying whether it is positive, negative or neutral. In this way, it indicates the issues customers are facing like delay in delivery or poor product quality. The model can be trained according to the requirement, for example, it will alert the support team when it recognizes a negative review.

Understanding public opinions : Online discussions and social media posts like twitter, threads or instagram help brands in product development by discovering the unmet needs of people, this way they get to know about individual features that are to be added upon. Sentiment analysis also helps the marketers in enhancing their marketing campaigns by identifying which post or ad was reached to maximum audience so that they can resonate to what people think. Alongside, sentiment analysis also helps the government body to understand people's opinions and responses to their policies and speeches by tracking reactions to events like elections or social rallies.

Personalized recommendations : Platforms like Youtube, Netflix, Spotify and amazon need to understand the user's preference and priorities in order to improve their recommendation system ; Sentiment analysis is therefore used to detect the patterns in what viewers or listeners enjoy by delivering personalized suggestions for songs, products, movies or OTTs. This helps them to develop a more engaging space for users.

Tools for Sentiment analysis :

TextBlob : This is beginner-friendly python library that included pre-defined sentiment classifiers that makes it beneficial for basic sentiment analytics tasks. It enables users to get started without much expertise in deep learning.

NTLK (Natural Language Toolkit) : This is a sturdy library for natural language processing as it provides advanced tools for analyzing and processing text. Thus it is widely used in academic and professional fields.

VADER (Valence Aware Dictionary and sEntiment Reasoner) : It is a library used to interpret and analyse short texts like tweets or social media posts. Hence, it's training data involves emojis, genz words, slangs so that it can easily understand casual communications efficiently.

Conclusion

Sentiment analysis is providing computers the power to grasp human behaviour and emotions. While it is evolving itself , it is already helping businesses and even individual in making better decisions on what people are feeling. It is an amusing technique for everyone whether they are just curious about ai or they are using it professionally by connecting human emotions with computerised algorithms.

Article by: Tanuja Jain
3rd Year, CSE-AIML

Articles

The Dawn of AI Agents: Your Guide to the Next Tech Evolution

We all remember the splash ChatGPT made, transforming how we approached everything from essay writing to coding. It was a fascinating glimpse into a more technologically integrated future. Then came whispers and demos of tools like Devin, sparking both excitement and anxiety about the future of many professions. While some early advanced AI agent projects didn't immediately revolutionize the world as hyped, they undeniably set the stage for what many are calling the "year of AI Agents." So, what exactly are they, and why are they poised to be the next big thing?

At its core, ChatGPT is a type of Large Language Model (LLM), which is built upon a refined architecture called a Transformer. LLMs are "reactive" – they excel at responding to the information given to them. They can draft emails, create stories, and even debug code based on prompts. However, they traditionally lack the ability to independently "think" or perform complex, multi-step tasks without continuous human guidance.

The Leap to "Thinking" Machines

A significant step forward came with concepts like "Chain of Thought" (CoT) prompting. This allowed LLMs to break down complex problems and reason through them step-by-step, rather than just giving a direct answer. This was a crucial development, enhancing their problem-solving capabilities and inching us closer to more sophisticated AI.

Enter AI Agents: LLMs with Real-World Access

So, what elevates an LLM to an "AI Agent"? The key difference is an AI Agent's ability to interact with the external world beyond its training data. LLMs are trained on vast datasets. However, this data has a cut-off point. For an LLM to access real-time information – say, the details of a breaking news story or the findings of a very recent research paper – it needs a way to fetch and process that new information.

AI Agents are essentially LLMs given "tools" or "senses" to perceive and act upon the current environment. This could mean:

- Accessing the internet: To search for up-to-the-minute information. Features like ChatGPT's web browsing capabilities are a prime example.

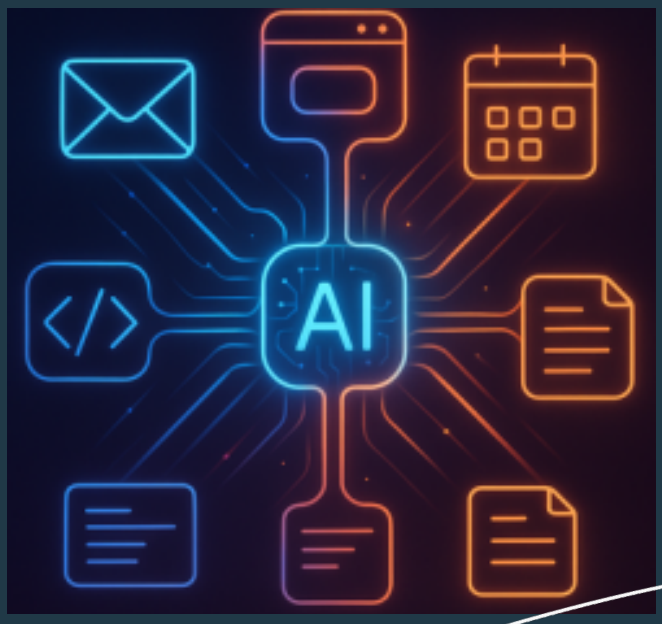
- Utilizing other software or APIs: An AI agent could be empowered to interact with your calendar, email, or other applications to perform tasks.

- Controlling physical systems: Think robotics, where an AI agent could direct a robot to perform a physical task based on its understanding of the environment.

The Road Ahead

AI agents represent a significant shift from reactive AI to proactive, goal-oriented AI. While the journey towards highly sophisticated and autonomous agents is ongoing, their potential to streamline complex tasks, enhance productivity, and unlock new capabilities is immense. Keep an eye on this space – the age of AI agents is truly just beginning!

By Abhivyakt Bhati - 2nd Year, CSE-AIML



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