TINKER TIMES™

EXPERT COLUMN
Education With Creative Innovation by Uday Chatterjee

LET US EXPLORE
Deep learning- Meaning, Uses, Applications and more

FIND OUT MORE
Understanding APIs and their use in development

QUIZ TIME
Monthly edition of audience favourite quiz is back

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HAPPENINGS @ SSA

The Srians were busy with the first terminal examinations that commenced at the beginning of September. However, with the announcement and call for innovative idea submission for the most prestigious Inspire Manak Awards 2021 by the Department of Science and Technology, Govt. of India, 17 students participated in the idea submission. After screening these ideas and evaluating them based on the following points- Originality of Idea, Practicality of Idea, Application of idea and Social Usefulness of the idea.

A total of five students have been nominated this time and names of the students along with their project titles are as follows:

Hansrudh Gupta (10B) – Legal Documentation Verification System
Mitadru Dasgupta (9C) – WBAN an architectural design for remote surveillance
Yasashwi Rai (9B) – Smart Farming using IoT
Shaivi Kumar (8D) – Eld-Help
Sanyam Surana (8A) – Optimized Smart Street Lighting and use of Renewable Energy

Best wishes to all the nominees for this year.

UDAY CHATTERJEE
Angel Investor

EDUCATION WITH CREATIVE INNOVATION

Ideal of Good Education has always been to produce well rounded students and not the single minded pursuit of highest scores that became the norm. Somehow in the ultra competitive world, we as a nation lost sight of what kind of young people we needed to create a self confident and forward looking nation. Our national mission for most of the past decades has been to create a nation of Job Seekers instead of creating a nation of Job Creators.

We became an assembly line for producing engineers and doctors, civil servants and bankers who were not adequately honed in the art of life skills -Critical Thinking, Problem Solving, Adaptability and most of all the ability to join the dots. The ability to assimilate all the learning and putting it to practice in real life situation comes only from real comprehension and working in a Laboratory environment.

Talking about Laboratory , gaining real comprehension and ability to join the dots , my most favorite icon is Michael Faraday -the great scientist who did not have any formal education and learnt all his chemistry and physics by working as a Laboratory assistant to Sir Humphrey Davy who was one of the greatest practicing scientists of his day. Under Davy's tutelage and guidance Faraday became the greatest chemist of his times and went on to create a series of scientific discoveries that astonished the scientific world .He rode the whole scientific spectrum of his times like a colossus from laying the foundations of scientific metallurgy and metallography and then went on in 1885 to improve the quality of optical glass for telescopes leading to the discovery of diamagnetism.

From there on he began a series of studies on electricity and magnetism that went on to revolutionize physics. He devised an apparatus which transformed electrical energy into mechanical energy and thus was born the very first electric motor. There is a lot more to Faraday's work across chemistry and physics than I can cover but I wanted to highlight how a vibrant environment of actually working in a Lab and tinkering under inspiring guides/mentors can unleash great scientific talent which conventional classroom education is not able to do.

As a lifelong entrepreneur I believe we must have a holistic education system balancing theoretical knowledge with Lab and Field work to validate and internalize our theoretical knowledge. Our conventional education and value system defines Success and Failure in silos with very negative connotation attached to failure.

One of the greatest lessons of a scientist in a Lab or an Entrepreneur is to encounter failure everyday-course correct continuously and start a new experiment till you reach success. Remember how Alexander Fleming after carrying out thousands of experiments that did not yield satisfactory results, finally discovered the origins of Penicillin the first antibiotic.

Penicillin discovered in 1929 remains one of the most important discoveries in the field of health sciences to date .Remember FAILURE IS OUR FRIEND.A young tinkerer learns this important life lesson early but rarely is imbibed in a typical classroom. One of the other great learning in a Lab /Real Life situation is to develop a Problem Solving Attitude , to experiment, to figure things out ,reflect and then start all

over again with the benefit of your learning. In a classroom academic environment children are not encouraged to think for creative solutions but look for answers.

New thinking in Education for the young, is to introduce students to an environment that combines classroom studies and working in a Lab to innovate and create and try to set up enterprises to validate and monetize their theoretical learning. Earlier this was prevalent at college level education but now this model is being used to hone both scientific mindset and innovation at school level.

My daughter when she was only 12 wanted to bake cakes and sell them in a Sunday Market. We encouraged her with a little seed capital (all of Rs 1500 or so) to buy her essential raw material for her cakes and pastries. Then she went and made her purchases after making a determination of raw material and quantities.

She then worked on the weekend to make her offerings - cupcakes, pastries and cakes -do her costing, do her pricing and then on Sunday she had to sell her precuts, interact with her clients, get their feedback ,learn which were her fast moving items and what did not meet with her expectations. All this learning went into modifying her product mix, pricing etc for her production next week.

She learnt to calculate her profits and it gave her a great sense of achievement when she made a small profit. Looking back at the benefits from her early life experience at running a small enterprise was enormous and she learnt so many things like Purchasing, Costing, Production, Selling and learning entrepreneurship that gave her great sense of achievement and self esteem.

In conclusion I will like to emphatically state that a healthy mix of classroom education combined with field work, Lab work and some real practical experience at creating innovative products and services and creating little enterprises can really make education a much more useful and fulfilling experience than what conventional classroom, marks oriented and job focused education can give.

This kind of Lab+Innovation+Enterprise approach as a part of school curriculum is already very popular in the West and just beginning to find some sporadic support in India. Schools like Sri Sri Academy in Kolkata have been doing some really pioneering work in this in collaboration with Rabvik Innovation.

They are laying out a new paradigm in balanced education where you learn the theory in the classroom and then you go to a Lab or field trips to put your theoretical knowledge to practice. When students are encouraged to start an enterprise-they learn essential life skills like Team Work, Problem Solving Approach, Innovation ,Thinking out of the Box ,Costing ,Budgeting ,Dealing with Failures and Rising again like a Phoenix.

DEEP LEARNING

Deep learning is a subset of machine learning, which is essentially a neural network with three or more layers. These neural networks attempt to simulate the behavior of the human brain—albeit far from matching its ability—allowing it to "learn" from large amounts of data. While a neural network with a single layer can still make approximate predictions, additional hidden layers can help to optimize and refine for accuracy.

Deep learning drives many artificial intelligence (AI) applications and services that improve automation, performing analytical and physical tasks without human intervention. Deep learning technology lies behind everyday products and services (such as digital assistants, voice-enabled TV remotes, and credit card fraud detection) as well as emerging technologies (such as self-driving cars).

HOW DEEP LEARNING WORKS?

Deep learning neural networks, or artificial neural networks, attempts to mimic the human brain through a combination of data inputs, weights, and bias. These elements work together to accurately recognize, classify, and describe objects within the data.

Deep neural networks consist of multiple layers of interconnected nodes, each building upon the previous layer to refine and optimize the prediction or categorization. This progression of computations through the network is called forward propagation. The input and output layers of a deep neural network are called visible layers. The input layer is where the deep learning model ingests the data for processing, and the output layer is where the final prediction or classification is made.
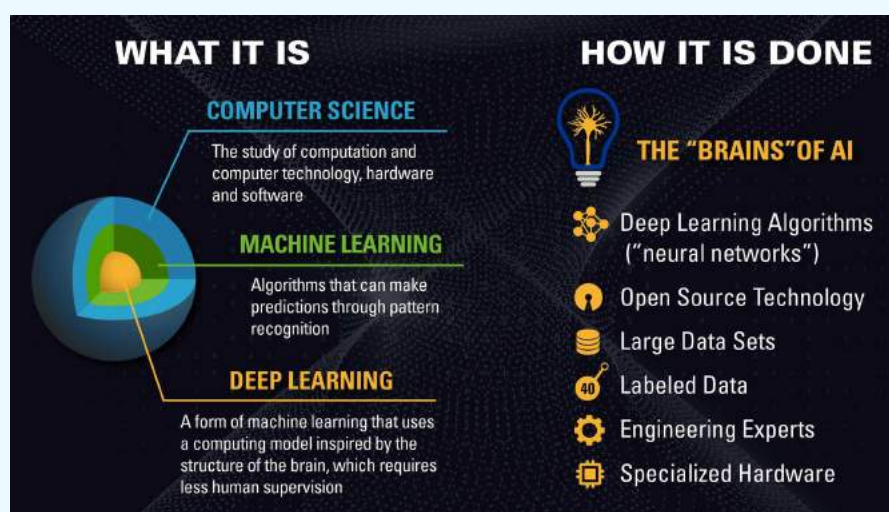

Another process called backpropagation uses algorithms, like gradient descent, to calculate errors in predictions and then adjusts the weights and biases of the function by moving backwards through the layers in an effort to train the model. Together, forward propagation and backpropagation allow a neural network to make predictions and correct for any errors accordingly. Over time, the algorithm becomes gradually more accurate.

The above describes the simplest type of deep neural network in the simplest terms. However, deep learning algorithms are incredibly complex, and there are different types of neural networks to address specific problems or datasets.

- Convolutional neural networks (CNNs), used primarily in computer vision and image classification applications, can detect features and patterns within an image, enabling tasks, like object detection or recognition. In 2015, a CNN bested a human in an object recognition challenge for the first time.
- Recurrent neural network (RNNs) are typically used in natural language and speech recognition applications as it leverages sequential or times series data.

DEEP LEARNING APPLICATIONS

Real-world deep learning applications are a part of our daily lives, but in most cases, they are so well-integrated into products and services that users are unaware of the complex data processing that is taking place in the background. Some of these examples include the following:
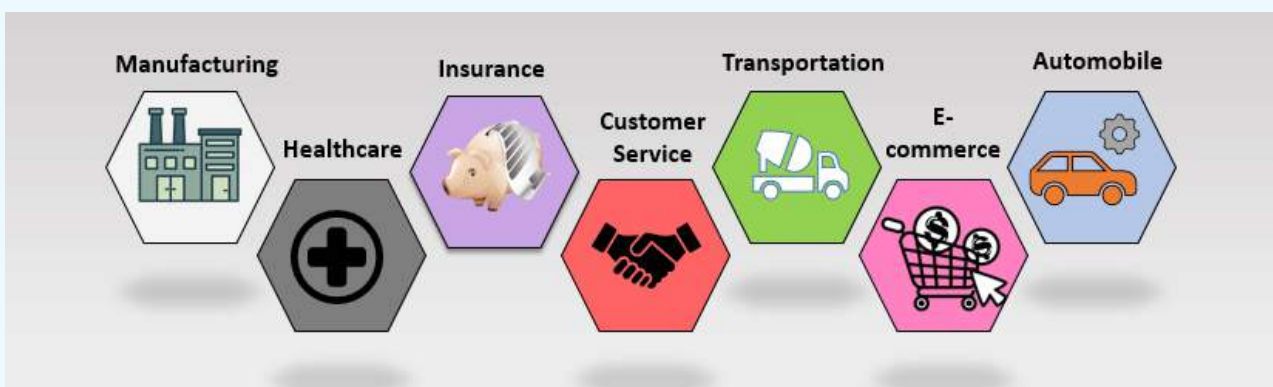
LAW ENFORECEMENT
Deep learning algorithms can analyze and learn from transactional data to identify dangerous patterns that indicate possible fraudulent or criminal activity. Speech recognition, computer vision, and other deep learning applications can improve the efficiency and effectiveness of investigative analysis.

FINANCIAL SERVICES

Financial institutions regularly use predictive analytics to drive algorithmic trading of stocks, assess business risks for loan approvals, detect fraud, and help manage credit and investment portfolios for clients.

CUSTOMER SERVICES

Many organizations incorporate deep learning technology into their customer service processes. Chatbots—used in a variety of applications, services, and customer service portals—are a straightforward form of AI. Traditional chatbots use natural language and even visual recognition, commonly found in call center-like menus. However, more sophisticated chatbot solutions attempt to determine, through learning, if there are multiple responses to ambiguous questions. Based on the responses it receives, the chatbot then tries to answer these questions directly or route the conversation to a human user.

Virtual assistants like Apple's Siri, Amazon Alexa, or Google Assistant extends the idea of a chatbot by enabling speech recognition functionality. This creates a new method to engage users in a personalized way.

HEALTHCARE

The healthcare industry has benefited greatly from deep learning capabilities ever since the digitization of hospital records and images. Image recognition applications can support medical imaging specialists and radiologists, helping them analyze and assess more images in less time.

WHAT IS API?

API which is a short form of Application Programming Interface. It is a type of software intermediate that allows two apps to connect.

For example – Whenever you order food on Zomato, you can easily see that where is your delivery boy through a digital map. Is this digital map is owned by Zomato? Well, the answer will be no. This map is owned by a Google map system.

So, now the question arises that how Zomato used this system. This is because of API. Google has given access to new startups through API. Even, Big companies like Facebook, Twitter, Microsoft has given access to new startups.

Now, another question arises that why these companies don't have fear of their security? Well, their API is programmed just like this that if someone tries to hack their security, so they cancel the access license with that startup

WHERE CAN YOU USE API?

If you install any application, you will find two options to do sign up. That is Sign in with Facebook or Sign in with Google. It may help the user to not make more accounts and accounts on many apps, so they just simply sign in with most of the biggest corporate and trustable companies.
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Google isn't in the business of weather data (yet!), so they source this information from a third party. They do so by means of an API, which sends them the latest weather details in a way that's easy for them to reformat. As there are many weather APIs that power this kind of functionality.

Even, whenever you book your bus or train with a third party website like airpaz, book my show, so there is a usage of API system that is provided by Airline Companies like Indigo. So, by their API system, we can able to book our ticket of buses. and flight
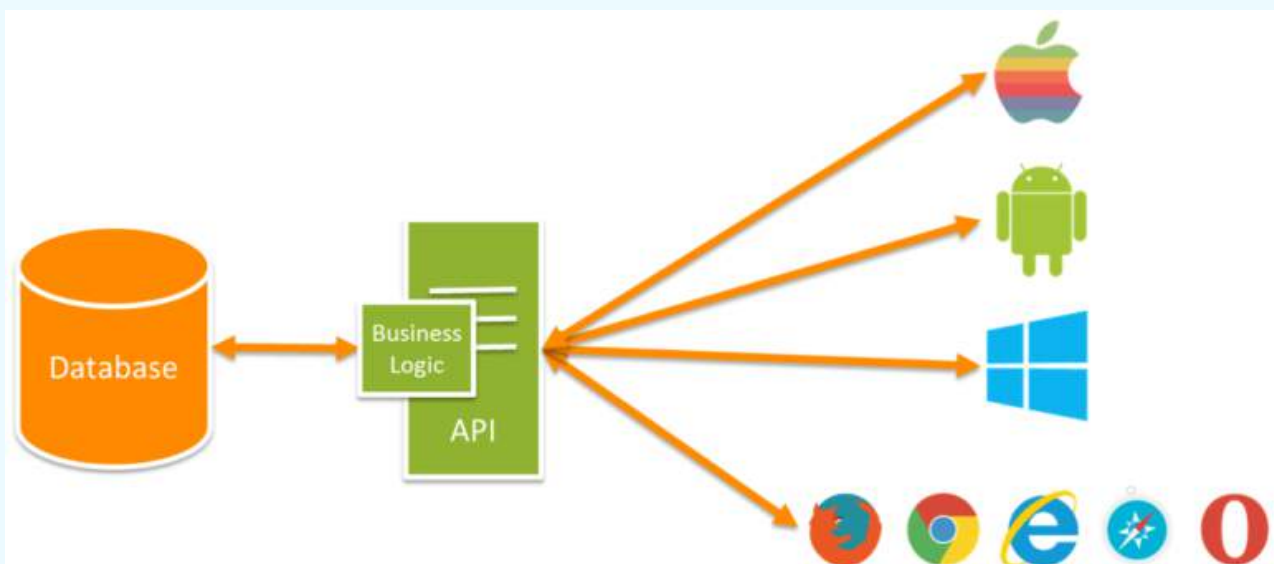
HOW CAN IT HELP A DEVELOPER?

As a programmer, this system will help you a lot. Many things like maps, Weather cannot be controlled on your own. So, you can take access to these companies to reduce your load.

Now the question arises that how will you get access? Simply, go to the Google API or Facebook for developers programme where you will demand to get access to their API. They can easily give you access.

But you have to also code to access their API in your program. You can do it with the help of Java if you know about it. I will personally give you the advice to take a tutorial or do a course about it.

Then after some time, if your company grows, so there will be a huge share of your company to them. They can create a passive income from this system but by this, you can save your time a lot.

CONCLUSION

So, this is an explanation of API system. Many of you do not have any idea about this system which you are using daily. You have booked a ticket, sign-in on the app, seen the weather forecast regularly but do not have any idea about this.

This is not just the technology made for just users. This is also made for the programmers. With the help of this, you can reduce your work and make your project more engaging.

SCAN THE QR CODE TO PARTICIPATE

ABOUT US

Rabvik Innovations aims to train and prepare the next generation of robotics, scientists, and engineers innovative enough to push the envelope and be creative enough to achieve the impossible. Rabvik Labs prepare the students for a toe-dip in the pool which will become an ocean in the pool which will become an ocean in a few years and will also allow them to get real-life experience in the world of robotics, automation, AI and IoT.

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