



**VIDYAVARDHINI'S
COLLEGE OF
ENGINEERING AND
TECHNOLOGY**



**THE TECHNICAL NEWSLETTER OF
COMPUTER ENGINEERING DEPARTMENT.**

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POWER TO DEVELOP AI LEAD SOLUTIONS IN HANDS OF A COMMON PERSON

Artificial intelligence and machine learning has changed the way our world works in an unprecedented way. From complex brain surgeries to a simple alarm clock, from assisting a pilot to fly the plane, to helping a little kid improve their pronunciation, the "machine brain" has found its place in every nook and corner of our lives.

But is this wonder of technology democratically available? With great hardware requirements and heavy reliance on big data, this may be a debatable issue. However, armed with the right tools, one can develop their own AI/ML solutions.

One of the biggest hurdles one faces during the development and training of their machine learning model is the hardware resources that the model requires. Especially now when GPU prices are at an all-time high, it is a big entry barrier for many machine learning enthusiasts.

A viable solution to this problem is using Google Colab and Jupyter notebook. Jupyter is an open-source

community supported service that provides all its services for free. Jupyter notebook doesn't offer cloud-based hardware assistance but one can run their Jupyter notebook on the cloud using alternate methods that are easy to implement and free plans.

Google colab has inbuilt cloud support which helps devices with weak hardware to develop and train their models using the cloud. It can be defined as a free Jupyter notebook environment that runs entirely in the cloud. Google colab is a freemium service that has free as well as paid plans for its users. The free plan offers 12 GB of RAM (extendible up to 25 GB).



After solving the hardware issues, one can look forward to the development process, but writing machine learning programs that are best suited and most efficient logically, is a tedious and long task. One can take the help of powerful, robust and easy to use built-in libraries. These libraries are capable of handling tasks starting from the preprocessing of data to the fine-tuning of the precision of the model.

For preprocessing, working with our dataset and doing the mathematical computations, Numpy and Pandas are some of the best libraries available out there. They have a big community which makes the debugging process simpler and more efficient. To develop deep learning models Pytorch, TensorFlow, Keras and FANN are some of the best libraries. Choosing a suitable library and a machine learning model that is fit for your data is a very crucial stop.

The final step in all machine learning projects is the deployment of the model. Using a microservice like Django or Flask to deploy the models is becoming an industry practice. For example, when I wanted to deploy my machine learning project, "Stock market analysis and Comparative Study of models, using ANN and RNN LSTM", then to run the python scripts, we used the Flask micro-framework. Another issue we encountered was the huge file size of the libraries and the model. We were able to solve the library size issue by uploading only the specific code file used in the development model.

There are many services that offer free plans or resource-limited free hosting options that one can use to host their model online. Heroku and pythonanywhere are two such services that get the job done nicely.

Amazing applications, solutions to mind-boggling problems or anything under the sky, can be developed utilizing the power of machine learning. The best time is now, with the knowledge of machine learning let's start our journey to "To infinity and beyond".

Note: A list of tools we talked about:

1. Hardware/Development Environment: Google Colab and Jupyter notebook
2. ML/AI libraries: Numpy, Pandas, Pytorch, TensorFlow, Keras and FANN
3. Python web frameworks: Flask and Django
4. Hosting: Github, Heroku and pythonanywhere

THE RISE OF RANSOMWARE

What is a Ransomware attack?

Ransomware attack is a type of malware attack in which the data on a system is encrypted by hacker's malicious software and money is demanded to get back the encrypted data. The system is of an individual, a company or an organization.



Ransomware attacks have been experienced for decades. But there has been a rise in ransomware from the early months of COVID-19. According to the FBI's 2020 Internet Crime Report 2400+ ransomware incidents in 2020 resulted in a loss of about 29 million dollars. The numbers are increasing at a greater rate and it doesn't even include unreported attacks. It was a nightmare for companies to deal with these attacks. 2021 was a breakout year for ransomware. Cyber criminals are now moving to more advanced techniques for their attack. The effects can be brutal as it hits hard on the supply chain.

Some recent examples of Ransomware attacks are :
 Acer : In March 2021, Acer was the victim of a ransomware attack executed by the Revil group.

CNA Financial : In March 2021, cyber insurance company CNA Financial was the victim of a ransomware attack. Executed by a group named Phoenix.

Colonial Pipeline : In May 2021, this company was victim of a ransomware attack that affected the flow of oil across the eastern U.S.

Sinclair Broadcast Group : In October 2021, the company was the victim of a ransomware attack that damaged the network's broadcast operations.

The following ways can be adapted to prevent ransomware attacks :

- Cyber Security awareness
- System Backup
- Quarantining suspicious emails
- Ransomware detection software
- Up-to-date system
- Develop Plans and Policies
- Migrate to cloud technologies

BIOINFORMATICS

Bioinformatics is the application of computer technology to the understanding and effective use of biological and biomedical data. It is the discipline that stores, analyses and interprets the big data generated by life-science experiments, or collected in a clinical context. This multidisciplinary field is driven by experts from a variety of backgrounds: biologists, computer scientists, mathematicians, statisticians and physicists.

Bioinformatics is an interdisciplinary field that develops methods and software tools for understanding biological data, in particular when the data sets are large and complex. As an interdisciplinary field of science, bioinformatics combines biology, chemistry, physics, computer science, information engineering, mathematics and statistics to analyze and interpret biological data. Bioinformatics has been used for in silico analyses of biological queries using mathematical and statistical techniques.



Bioinformatics includes biological studies that use computer programming as part of their methodology, as well as specific analysis "pipelines" that are repeatedly used, particularly in the field of genomics. Common uses of bioinformatics include the identification of candidate

genes and single nucleotide polymorphisms (SNPs). Often, such identification is made with the aim to better understand the genetic basis of disease, unique adaptations, desirable properties (esp. in agricultural species), or differences between populations. In a less formal way, bioinformatics also tries to understand the organizational principles within nucleic acid and protein sequences, called proteomics.

Image and signal processing allow extraction of useful results from large amounts of raw data. In the field of genetics, it aids in sequencing and annotating genomes and their observed mutations. It plays a role in the text mining of biological literature and the development of biological and gene ontologies to organize and query biological data. It also plays a role in the analysis of gene and protein expression and regulation. Bioinformatics tools aid in comparing, analyzing and interpreting genetic and genomic data and more generally in the understanding of evolutionary aspects of molecular biology. At a more integrative level, it helps analyze and catalog the biological pathways and networks that are an important part of systems biology. In structural biology, it aids in the simulation and modeling of DNA, RNA, proteins as well as biomolecular interactions.

APPLICATION OF IOT: IMAGE DETECTION AND PRENATAL GENETIC TESTING

The use of new techniques and methods can be significantly improved during prenatal examination and screening of fetal genetic abnormalities. Expanding the number of vectors in screening and screening for single-cell gene diseases in fetal DNA will increase the probability of success of the whole screening test. Recently, sub chromosomal abnormalities have been introduced into prenatal care. The lack of suitable tools makes it very difficult to obtain information about collection, management, and prenatal genetic testing.

The purpose of this study is to improve the accessibility of nutritional information by using the advantages of advanced medical image detection and integrating the IoT (Internet of Things) and prenatal genetic testing platforms in obstetric outpatient clinics. Records are kept that the platform will allow IoT to interact with sensor practitioners and provide immediate access to medical images prior to delivery.

This proposed system provides an IoT application for managing obstetric outpatient information and prenatal genetic testing requirements. The requirement for establishment is the realization of the development of an IoT platform for complete medical image detection information management with IoT input required for integration with existing medical information systems. In response, the purpose of the study is to use integrated IoT applications to help nutrition professionals, researchers, patients, and especially

mothers, to enhance their collection of medical imaging and prenatal genetic testing IoT sensor based information transfer.

ROBOTIC PROCESS AUTOMATION

What is robotic process automation?

Robotic process automation (RPA) is a software technology that makes it easy to build, deploy, and manage software robots that emulate humans actions interacting with digital systems and software. Just like people, software robots can do things like understand what's on a screen, complete the right keystrokes, navigate systems, identify and extract data, and perform a wide range of defined actions. But software robots can do it faster and more consistently than people, without the need to get up and stretch or take a coffee break.

What are the business benefits of RPA?

Robotic process automation streamlines workflows, which makes organizations more profitable, flexible, and responsive. It also increases employee satisfaction, engagement, and productivity by removing mundane tasks from their workdays.

RPA is non-invasive and can be rapidly implemented to accelerate digital transformation. And it's ideal for automating workflows that involve legacy systems that lack APIs, virtual desktop infrastructures (VDIs), or database access.



Why is RPA transformative?

Software robots—instead of people—do repetitive and lower-value work, like logging into applications and systems, moving files and folders, extracting, copying, and inserting data, filling in forms, and completing routine analyses and reports. Advanced robots can even perform cognitive processes, like interpreting text, engaging in chats and conversations, understanding unstructured data, and applying advanced machine learning models to make complex decisions.

When robots do these types of repetitive, high-volume tasks, humans are freed to focus on the things they do best and enjoy more: innovating, collaborating, creating, and interacting with customers. Enterprises get a boost too: higher productivity, efficiency, and resilience. It's no wonder that RPA is rewriting the story of work.

Where can RPA be used?

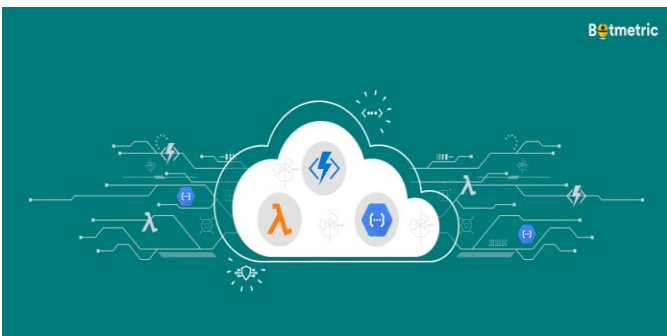
Today, RPA is driving new efficiencies and freeing people from repetitive tedium across a broad swath of industries and processes. Enterprises in industries ranging from financial services to healthcare to manufacturing to the public sector to retail and far beyond have implemented RPA in areas as diverse as finance, compliance, legal, customer service, operations, and IT. And that’s just for starters.

RPA has become so widespread because it is broadly applicable. Virtually any high-volume, business-rules-driven, repeatable process is a great candidate for automation—and increasingly so are cognitive processes that require higher-order AI skills.

SERVERLESS COMPUTING

What is serverless computing?

Serverless computing is a method of providing backend services on an as-used basis. A serverless provider allows users to write and deploy code without the hassle of worrying about the underlying infrastructure. A company that gets backend services from a serverless vendor is charged based on their computation and do not have to reserve and pay for a fixed amount of bandwidth or number of servers, as the service is auto-scaling. Note that despite the name serverless, physical servers are still used but developers do not need to be aware of them.



In the early days of the web, anyone who wanted to build a web application had to own the physical hardware required to run a server, which is a cumbersome and expensive undertaking. Then came cloud computing, where fixed numbers of servers or amounts of server space could be rented remotely. Developers and companies who rent these fixed units of server space generally over-purchase to ensure that a spike in traffic or activity will not exceed their monthly limits and break their applications. This means that much of the server space that gets paid for can go to waste. Cloud vendors have introduced auto-scaling models to address the issue, but even with auto-scaling an unwanted spike in activity, such as a DDoS Attack, could end up being very expensive.

Serverless computing allows developers to purchase backend services on a flexible ‘pay-as-you-go’ basis, meaning that developers only have to pay for the services they use. This is like switching from a cell phone data plan with a monthly fixed limit, to one that only charges for each byte of data that actually gets used.

NFT

What is an NFT?

An NFT is a digital asset that represents real-world objects like art, music, in-game items and videos. They are bought and sold online, frequently with cryptocurrency, and they are generally encoded with the same underlying software as many cryptos.

Although they’ve been around since 2014, NFTs are gaining notoriety now because they are becoming an increasingly popular way to buy and sell digital artwork. A staggering \$174 million has been spent on NFTs since November 2017.

Anyone can view the individual images—or even the entire collage of images online for free.

An NFT allows the buyer to own the original item. Not only that, it contains built-in authentication, which serves as proof of ownership. Collector’s value those “digital bragging rights” almost more than the item itself.

How Does an NFT Work?

NFTs exist on a blockchain, which is a distributed public ledger that records transactions. You’re probably most familiar with blockchain as the underlying process that makes cryptocurrencies possible.

Specifically, NFTs are typically held on the Ethereum blockchain, although other blockchains support them as well.

What Are NFTs Used For?

Blockchain technology and NFTs afford artists and content creators a unique opportunity to monetize their wares. For example, artists no longer have to rely on galleries or auction houses to sell their art. Instead, the artist can sell it directly to the consumer as an NFT, which also lets them keep more of the profits. In addition, artists can program in royalties so they’ll receive a percentage of sales whenever their art is sold to a new owner. This is an attractive feature as artists generally do not receive future proceeds after their art is first sold.

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