



CACHE

Department of IST's Official Tech Magazine

ISTA'S MARK IN 2024
An overview on i++'24

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THE ILLUSION OF FREE MUSIC
The Digital Disruption of Music

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ACKNOWLEDGEMENT

We express our profound gratitude to Dr. Selvi Ravindran, esteemed Treasurer of ISTA, and Dr. K. Vani, the distinguished President of ISTA, for their invaluable support in the compilation of our magazine.

Our heartfelt appreciation extends to Sanmitha .V.S, Chairperson of ISTA, for her instrumental role in fostering excellence. Her contribution and unwavering support has been pivotal to the realization of our magazine's success.

Additionally, our sincere appreciation extends to the erudite professors and students of the Department of IST, who significantly contributed to the creation and refinement of this publication.

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VISION OF THE DEPARTMENT

To educate students with conceptual knowledge and technical skills in the field of Information Technology with moral and ethical values to achieve excellence in academic, industry and research centric environments.



MISSION OF THE DEPARTMENT

1. To inculcate in students a firm foundation in theory and practice of IT skills coupled with the thought process for disruptive innovation and research methodologies, to keep pace with emerging technologies.
2. To provide a conducive environment for all academic, administrative, and interdisciplinary research activities using state-of-the-art technologies.
3. To stimulate the growth of graduates and doctorates, who will enter the workforce as productive IT engineers, researchers, and entrepreneurs with necessary soft skills, and continue higher professional education with competence in the global market.
4. To enable seamless collaboration with the IT industry and Government for consultancy and sponsored research.
5. To cater to cross-cultural, multinational, and demographic diversity of students.
6. To educate the students on the social, ethical, and moral values needed to make significant contributions to society.

PLACEMENT COORDINATOR

- Conducting several technical sessions regarding placements.
- Collecting placement experience from placed students.
- Collecting placement experiences from placed students.

CHAIRPERSON

- Overall management of all club activities, ensuring smooth and effective execution of plans.
- Delegation of tasks and, fostering coordination among team members to achieve the club's objectives.

COURSES

- Assisting students by dedicating extra time, facilitating their grasp of core concepts.
- Conducting regular classes to assess their progress and understanding.
- Providing abundant resources to enhance their technical knowledge through the resource repository.

MARKETING

- Promoting the department's initiatives within the college.
- Maintaining a consistent brand image across all communication channels.
- Boost event attendance with coordinated promotional campaigns across colleges.

EVENTS

- Organising various events from multiple domains as a part of i++ and ITrix
- Arranging weekly activities as part of Tech Trek.

MEDIA



MEDIA

- Drafting the newsletter, INSTANCE on a monthly basis.
- Crafting content for social media and marketing.
- Maintaining the ISTA timeline.

TREASURER

- *Maintain accurate financial records of transactions*
- *Help create and manage the association's budget, ensuring that it aligns with the department's goals.*

INTERNSHIP COORDINATOR

- *Providing materials for preparation.*
- *Conducting contests to assess themselves.*



INDUSTRIAL RELATIONS

- *Drafting MOU's, managing contact with donors, partners, media and public.*
- *Bringing in sponsors and partners for department events.*
- *Managing and coordinating workshops.*

DESIGN

- *Managing all design related works in the club including social media posts, magazines, posters, etc.*
- *Delegate work and train juniors in the field of design.*

WEB-DEV

- *Maintaining the website, resource repository & placement experience repository.*
- *Delegation of tasks to juniors, while working on the ISTA website*
- *Having ISTA website populated with all necessary details for events, during the times of Itrix and i++.*

and
countless
other
volunteers!

PRESIDENTIAL ADDRESS



Dr. Vani K mam, our esteemed new President of the Information Science and Technology Association (ISTA), is pleased to address our vibrant community today. With a deep sense of pride and enthusiasm, she brings forth a vision aimed at enriching the student experience and fostering a culture of innovation and excellence within our department.

First and foremost, she emphasizes the importance of student-centric initiatives. She highlights how ISTA's various events, workshops, and training sessions are meticulously curated to benefit students at every step of their academic journey. From providing comprehensive materials for placements to conducting regular contests and mock interviews, the association aims to equip students with the necessary skills and confidence to excel in their careers.

Furthermore, she highlights the significance of addressing students' specific needs and challenges. Through targeted training sessions tailored to address difficult subjects, junior and senior students are encouraged to collaborate and support each other's learning. Additionally, ISTA collaborates with industry partners to provide students with internship and placement opportunities, rewarding those who excel in symposium events.

The principal objective of ISTA is to empower students with knowledge and skills essential for success in the dynamic IT industry. Through initiatives like hackathons and research support, the association strives to nurture critical thinking and problem-solving abilities among students. Moreover, ISTA extends its support to students aspiring for diverse career paths, including those interested in pursuing research or appearing for competitive exams like UPSC.

As we look toward the future, Dr. Vani emphasizes the importance of building a robust alumni network to facilitate mentorship, internships, and project collaborations for current students. She encourages active participation from all students, emphasizing the value of teamwork, collaboration, and continuous learning.

In conclusion, mam urges all students to actively engage with ISTA's initiatives, seize growth opportunities, and contribute to the collective success of the association. Together, let us embark on this journey with enthusiasm, dedication, and a commitment to excellence.

Warm regards,

[Dr. Vani K]

President, Information Science and Technology Association (ISTA)

ABOUT CACHE

Welcome to Cache Magazine, your go-to destination for a dynamic blend of technology, creativity, and career insights! With a diverse range of sections catering to the curious mind, we pride ourselves on being a multi-faceted platform that encapsulates the essence of the digital age.

At the heart of Cache Magazine lies the fusion of tech-savvy knowledge and innovative thinking. We have got a lot of tech articles lined up for the readers.

Cache Magazine isn't just about the technicalities; it's also about the people who make the tech world come alive. Our exclusive interviews bring you closer to the experiences and perspectives of individuals shaping tomorrow's innovations. Moving beyond the realms of technology, Cache Magazine celebrates creativity through its various corners. The "Talent Corner" provides a canvas for artistic expressions, featuring captivating artwork, thought-provoking poetry, and other forms of creative genius. For those seeking mental stimulation, our "Puzzle Corner" challenges the mind with brain-teasers, riddles, and puzzles that entertain and stimulate cognitive abilities. Additionally, we embrace the softer side of expression through a collection of captivating poems, offering a moment of tranquility amidst the bustling tech-centric content.



Cache Magazine is more than just a publication; it's a community—a convergence of technology enthusiasts, creative souls, and career-driven individuals. We invite you to immerse yourself in the rich tapestry of knowledge, inspiration, and innovation that defines our pages. Join us on this exhilarating journey where tech meets creativity, and possibilities know no bounds.

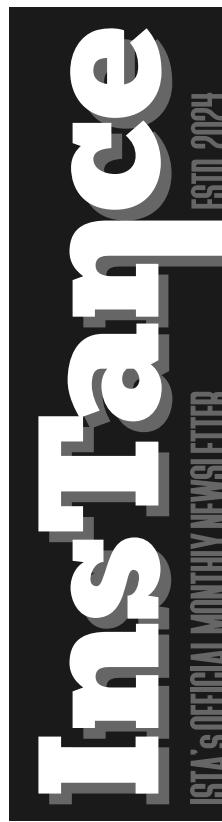


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NON TECHNICAL EVENTS

**MARCH
21,22,23**

ZOHO Creator
Catalyst by ZOHO
AI Frontiers: LLMs and
RAG by IBM
Hands-on IOT and EDGE
COMPUTING

WORKSHOPS

ITRIX HACKATHON

HACK IT

- A 10 hour marathon

3+ WORKSHOPS



CJ ISTA's mark in 2024

i+24
iterate to infinity

SHANJANAA.G - 2021115099

October 25 marked the start of a fun-filled series of events awaiting to be unfolded, featuring a power-packed workshop and 12 thrilling events that kept participants on their toes. From tech battles to brainy escapes, and even an exclusive hiring drive, this symposium was nothing short of legendary!

ARAMBIKALAMA... / ISTA ASSEMBLE

The event kicked off in style at the Ada Lovelace Auditorium, with an inauguration that was as prestigious as it was heartwarming. The stage gleamed with the presence of Dr. Swamynathan (HoD, IST), Dr. Vani (President, ISTA), Dr. Selvi Ravindran (Treasurer, ISTA), and the esteemed chief guest, Mr. TAMIL ELAMUKIL from Codestax.Ai.



A new tradition was set in motion with the distribution of exclusive badges for ISTA office bearers—finally giving them the official recognition they deserve! ISTA's Chairperson Sanmitha S.V. and Student Treasurer Ibrahim Navas added more colour to the stage with their presence, exuding confidence and elegance. All the office bearers collected their badges from the dignitaries in formal attire, looking sharp and sophisticated, making the moment even more special.



CRACKING THE CODE TO HIGHER STUDIES



As part of I++ 2024, Magoosh conducted an insightful and engaging session on higher studies abroad, covering everything from preparation through the application process and the initiation of students' studies abroad. To help the students on this journey, they set up an exclusive stall for students, clearing doubts, busting myths, and making the dream of studying abroad feel much closer to reality.

The symposium was an action-packed extravaganza, featuring a variety of events that challenged minds and sparked innovation. From coding duels that had participants questioning their life choices to puzzle-solving quests that felt like an escape room on steroids, every challenge brought its own twist. Collaborations made things even more exciting. Code Royale with CSAU turned coding into a strategic chess match, Resurrection Run with ACM had participants reviving fictional characters through code (because why not?), and SportFlix with Quizzers Anonymous tested just how much random trivia one could store in their brain. Every event had something fresh, ensuring that boredom never stood a chance!

One event that truly stole the spotlight was Sparkathon, a hackathon that pushed participants to their limits, encouraging them to come up with out-of-the-box solutions under time pressure. The competitive spirit was electric, with teams brainstorming, coding, and collaborating to present their best ideas.

Adding to the excitement was Tech Trek 2.0, a one-of-a-kind weekly series that transformed the Ada Lovelace Auditorium into a hub of learning and growth. Every Friday sharp at 3:00 pm, students gathered to refine their interview skills, dive into SQL-based challenges, and even tackle creative marketing tasks that blended fun with strategy. Designed by different ISTA domains, the sessions were a perfect blend of technical expertise and soft-skill development, fostering both knowledge and camaraderie among participants.



HIRING IN PROGRESS...

Talent Quest , one of the biggest attractions of the symposium, an exclusive hiring drive conducted by Codestax.ai. With over 100 participants competing for an envied position, the event was a high-stakes affair. After rounds of intense evaluations, 3 candidates emerged victorious, securing placement opportunities.

A special shoutout to Vithyaghar, IT Alumnus for facilitating this incredible opportunity and making it a grand success!

CURTAIN CLOSE

The investiture ceremony took place on October 26, 2024, at the very place where it all began- The Ada Lovelace Auditorium. ISTA office bearers gleamed in their signature ISTA hoodies, embodying the spirit of leadership and excellence. The winners of the various events were honoured, celebrating their hard work and achievements.

Making the event even more special, the 2024 alumni – Ramya R, Vithyaghar M, Mithulesh, and Rohith ,who returned to witness and celebrate the legacy of ISTA. The day concluded with a lively picture session, capturing the memories and marking the success of an unforgettable symposium.

The organizers survived sleepless nights, last-minute panic attacks, and a borderline unhealthy amount of coffee to pull off an event that left participants both inspired and slightly exhausted. From code that miraculously worked at the last second to treasure hunts that had people sprinting across campus like it was the Olympics, this symposium set new milestones and proved that with enough passion (and caffeine), anything is possible!



UNTIL NEXT TIME!

a look into the SECONDARY STORAGE

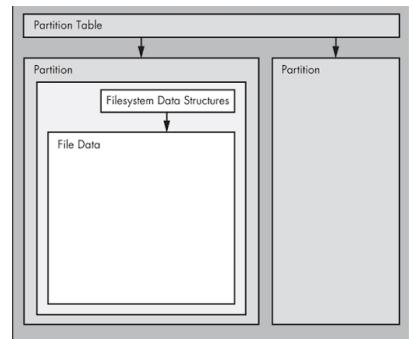
Disk Partitions and File Systems

NISHANTH.S.D - 2021115070

In this article we look into how the secondary storage devices work in the logical level by understanding the disk partitions and its associated file system types

PARTITIONS - WHAT ARE THEY?

Partitions are essentially logical sections of the disk which can hold a file system in it. A partition usually defines where it starts where it ends and the number of physical data blocks it holds. A file system is a specific way of organizing files as per the well-defined standards that are discussed later in this article. The adjacent diagram depicts this visually.



Ok let's see what the components mentioned in the picture one by one.

PARTITION TABLE

A partition table is a data structure stored on a disk that defines the layout of partitions. The partition table contains information such as the size, location, and type of each partition on the disk.

There are two types of Partition Tables

Master Boot Record (MBR) Table - Older one

GUID Partition Table (GPT) - The newer currently used one

The details of these tables are left to reader's curiosity :).

These tables are stored at the starting blocks of the physical disk.

PARTITIONS

As mentioned above the partitions are logical sections of the disk that do various tasks such as storing data in a file system to even storing the OS itself. In MBR schemes **Primary Partition** holds the OS and in GPT schemes **EFI System Partition** plays a major role in booting the OS. There are many other types of partitions available.

Viewing the partitions in your system's secondary storage

WINDOWS

Diskpart utility can be used to view the partitions in the disks connected to the system. In the given picture, disk 0 is the SSD that is connected and the Disk 1 is the pendrive that is also connected to the system.

The size, type and offset of each partition is given too.

The File systems in each partition including the pendrive is listed by this command.

DISKPART> list volume							
Volume ##	Ltr	Label	Fs	Type	Size	Status	Info
Volume 0	C	Vostok	NTFS	Partition	275 GB	Healthy	Boot
Volume 1	D	Apollo	NTFS	Partition	149 GB	Healthy	
Volume 2		SYSTEM	FAT32	Partition	260 MB	Healthy	System
Volume 3			NTFS	Partition	627 MB	Healthy	Hidden
Volume 4		Windows RE	NTFS	Partition	571 MB	Healthy	Hidden
Volume 5	E	CDROM	FAT32	Removable	15 GB	Healthy	

PS C:\Users> diskpart							
Microsoft DiskPart version 10.0.26052.1000							
Copyright (C) Microsoft Corporation.							
On computer: NISHANTH							
DISKPART> list disk							
Disk ###	Status	Size	Free	Dyn	Gpt		
Disk 0	Online	476 GB	7168 KB	*			
Disk 1	Online	15 GB	0 B		*		
DISKPART> select disk 0							
Disk 0 is now the selected disk.							
DISKPART> list partition							
Partition ###	Type	Size	Offset				
Partition 1	System	260 MB	1024 KB				
Partition 2	Reserved	16 MB	261 MB				
Partition 3	Primary	275 GB	277 MB				
Partition 4	Recovery	627 MB	275 GB				
Partition 5	Primary	149 GB	276 GB				
Partition 7	Unknown	50 GB	426 GB				
Partition 6	Recovery	571 MB	476 GB				
DISKPART> select disk 1							
Disk 1 is now the selected disk.							
DISKPART> list partition							
Partition ###	Type	Size	Offset				
Partition 1	Primary	15 GB	1024 KB				

LINUX

Similarly in Linux, the partitions and their information can be viewed by

Utilities such as **parted** and **lsblk**.

File Systems:

A file system is like a digital filing cabinet for your computer. It organizes and stores your files, making it easy for the computer to find and access them when needed.

Just like how you arrange papers in folders and drawers, a file system arranges data on storage devices like hard drives or SSDs. It helps keep everything tidy and makes it possible for your computer to work with your files efficiently.

Ok enough with the definitions...

Basically, a File System defines how you organize files and how the system accesses it.

The File System also decides the maximum size a file can take too. Here are the various types of File Systems:

FAT family

Used by DOS operating system computers

File Allocation Table is abbreviated as FAT

FAT 12 - max file size 32 MB

FAT 16 - max file size 2 GB

FAT 32 - max file size 4 GB

APFS

Apple File System

Used in all MacOS systems

This file system is not supported in both linux and windows natively but third-party applications are available

Max file size 8 Exabytes

Extended File Systems (ext x)

Linux's default file system

The most recent one is ext4

Windows unfortunately can't read ext x filesystems natively but third-party applications are available

Ext2 - max file size 2 TB

Ext3 - max file size 2 TB

Ext4 - max file size 16TB

NTFS

New Technology File System

Used in almost all windows PCs

Linux can read NTFS natively

Maximum file size is 16 Exabytes

Thus, some of the major file systems are explored and the reader is requested to further explore deep into the workings of the secondary storage in our computers.

BLOCKCHAIN

The Gen Z's Economic Revolution

BEYOND BITCOIN AND INTO THE FUTURE

ANANYA.K.A - 2021115013

INTRODUCTION: LET'S GET LIT WITH BLOCKCHAIN!

Hey there, Gen Z! You're not just the generation of TikTok dances and avocado toast; you're also the ones who are about to ride the blockchain wave that's crashing into the economy. Buckle up and put on your favorite meme-inspired T-shirt because we're going to explore how blockchain, that thing beyond Bitcoin, is changing the game like never before.

THE BLOCKCHAIN BEAT: BEYOND BITCOIN & INTO EVERYTHING

So, you've heard of Bitcoin, right? Well, meet the rockstar behind the scenes – blockchain. It's not just about digital coins anymore; it's a tech powerhouse that's here to make you rethink the way you see the world.

1. Money Evolution: DeFi for the Win

Bitcoin is cool, but DeFi (Decentralized Finance) is cooler. Think of it as a party where traditional banks aren't invited. DeFi lets you lend, borrow, and trade without the old-school financial institutions gatekeeping your money. It's like your financial freedom playlist, and everyone's invited.

2. Supply Chains: From Farm to Hipster Avocado Toast

Ever wondered where your brunch's avo toast came from? Blockchain is on a mission to make sure you know. It's shaking up supply chain management, allowing you to trace your favorite snack right from the farm to your Insta-worthy plate. It's like a farm-to-table movement on digital steroids.

3. Smart Contracts: Making Magic Happen

Smart contracts are like magic spells, but for grown-ups. They're self-executing contracts written in code. Need to rent an apartment? Poof, smart contract. Splitting the pizza bill? Abra-kadabra, another smart contract. It's like automation, but cooler.





THE BLOCKCHAIN TAKEOVER: GET READY TO BE AMAZED!

Okay, how is blockchain taking over, you ask? Get ready for some mind-blowing facts:

1. No More Middlemen: Bye-Bye Bankers

Blockchain says goodbye to those middlemen who've been charging you fees and making transactions slow. It's like your favorite indie artist releasing music directly to fans, cutting out the record label. Fewer fees, faster transactions, and more control. It's a financial revolution you can vibe with.

2. Global Access: Your Cousin's In, Too

Blockchain doesn't care about borders or fancy suits. Anyone with internet access can join the blockchain party. It's like your cousin in a remote village becoming a crypto whiz overnight. It's tech democracy in action.

3. Innovation Galore: Your Playground

Blockchain is the ultimate innovation playground. Startups are using it to change the game in everything from art to gaming to voting. It's like an endless buffet of tech ideas, and you're the chef creating the future.

4. Transparency Rules: No More Secrets

Blockchain is all about transparency. It's like your diary, open for everyone to see but super secure. No more fudging the numbers or sneaky business. It's like the truth serum for the digital age.

WHAT'S THE CATCH?

But, and there's always a but, blockchain isn't all sunshine and rainbows. Think of the challenges it faces as the boss levels in a video game. Things like scaling up, dealing with regulations, and that whole energy consumption thing need to be sorted out.

BLOCKCHAIN'S CALLING, WILL YOU PICK UP?

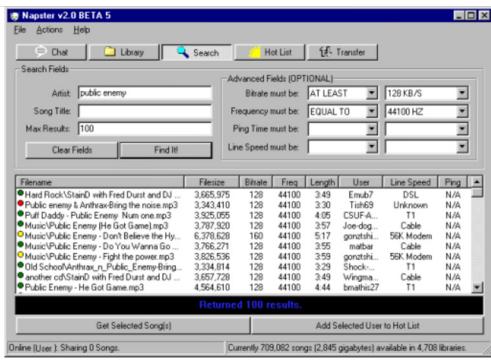
So, Gen Z, here's the scoop: Blockchain is not just a buzzword; it's a revolution. It's shaking up old systems, breaking down barriers, and giving power back to the people. Keep an eye on it because the blockchain revolution is just getting started, and it's going to blow your mind. Strap in, stay curious, and get ready to change the world!

THE ILLUSION OF FREE MUSIC

MUKILARASAN.V - 2021115066

In 1982, Sony and Philips launched the Compact Disc (CD) music format, which started the downfall of then-dominant music formats, including vinyl records and cassettes. CDs contain uncompressed audio data in PCM (Pulse-Code Modulation) samples. Unlike today's digital files, CDs require a compatible CD player for playback and can't be readily duplicated or shared across devices. The inability to transfer or copy CDs posed a significant limitation for music enthusiasts.

In 1988, Karlheinz Brandenburg and his team, Moving Pictures Expert Group (MPEG), started working on digitally transmitting audio data, which was impossible then. They developed Layer I and II, but the audio-only layer, Layer III, is more complex because it needs high-fidelity audio to compare the converted audio file. They picked Suzzane Vega's "Tom's Diner" due to its acapella nature and Suzzane's clear vocal range. In the mid-90s, MPEG finally unveiled 'MPEG Audio Layer 3' aka MP3. MPEG only released the encoding format first in 1995, but it only took two more years for an Australian student to crack the code. They bought the encoding software in Germany and somehow managed to develop the decoding software and posted it on an American FTP site for the public. Now, there is a vile possibility that anyone with the decoding software could pirate and release music in public, which is very bad for the music industry, and that is pretty much what happened back then. But during this time, the sales of the CDs peaked. 1999 saw nearly 1.4 billion dollars in CD sales with Oasis, Tupac, Spice Girls, The Backstreet Boys and Britney Spears.



Napster's User Interface (1999)

Napster, a peer-to-peer file-transferring website, used this opportunity to transfer audio files digitally, and millions of people used this. Many thought that this would be the end of the music industry. Vinyl records and CDs saw their worst sales in the following years. Music leaks before the release date become more often. It didn't fit well with the music industry, So after a long legal battle, Napster was banned, once and for all. With all this chaos, Steve Jobs released the iPod in 2001, with many companies releasing MP3 players.

But this didn't match up with the earlier CD or Vinyl sales, So the artists were forced to tour more by their respective labels.



Spotify (2011)

In 2011, a Swedish music startup named Spotify came along by giving access to people, all the music worldwide. The revenue came from the ads. Spotify and Apple Music jointly ruled the streaming industry by providing music for free or at least the illusion of it. In 2015, Taylor Swift wrote an open letter to Apple Music stating how artists are paid very little by their platform. Following this, she pulled her most successful album '1989' across all streaming platforms, making people avail her music only the old-school way, through physical media. At the same time, Adele's '25' broke the record for most first-week sales by any artist after NSYNC's No Strings Attached. In 2017, Swift came back to streaming because it was the only way to earn the most through recording music

To Apple, Love Taylor

Follow taylor swift



TAYLOR SWIFT
BORN IN 1989.
[JOIN MAILING LIST](#) [TAYLORSWIFT.COM](#) [SHOP TAYLOR SWIFT](#)
[TUMBLR RADAR!](#) [ARCHIVE](#)

I write this to explain why I'll be holding back my album, 1989, from the new streaming service, Apple Music. I feel this deserves an explanation because Apple has been and will continue to be one of my best partners in selling music and creating ways for me to connect with my fans. I respect the company and the truly ingenious minds that have created a legacy based on innovation and pushing the right boundaries.

I'm sure you are aware that Apple Music will be offering a free 3 month trial to anyone who signs up for the service. I'm not sure you know that Apple Music will not be paying writers, producers, or artists for those three months. I find it to be shocking, disappointing, and completely unlike this historically progressive and generous company.

This is not about me. Thankfully I am on my fifth album and can support myself, my band, crew, and entire management team by playing live shows. This is about the new artist or band that has just released their first single and will not be paid for its success. This is about the young songwriter who just got his or her first cut and thought that the royalties from that would get them out of debt. This is about the producer who works tirelessly to innovate and create, just like the innovators and creators at Apple are pioneering in their field...but will not get paid for a quarter of a year's worth of plays on his or her songs.

Taylor Swift's letter to Apple Music (2015)

Switching back to the current day scenario, People started to buy music again. Though Spotify Wrapped and Apple Music Replay have cultural relevance right now, the idea of supporting their favourite artists and having a physical copy of their favourite albums, made people start their record collection. According to RIAA and Billboard, 2023 was the best year in record sales with over 43 million records, 6 million CDs and even nearly half a million cassettes sold. Though this is not even near what artists earned through streaming, it is good to acknowledge that people are respecting the retrospective way of conceiving music.

EMULATION

SALAI KOWSHIKAN - 2022115081

INTRODUCTION

With computer architecture and operating systems evolving faster than ever, software developed for legacy systems is often left behind in the dust, forgotten by the influx of new software being pushed every year.

But is it wise to discard them so easily? What if we need them in the future? Software development is also a form of art, crafted by developers using the paintbrush of code. Shouldn't these creations be preserved for future generations to see and experience? Amidst the commercialization of software, there is a solution to prevent such obsolescence—emulation.

SO WHAT IS IT?

An emulator is an application that allows your computer to behave like another system. More specifically, it mimics the hardware architecture of the target system, enabling your computer to run software designed for that architecture. It's a versatile field that serves as the backbone of many applications—ranging from running legacy software to testing and developing for newer systems.

THAT SOUNDS EXACTLY LIKE A VIRTUAL MACHINE THOUGH

Emulators and virtual machines are often confused because they provide similar use cases, but they operate differently. Emulators focus on replicating the hardware architecture of a target system, enabling software designed for that system to run on a completely different architecture. For instance, Android emulators allow developers to test apps by imitating the functionality of an Android device, including its hardware and software layers.

Virtual machines, on the other hand, create a logically independent, isolated environment for running software. This may involve virtualization techniques, where the VM shares the same hardware architecture as the host system for optimal performance. Unlike emulators, VMs don't always replicate specific hardware—rather, they provide the functionality to run entire operating systems or applications in a secure, sandboxed environment. A good example is the Java Virtual Machine (JVM), which abstracts the underlying system to execute Java bytecode without emulating specific hardware.

THIS DOESN'T SOUND VERY EASY

Indeed, emulators typically need to replicate the CPU architecture of the target machine, which might have a different instruction set, registers, and flag bits. Additionally, the target machine's memory subsystem could have entirely different word sizes, addressing mechanisms, and methods for mapping logical to physical memory.

The simplest approach to CPU simulation is using an interpreter, which translates each machine instruction of the emulated system into semantically equivalent instructions for the host system. This is why emulation is computationally expensive—even emulating a 20-year-old system like the PlayStation 3 requires top-of-the-line CPUs available on the current market. However, using specialized FPGAs designed for the target system can significantly reduce computational requirements.

But there is an important aspect we must not overlook: input/output and other peripherals. These require specialized handling, including managing interrupts and memory-mapped I/O. Building an emulator for a system demands a deep understanding of its architecture and intricacies.

DEVELOPMENT OF NEW SYSTEMS

Emulators play a crucial role in designing, developing, and testing new systems before they are physically built. They also allow developers to create software for hardware that has yet to be released. Furthermore, emulators are highly accurate in replicating the bugs and errors that might occur in the original hardware, making them invaluable tools for testing.

CREATION OF NEW MEDIA

Many developers work on passion projects, creating new software for older systems. This may be driven by nostalgia, a desire to utilize the unique graphical rendering style of a specific system, or simply because they enjoy developing software for that particular platform.

**ALL
OF THIS
FOR
WHAT?**

DIGITAL PRESERVATION

Emulation helps combat obsolescence by enabling modern hardware to run legacy software, preserving it for future generations. This is particularly significant in the realm of video games, where millions of titles are preserved and made accessible to future generations—games that would have otherwise been lost to time.

CLOSING THOUGHTS

If all of this has sparked even a tiny bit of curiosity in you, we recommend trying to write an emulator for a simple system like the CHIP-8. It is widely regarded as the starting point for aspiring developers, thanks to its straightforward architecture. Building a CHIP-8 emulator is also one of the best ways to learn computer architecture and low-level programming.

If you manage to build one, share it on your socials, and don't forget to tag ISTA!

ALUMNI FEATURES

ROBOTIC PROCESS AUTOMATION

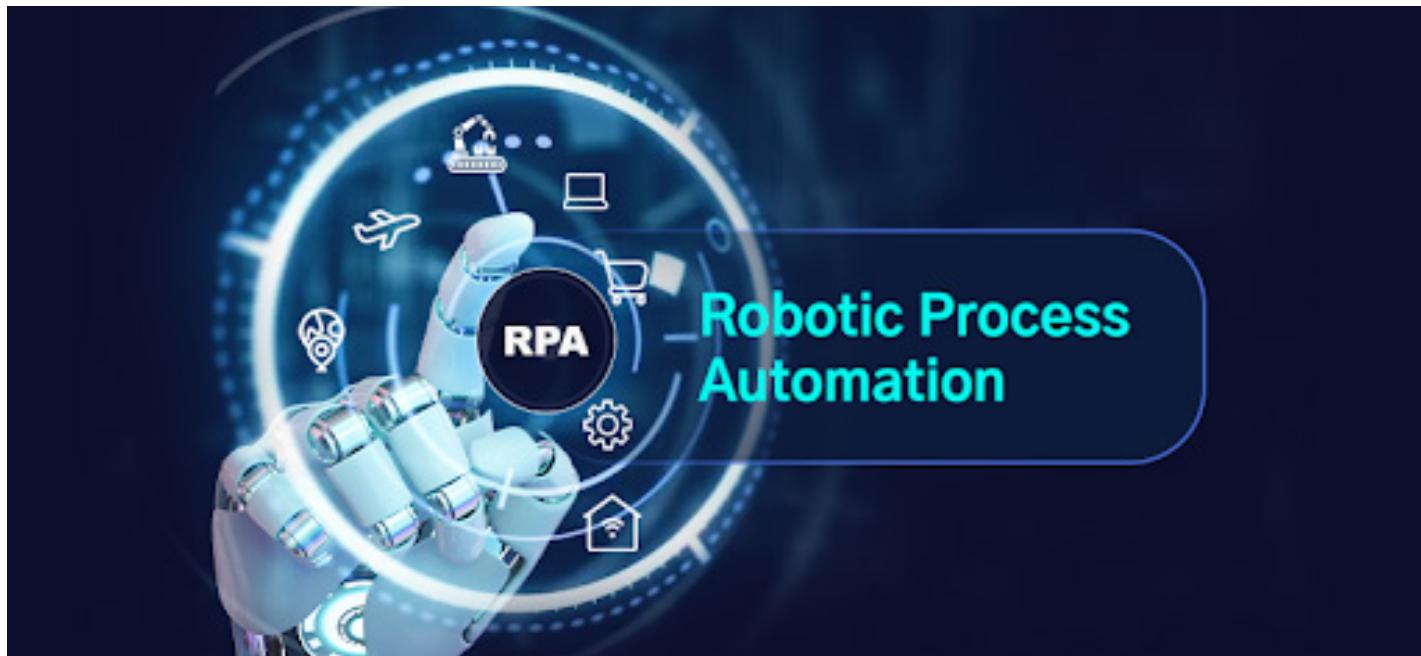
MUTHU RESHMI



Robotic Process Automation(RPA) is a software bot that can work on repetitive and mundane tasks. These bots run in physical computers or virtual machines and make the complex time-consuming processes much simpler.RPA tools can configure software/tools to train the algorithms with structured data to carry out tons of repetitive work in an easy fashion. They can range from simple response to emails to complex tasks in Enterprise Resource Planning(ERP).

Robotic process automation is not the same as artificial intelligence, they are related. AI is the process of mimicking human intelligence in a decision-making process whereas RPA does the tedious and repetitive human tasks. AI works with training structured data whereas RPA deals with unstructured data.RPA is highly process-driven where it looks through a process and automates it whereas AI is data-driven because it trains the models through a huge amount of data and observes patterns in them to arrive at an automated decision. We cannot tell which is the best, because both are important in today's scenario and so they are used in a combined manner to enable end-to-end intelligent automation. This combo is used in a lot of processes like the verification of a new bank account creation.

To see what processes can be automated with RPA, there are certain needs that the processes have to satisfy. First, the process should be rule-based i.e. the process should follow standard rules and should be consistent . Next, the process should be repetitive at regular intervals or should be pre-triggered so that RPA can automate this process and make it easier for us. A process that has to deal with huge amounts of data can also be considered a suitable candidate for RPA. Tasks that involve a lot of paper-based work where there are possibilities of a lot of errors, can be done perfectly without any mistakes using RPA.



RPA has proved to be very helpful in the business domain. It has increased productivity, security, and efficiency. RPA is non-disruptive because RPA bots interact with legacy systems at the UI end of the presentation layer. Apart from the business domain, RPA has also positively affected other domains like healthcare, manufacturing, telecommunications, and many more domains. Patient data migration and processing, Reporting for doctors, Medical bill processing, Insurance data automation, Insurance claim processing, and Patient record storage are the primary use cases in healthcare. RPA has the following applications in the manufacturing domain: automation of logistics data, data monitoring, ERP automation, and product pricing comparisons. In telecommunication it has been used to backup client systems, Collect and consolidate client's phone data and upload data.

Even though we find RPA renders many benefits, it also has several challenges. One of the major challenges is the scaling of the RPA program due to regulatory updates or internal changes. Managing security risks is one of the top priorities in RPA management since these software bots will be dealing with the company's sensitive data. Many companies face financial losses by automating wrong processes.

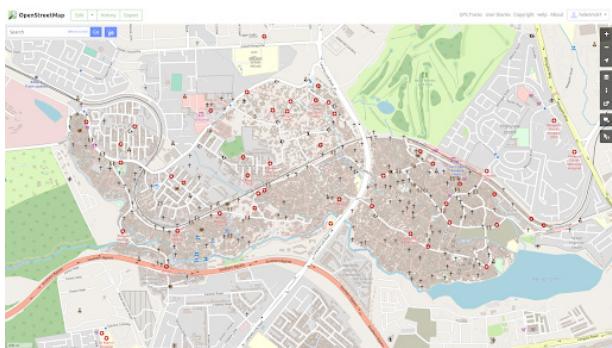
Much like a two-sided coin, RPA presents both advantages and disadvantages. The key lies in our strategic and thoughtful utilization of RPA to effectively automate tedious processes, ensuring that the benefits outweigh any potential drawbacks.

GEOSPATIAL MACHINE LEARNING

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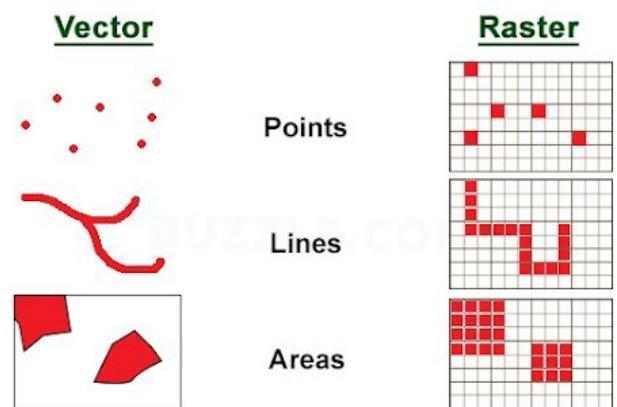
WHAT IS GEOSPATIAL DATA?

Geospatial data, or geodata, is data that includes information related to locations on the Earth's surface. Geospatial data generally comprises location information (usually in the form of coordinates), attribute information (the qualities of the object, event, or phenomenon in question), and temporal information (the period during which the location and attributes exist). The location of your device, for instance, can be shown using geographical data, and it can even track its location while moving.



Geospatial data typically involves large sets of spatial data gleaned from many diverse sources in varying formats and can include information such as census data, satellite imagery, weather data, cell phone data, drawn images and social media data. Geographic information systems (GIS) are software systems that create, manage, analyze, and map all types of data.

Vector and raster data are the two primary categories of geographical data. Vector data is data in which points, lines and polygons represent features such as properties, cities, roads, mountains and water bodies. For example, in a vector data-based visual representation, homes could be represented as points, highways as lines, and entire towns as polygons. Raster data is pixelated or gridded cells identified according to row and column. Photographs and satellite imagery which are significantly more complicated imagery are examples of raster data.



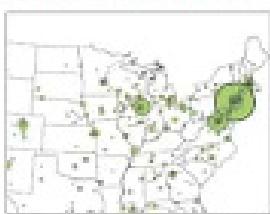
WHAT IS MACHINE LEARNING?

Machine learning is a subset of AI, which uses algorithms that learn from data to make predictions. In some cases, writing a program for the machine to follow is time-consuming or impossible. Machine learning takes the approach of letting computers learn to program themselves through experience. As they are exposed to new data, machine learning algorithms develop and get better. It enables learning the hidden patterns of the datasets which are used to make predictions on new similar type data, without being explicitly programmed for each task.

MACHINE LEARNING IN GEOSPATIAL DATA

ML techniques can be used to process, interpret, and extract insights from geospatial data. This offers a variety of advantages, such as improved efficiency through automated tasks, increased accuracy through reducing errors and biases, scalability through cloud computing and parallel processing, and creativity through data mining and deep learning.

Fraud and Abuse



Detect patterns of fraud and collusion (e.g. claims fraud, credit card fraud)

Retail



Site selection, urban planning, foot traffic analysis

Financial Services



Economic distribution, loan risk analysis, predicting sales at retail investments

Healthcare



Identifying disease epicenters, environmental impact on health, planning care

Disaster Recovery



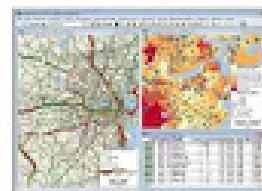
Flood surveys, earthquake mapping, response planning

Defense and Intel



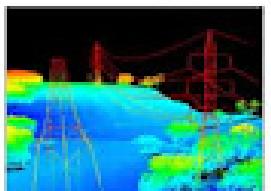
Reconnaissance, threat detection, damage assessment

Infrastructure



Transportation planning, agriculture management, housing development

Energy



Climate change analysis, energy asset inspection, oil discovery

Machine learning can be divided into three main types: supervised learning, unsupervised learning, and reinforcement learning. Each type has different applications and challenges for geospatial data analysis. Some of the most common ways where machine learning is applied on geospatial data are:

CLASSIFICATION

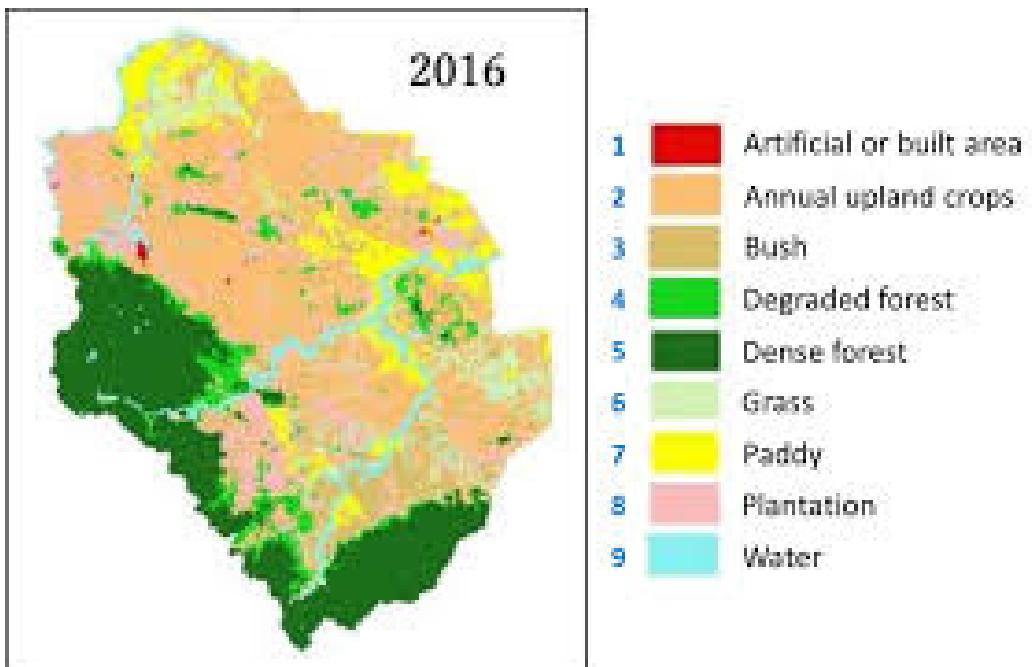
CLUSTERING

REGRESSION

ANALYSIS

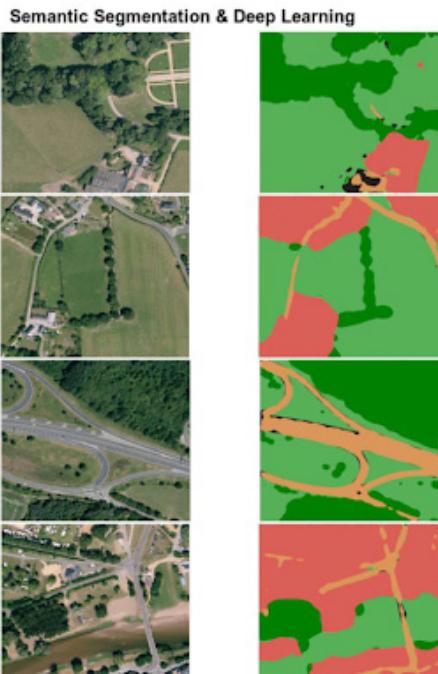
CLASSIFICATION

Classification is a supervised machine learning method where the model tries to predict the correct label of a given input data. For instance, AI can help classify different types of land cover, detect and locate specific objects and divide an image into meaningful regions.



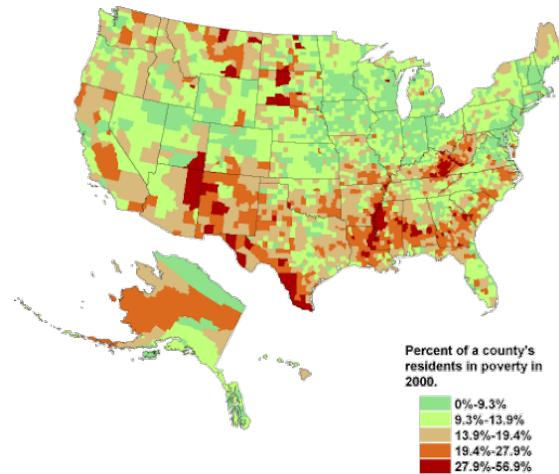
CLUSTERING

Clustering is the task of grouping a set of objects in such a way that observations in the same group are more similar to each other than to those in other groups. For example you can segment water, vegetation and rock areas in satellite images with the help of clustering algorithms. You can also identify spatial hotspots, detect crime clusters and disease outbreaks.



REGRESSION

It is a method for understanding the relationship between features and outcome. The method is used to predict continuous values. For example, you can identify the relation between the poverty rate of an area and factors like population density, built up area proportion, building count, economic activity, etc and predict the poverty rate of the area.



ANALYSIS

AI can also be used to analyze road networks and transportation routes to suggest the best routes (yes, just like how Google Maps does!). It can also be used to study suitability of a region for building infrastructure like schools and hospitals.

There are a lot more interesting applications like analyzing the after effects of a disaster which will help identify affected zones and help provide better care. Rescuing people from war zones using geospatial data? Yes, that's possible too! With the rise of AI and ML, it has made various tasks much easier to complete in an efficient manner. These capabilities save time and resources, at the same time improve the quality of your results, handle large datasets, and uncover new insights in your data.

In the heart of CEG, where legends grow,
Lives the IT tribe, where ideas flow.
Codes are woven with fingers swift,
Dreaming in logic, they craft and lift.

From sunrise sprints to midnight grind,
They debug life with an agile mind.
Seeking Dijkstra's quickest way,
But negative weights cause them dismay.

They speak in Python, think in C,
Building futures we long to see.
Swagger in hoodies, coffee in hand,
Recursive functions in high demand.

At the helm stands ISTA, bright as day,
Crafting I++ where ideas play.
And ITRIX, where code takes flight—
Segmentation faults fade into the night.

**And coming soon...
An ode to the final years.**

A yearbook that captures every code,
coffee, and crazy memory.
Stories of hustle, heart, and hilarious mo+
ments—etched forever.
Stay tuned. This one's for **you**.