IT INSIGHTS

Future EDUCATION — WIDE ANGLE LEARNING

INSTITUTION'S INNOVATION COUNCIL (Ministry of HRD Initiative)

EDITION: IV

DEPARTMENT OF INFORMATION TECHNOLOGY

MESSAGE FROM PRINCIPAL

Welcome to the forefront of Technology! Our latest issue is a gateway to the ever-evolving landscape of IT, offering a comprehensive exploration of groundbreaking trends and transformative innovations.

This edition is not just a magazine; it's a roadmap to staying ahead in the dynamic realm of IT. Gain insights from thought leaders, learn from real-world happenings and unlock the potential of emerging technologies. Elevate your IT IQ, and join us on this exciting journey of knowledge and discovery. Let's navigate the future together!"

Dr. Aloke Kumar Ghosh
Principal
FIEM

VOICE OF THE THE DEPARTMENT

Since its inception in 2007 with an intake of 60 students, FIEM's Information Technology Department has expanded to offer a comprehensive undergraduate program in IT. It boasts a dedicated team of adept faculty members and technical staff, many associated with research work on renowned institutions. The department houses well-equipped, independent laboratories, catering to cutting-edge technologies such as Data Analytics, IoT, AI, among others, providing students with hands-on experience in emerging fields. Faculty-led research initiatives and active student involvement in clubs like IEEE, ACM etc., and the Innovation Club stimulate practical learning and knowledge exchange.

Going beyond technical profiency, the department prioritizes instilling ethical values, striving to mold future leaders with strong moral character. Emphasizing managerial and soft skills, it aims to produce well-rounded professionals prepared for diverse challenges. Consistently throughout the year, the Department conducts various events such as the Pre-Placement Workshop (Prastuti), Technical Quiz, Project Competition (Prakaushal), Coding Competition (CodeExcellence), and more. These initiatives are designed to enhance knowledge and provide a morale boost to students. Prastuti, the Pre-placement Workshop, prepares students for professional life by offering insights into industry requirements and honing their employability skills. The Technical Quiz fosters competitive learning and a deeper understanding of technical concepts. The Project Competition, Prakaushal, encourages innovation and practical application of knowledge through project development. Additionally, the Coding Competition, CodeExcellence, hones coding skills and problem-solving abilities, crucial in the IT domain. These events serve not only as platforms for academic and technical development but also as opportunities for students to showcase their talents, fostering a competitive and enriched learning environment. They contribute significantly to students' holistic growth, preparing them for future challenges in their careers. Ultimately, the department aspires to contribute positively to the nation's progress by nurturing individuals who can make significant societal contributions.

Dr. Niladri Sekhar Datta
Associate Professor

FUTURE ++

The two-day seminar on the Journey of the IT Profession and New Opportunities held on 7th and 8th April 2022 was a huge success. It was conducted by the faculty and students of the IT and Computer Application Department. On 7th April, the discussion panel was conducted with seven highly-placed students, Prof Tapas Ray, HOD CS Dept, Prof Prosenit Mukherjee Asst Professor, IT Department and Prof Dr. Anirban Chakrabarty, HOD Dept. of Comp Application Dept. The entire program was streamed online, making it accessible to all. It was an amazing event to witness, giving us a glimpse into the future of the IT profession.

PRASTUTI

Prastuti, a pre-placement program for B.Tech IT students of Future Institute of Engineering and Management Sonarpur, was conducted on March 9th, 2022. The program was aimed at preparing the students for their upcoming placement drives and was organized by the faculty members of the IT Department. The program covered a wide range of topics such as Data Structure and Algorithm, DBMS, etc. technical skills along with communication skills to equip the students with the knowledge and tools required for their professional careers. The faculty members shared their expertise and experiences with the students, providing valuable insights and guidance. Prastuti was a great opportunity for the students to learn and develop themselves for their future careers.

fig1: Future ++ poster

fig3: Prastuti poster

fig2: Future ++ group photo

fig4: Prastuti group photo

STUDENT ACHIEVEMENT

Swetav Das	**2018-2022**	Joy of Computing using Python (Jan-Apr 2019) conducted by IIT Kharagpur
Swetav Das	**2018-2022**	Ethics is Engineering Practice (Jan-Apr 2019) conducted by IIT Kharagpur
Soumarya Samanta	**2018-2022**	Enhancing Soft Skills and Personality (Jan-Apr 2019) conducted by IIT Kharagpur
Soumarya Samanta	**2018-2022**	Ethics is Engineering Practice (Jan-Apr 2019) conducted by IIT Kharagpur
Md.Kaif Siddiqui	**2018-2022**	Ethics is Engineering Practice (Jan-Apr 2019) conducted by IIT Kharagpur
Arijit Das Gupta	**2018-2022**	Enhancing Soft Skills and Personality (Jan-Apr 2019) conducted by IIT Kharagpur
Abhirup Ghosh	**2018-2022**	Ethics is Engineering Practice (Jan-Apr 2019) conducted by IIT Kharagpur
Abhirup Ghosh	**2018-2022**	Enhancing Soft Skills and Personality (Jan-Apr 2019) conducted by IIT Kharagpur

PLACEMENT RECORDS , YEAR 2022
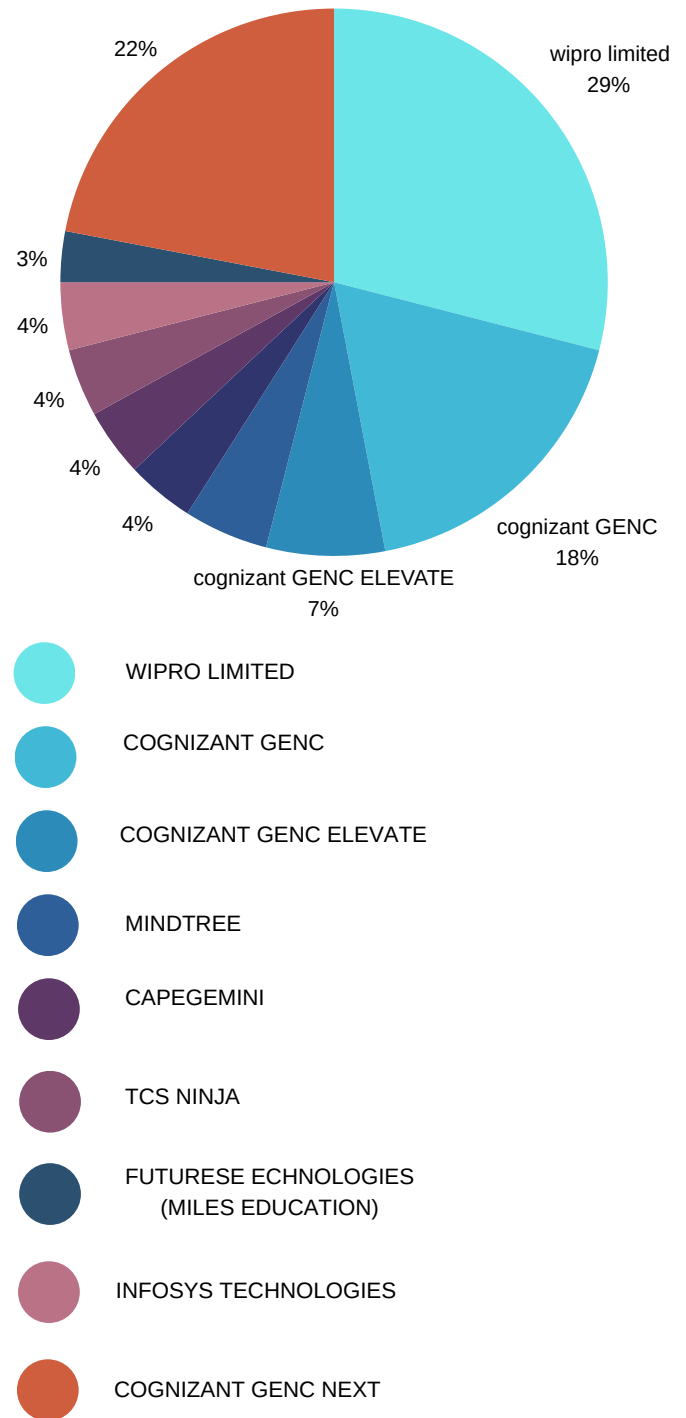
- wipro limited 29%
- cognizant GENC 18%
- cognizant GENC ELEVATE 7%
- 4%
- 4%
- 4%
- 4%
- 3%
- 22%

- WIPRO LIMITED
- COGNIZANT GENC
- COGNIZANT GENC ELEVATE
- MINDTREE
- CAPEGEMINI
- TCS NINJA
- FUTURESE ECHNOLOGIES (MILES EDUCATION)
- INFOSYS TECHNOLOGIES
- COGNIZANT GENC NEXT

DOWN THE MEMORY LANE

THE BEST ADVICE I GOT BEFORE I STARTED MY CAREER

During my college days, like all others, I too was busy with curriculum, chasing grades, doing extra courses, with the goal of landing a job where I would work with technologies that I loved with the hopes that "If you love what you do, you will never work a day in your life.". I kept chasing and running.

As a student, we tend to get a lot of well-intentioned advice, from our parents, teachers, mentors, seniors, peers, and even strangers! But most of the advice we follow tends to not be our own. When I had reached out to one of my mentors asking them about what next steps I should take in order for me to advance, I was told "Be Independent". We are all at this point in life, where we are smart enough to understand what's best for us, what will help us and what will not. How the decisions we make today, affect our tomorrows. While it did not click to me at that point, there was a moment where I had an epiphany. I did courses and learnt what I liked and loved, and not what was trending. I read books which I found to be interesting which helped me monumentally. I started building out some of the most nerdy things, I built a weather app, a movie app and even an app that would consolidate my curriculum notes. I gained first hand experience with a lot of new technologies, I was not under the stress to perform, I had formed a positive feedback loop where I would add more and more to my apps, would learn more and more, build many more apps, and above all, I had a great time while doing these! To sum it up, be independent, find your drive and let it propel you.

As an alumnus of FIEM, the years I spent there had shaped a lot of who I am today. Some of the advices that I would like to leave out to those who are currently where I had once been, are:
1) Foster a positive culture: my friends and I loved nerding out, we learned together and built interesting stuff. Build your own positive feedback loops
2) Set goals for yourself: set long term and short term goals and plan out in depth how you would achieve them and smash them!
3) Be the change: while we might not always get what we want, we should try to be the change we wish to see.

By Rahul Singh
Sr. Technical Architect @ BlueVector.AI

INDUSTRY INSIGHTS

INDUSTRY 4.0

At the start of the 21st century, we saw wide adoption of Cloud Computing, a new paradigm where technical resources are available on demand, which seemingly scales infinitely, and is priced based on usage. This levelled the playing field for companies big and small, where they could focus on their technology and delegate the infrastructure. What initially started off small and faced a lot of scepticism, is now used by almost every company across all industries.

Over the last couple of years, we have seen a similar trend with the rise of AI and ML. Though it's still at its early phases, most of us have seen a vision of the direction it has headed, the possibilities it can enable, bringing disruption on how things are done across the industry. Just as digitisation has changed just about everything we do, over the next few years we'll see similar impacts from AI.
But apart from these, there are a few more emerging technologies which can bring about similar levels of positive disruption, technologies such as IoT, Industrial IoT, Virtual & Augmented Reality, Robotics and Intelligence based systems, just to name a few.

Industry 4.0 refers to rapid technological advancements that we are seeing in this century. Another term for it would be the Fourth Industrial Revolution. We, as a nation, have the potential to capitalise on these emerging technologies just as we had done with the rise of IT in the late 20th century. But for this, we must be prepared, well trained for us to take advantage of these emerging trends and sectors. These would require many long term systematic changes. There should be a rise in entrepreneurial spirit for us to establish ourselves as leaders in these sectors. The future is bright with countless opportunities.

By Rahul Singh
Sr. Technical Architect @ BlueVector.AI

MICRO FRONTENDS IN WEB APPLICATION USING ANGULAR

In today's fast-paced digital world, modularity and scalability are paramount for industrial applications. Enter Micro Front-ends in Angular – a game-changer revolutionizing how we build and deploy complex web systems.

Micro front-ends, inspired by the microservices architecture, decompose large frontend applications into smaller, manageable pieces, each with its own development lifecycle. Angular, with its robust framework and extensive tooling, provides an ideal environment for implementing micro front-ends.

In the snippet, below, Angular's powerful routing mechanism dynamically loads micro front-ends based on URL paths, ensuring a seamless user experience. Each micro frontend resides in its own Angular module, encapsulating its logic, styles & dependencies.

```
import { BrowserModule } from "@angular/platform-browser";
import { NgModule } from "@angular/core";
import { AppComponent } from "./app.component";
import { RouterModule } from "@angular/router";

@NgModule({
  declarations: [AppComponent],
  imports: [
    BrowserModule,
    RouterModule.forRoot([
      {
        path: "microfrontend1",
        loadChildren: () =>
          import("./microfrontend1/microfrontend1.module").then(
            (m) => m.MicroFrontend1Module
          ),
      },
      {
        path: "microfrontend2",
        loadChildren: () =>
          import("./microfrontend2/microfrontend2.module").then(
            (m) => m.MicroFrontend2Module
          ),
      },
      // Add more micro-frontends as needed
    ]),
  ],
  providers: [],
  bootstrap: [AppComponent],
})
export class AppModule {}
```

By breaking down monolithic frontends into modular components, teams can independently develop, test, and deploy features, promoting agility and reducing time-to-market.

Furthermore, this approach facilitates scalability, allowing seamless integration of new functionalities without disrupting existing systems.

```
// Micro Frontend Module Example (microfrontend1.module.ts)
import { NgModule } from "@angular/core";
import { CommonModule } from "@angular/common";
import { MicroFrontend1Component } from "./microfrontend1.component";

@NgModule({
  declarations: [MicroFrontend1Component],
  imports: [CommonModule],
  exports: [MicroFrontend1Component],
})
export class MicroFrontend1Module {}
```

As industries evolve, embracing innovative techniques like micro front-ends in Angular is crucial for staying ahead of the curve. By harnessing the power of modularity and Angular's robust ecosystem, organizations can navigate the industrial landscape with confidence, delivering scalable, resilient, and user-centric applications.

Hardik Dalmia is an innovative Electrical & Electronics Engineer who can be an inspiration to his peers and juniors. He passed out from Jadavpur University in 2020.

He joined PricewaterhouseCoopers in the same year. He is working as an Associate now.

THE EVOLUTION OF ARTIFICIAL INTELLIGENCE: A DEEPER DIVE

1950s - The Birth of AI:
The foundations of AI were laid in the 1950s when computer scientist John McCarthy, along with other visionaries, formalized the concept of machines exhibiting human-like intelligence. McCarthy's Dartmouth Conference in 1956 marked the beginning of systematic AI research. Alan Turing's groundbreaking Turing Test concept laid the theoretical groundwork, challenging scientists to create machines capable of indistinguishable human-like responses.

1960s-1970s - Early Exploration:
During this period, researchers delved into rule-based systems and early attempts at problem-solving.Projects like the General Problem Solver by Herbert A. Simon and Allen Newell aimed to create programs capable of finding solutions to a broad array of problems. However, limitations in computing power and the complexity of mimicking human cognition led to slower progress.

1980s-1990s - AI Winter and Renewed Focus:
The late 1970s and 1980s saw the rise of expert systems, where knowledge from human experts was encoded into software. Despite initial successes, high expectations collided with technical limitations, leading to a period known as "AI Winter." Funding dwindled, and interest waned as practical applications fell short. However, research continued, and by the late 1990s, renewed focus on machine learning and neural networks reignited optimism.

2000s - The Rise of Machine Learning:
Advancements in hardware capabilities, coupled with the explosion of data, marked the shift towards machine learning. Researchers began leveraging algorithms capable of learning patterns from vast datasets. Support vector machines, decision trees, and Bayesian networks gained popularity, setting the stage for a data-driven approach to problem-solving.

2010s - Deep Learning Dominance:
The 2010s witnessed the resurgence of neural networks, particularly deep learning. With the availability of powerful GPUs, training deep neural networks became more feasible. Breakthroughs in image recognition,speech processing, and natural language understanding showcased the transformative potential of deep learning. Notable achievements include the success of convolutional neural networks (CNNs) in image classification and the advent of recurrent neural networks (RNNs) for sequential data.

2020s - AI Integration and Ethical Considerations:
AI became an integral part of daily life, from virtual assistants like Siri and Alexa to recommendation systems on streaming platforms. However, this widespread integration brought forth ethical concerns. Issues of bias in algorithms, privacy considerations, and the need for responsible AI development gained prominence. Organizations and researchers began emphasizing transparency and ethical guidelines in AI applications.

Future Horizons - AI in the Quantum Era:
As we approach the next frontier, quantum computing holds the promise of revolutionizing AI. Quantum computers, with their ability to handle complex calculations exponentially faster than classical computers, open new possibilities for solving intricate AI problems.

In summary, the evolution of AI is marked by a rich history of innovation, setbacks, and paradigm shifts. From conceptualization to its current pervasive presence, AI's journey is a testament to human ingenuity and our relentless pursuit of creating intelligent machines that can augment and enhance various aspects of our lives.

**Arindam SinhaRay,
Assistant Professor,
Department of Information Technology,
FIEM**

fig5: Evolution of AI

1960s-1970s — Early Development
The 60s and 70s brought the birth of ELIZA, simulating human conversation, and Dendral, the first expert system, showcasing the early potentials of AI.

1980s — AI Winter & Expert Systems
The 80s faced reduced AI funding but saw the inaugural National Conference on AI. The backpropagation concept rejuvenated neural networks.

1990s — Revival & Emergence of ML
The 90s witnessed IBM's Deep Blue defeating chess champion Garry Kasparov and the inception of the LOOM project, laying the foundations for GenAI.

2000s — The Genesis of Generative AI
Geoffrey Hinton propelled deep learning into the limelight, steering AI toward relentless growth and innovation.

2010s — Rise of AI
In 2011, IBM Watson won "Jeopardy!", highlighting AI's language skills. The 2010s marked major AI milestones, including pioneering work in image recognition and the birth of GANs in 2014 followed by OpenAI's founding in

Quantum machine learning and quantum neural networks are emerging areas of research, hinting at a future where AI and quantum computing collaborate to tackle challenges beyond the reach of current technology.

GENERATIVE AI AND LARGE LANGUAGE MODELS: TRANSFORMING CREATIVITY AND LANGUAGE MASTERY

In the dynamic landscape of Artificial Intelligence, Generative AI and Large Language Models (LLMs) stand out as pioneering technologies, reshaping how machines understand and generate content.

Generative AI: A Catalyst for Creativity
Generative AI, a subset of AI, empowers machines to autonomously create content by learning patterns from extensive datasets. It excels in various domains, from aiding creative professionals to contributing to advancements in healthcare simulations.

Large Language Models: Mastering Linguistic Complexity
Large Language Models, like GPT-3, are a subset of generative AI specialized in understanding and generating human-like text. With a staggering 175 billion parameters, they excel in applications such as chatbots, language translation, and content summarization.

Synergy of Generative AI and LLMs: Pushing Boundaries

Generative AI and LLMs often collaborate to amplify each other's capabilities. This synergy is evident in applications requiring contextual understanding, creative content generation, and linguistic complexity, ushering in more human-like interactions.

Challenges and Future Developments: Responsible Advancement

As these technologies advance, challenges related to transparency, bias mitigation, and ethical considerations must be addressed. On-going research and collaboration are crucial for the responsible evolution of generative AI and
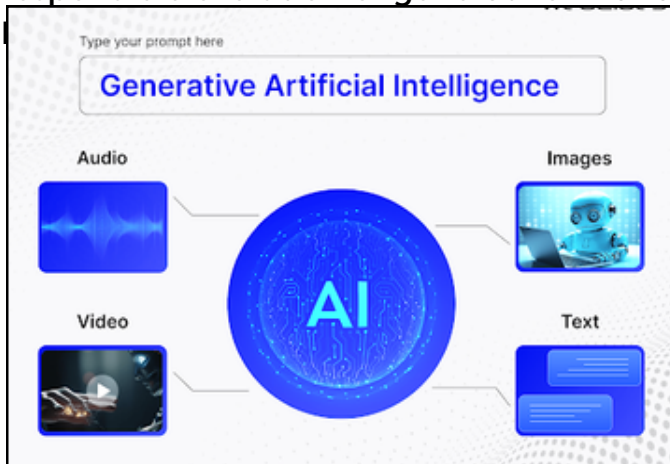

fig6:Generative AI

Conclusion: Shaping the Future of AI

Generative AI and Large Language Models represent a transformative frontier in AI, offering innovative solutions across industries. Embracing their potential while addressing challenges ensures a future where AI enhances human capabilities and enriches our technological landscape.

Subhasis Mitra
Assistant Professor,
Department of Information Technology,
FIEM

EULER'S SPOILERS: AN INTRIGUING CONUNDRUM IN GRAPH THEORY

Introduction:

Euler's spoilers, although not as widely known as Euler's famous theorem about the bridges of Königsberg, are a captivating problem in graph theory. These spoilers are not structures found in the physical world but instead represent a unique challenge that arises within the abstract realm of graph theory. In this write-up, we explore the concept of Euler's spoilers, their properties, and their significance in understanding the interconnectedness of graphs.

Understanding the Basics:

To grasp the notion of Euler's spoilers, we must first be familiar with Eulerian and Hamiltonian graphs. An Eulerian graph is one in which a closed walk exists that traverses every edge exactly once. On the other hand, a Hamiltonian graph is one where a closed walk exists that visits each vertex exactly once. Euler's spoilers are those edges that, when removed from an Eulerian graph, transform it into a Hamiltonian graph.

Characteristics of Euler's Spoilers:

- Transformative Nature: Euler's spoilers have the remarkable ability to convert an Eulerian graph into a Hamiltonian one. In essence, they bridge the gap between these two fundamental graph types.
- Edge Connectivity: Euler's spoilers are typically edges that link separate components of an Eulerian graph. By removing such an edge, the graph becomes a Hamiltonian circuit, as it forces a Hamiltonian path to visit all vertices.

- **Role in Graph Classification:** The presence or absence of Euler's spoilers is a distinguishing factor in categorizing graphs. Their identification can determine whether a graph is Eulerian, Hamiltonian, or neither.

- **Applications:** Understanding Euler's spoilers is valuable in various practical scenarios, such as optimizing routing in network design, identifying critical edges in transportation systems, and solving problems in computer science and optimization.

Significance and Challenges:

Euler's spoilers present a fascinating challenge in graph theory due to their role in graph transformation. The concept helps researchers explore the interplay between Eulerian and Hamiltonian graphs and sheds light on the complexity of different graph structures.

However, identifying Euler's spoilers and their effects on graph properties can be a computationally intensive task, especially for large and complex graphs. This challenge has implications in various domains, including network design, logistics, and computational algorithms.

Conclusion:

Euler's spoilers represent a captivating concept in graph theory, illuminating the intricate relationships between different graph structures. They provide valuable insights into the transformation of Eulerian and Hamiltonian graphs and have practical applications in a range of fields. Euler's spoilers serve as yet another testament to the enduring legacy of Leonhard Euler's contributions to the world of mathematics and graph theory.

Ishani Das
Assistant Professor,
Department of Information Technology, FIEM

IDENTIFICATION OF THE DAWN OR DUSK RAGAS

Professor Debjyoti Basu presented a paper titled "Identification of Dawn or Dusk Ragas" at the ICACA 2021 conference. Collaborating with fellow researchers, the study falls within the domain of Music Information Retrieval (MIR) and utilizes a machine learning approach. The research findings are published in the proceedings of the International Conference on Advanced Computing Applications (ICACA 2021) by Springer Singapore, spanning pages 581-589.

Music is a special set of sounds arranged in ways that can express different human emotions, feelings, thoughts, situations, and times. Throughout the world, several researchers have engaged themselves to retrieve this information present in different musics. In the present work, the Sandhi Prakash ragas, based on their time of presentation (dawn or dusk) have been classified. The audio rendering of Sandhi Prakash ragas is taken from Hindustani vocal music. The line spectral frequency (LSF)-based feature extraction technique has been used. The generated feature vector is then evaluated through several classifiers like MLP, RF, LibSVM, Naive Bayes, Bays Net, SMO, Simple Logistics, and achieved 99.86% recognition accuracy by MLP and RF classifier.

https://doi.org/10.1007/978-981-16-5207-3_49

Debjyoti Basu, Himadri Mukherjee, Shibaprasad Sen & Kaushik Roy

GCHROME BOOK VS. LAPTOP: WHICH ONE SHOULD I PICK?

The choice between a Chrome book and a traditional laptop is a significant decision for individuals, students, and professionals alike. Both devices have their own set of advantages and limitations, and the decision ultimately depends on the user's specific needs and preferences. This comparative analysis explores various aspects, including hardware, software, performance, portability, and price, to help users make an informed decision.

Hardware

Laptops typically come with a wider range of hardware configurations, offering more powerful processors, larger storage options, and dedicated graphics cards. Chrome books, on the other hand, tend to have more modest specifications, focusing on efficiency rather than raw power. This means that laptops are better suited for resource-intensive tasks like gaming, video editing, or 3D modeling, while Chrome books excel in lightweight computing.

Operating System

One of the most significant differences between Chrome books and laptops is the operating system. Chrome books run on Chrome OS, a lightweight and cloud-centric operating system developed by Google. Laptops run various operating systems like Windows, macOS, and Linux, providing greater flexibility and compatibility with a wide range of software.

fig7:GchromeVSlaptop

Software

Chrome books primarily rely on web-based applications and apps from the Google Play Store, making them well-suited for tasks such as web browsing, email, and document editing. Laptops have access to a wider array of software, including full desktop applications, making them more versatile for tasks like video editing, programming, and design work.

Performance

In terms of performance, laptops generally outperform Chrome books due to their more robust hardware and the ability to run resource-intensive software. If you need to perform tasks that demand substantial processing power, a laptop would be the better choice. However, Chrome books are highly efficient for everyday tasks and are known for their quick boot times and consistent performance.

Portability

Chrome books are designed with portability in mind. They are typically lighter and have longer battery life compared to most laptops. The focus on cloud-based storage and low power consumption makes Chrome books excellent for on-the-go users, especially students and frequent travelers. Laptops, while not as portable as Chrome books, still come in a variety of sizes and form factors, allowing users to choose a balance between performance and portability that suits their needs

Price

Chrome books are generally more budget-friendly than laptops. This affordability is due to their simpler hardware and the use of the free Chrome OS. Laptops come in a wide range of prices, from budget options to high-end models, and users can select a laptop that fits their budget and performance requirements.

Security

Chrome books are known for their robust security features, including automatic updates, sandboxed apps, and built-in virus protection. This makes them less susceptible to malware and other security threats. Laptops, while offering security features of their own, may require more user intervention to maintain their security.

Storage

Laptops typically come with larger storage capacities and support for traditional hard drives or SSDs, making them suitable for users who need a significant amount of local storage. Chrome books rely heavily on cloud storage, which can be limited by the user's internet connection and may not be suitable for users with extensive local storage needs.

Conclusion

The choice between a Chrome book and a laptop boils down to individual needs and preferences. Chrome books are ideal for those who prioritize portability, simplicity, and affordability while primarily engaging in web-based tasks. Laptops offer more power, versatility, and a wider range of software options but may come at a higher cost. Ultimately, the decision depends on the user's specific use cases, budget, and the importance of factors like performance, software compatibility, and security. Consider your needs carefully to make the best choice between these two devices.

Dr. Niladri Sekhar Datta.
Assistant Professor,
Department of Information Technology, FIEM

QUIZ

1.These are algorithm paradigms except one:
A.Divide and Conquer B.Backtracking
C.Searching   D.Greedy

2.O(n) is in what time complexity?
A.Linear   B.Constant
C.Quadratic   D. Logatihmic

3.If f(x) = x +1 the Big Oh is O(1)
A.True   B.False

4. . O(n) time complexity is faster than O(1).
 A.True   B.False

5.Display "please enter a number" Number = what the user types
in If Number >=100 sales = number x 2 else sales = number x 3 endif
 display sales If you enter 50 what is displayed?
A.100 150   B.150 100
C.100   D.150

6.Which of the following would instruct a robot to draw a square of side 3 units?

A.Forward 3, right turn 90, forward 3, right turn 90, forward 3, right turn 90,forward 3, right turn 90

B.Move 3 turn 90 move 5 turn 90 move 5 turn 90 move 3 turn 90 move 3

C.Forward 3, forward 3, right turn right turn 90,forward 3, right turn forward 3

D.Forward 3, turn right forward 3, turn left, forward 3, turn right ,forward 3

7. A teacher is separating a class into groups by age, those 12 or above, and those less than 12. Which of the four algorithms might do this?

A. while there are more pupils if pupil age >= 12 put into the above group else put into the below group endif endwhile

B. while there are more pupils if pupil age >= 12 put into the above group endif endwhile

C. if pupil age >= 12 put into the above group endif if pupil age < 12 put into the below group endif

D. while there are more pupils if pupil age >= 12 put into the above group endif if pupil age < 12 put into the below group endif endwhile

8.We use dynamic programming approach when

A)We need an optimal solution
B)The solution has optimal substructure
C)The given problem can be reduced to the 3-SAT problem
D)It's faster than Greedy

Prepared By . Subhasis Mitra,
Assistant Professor,
Information Technology Department

ANSWERS

8.b)The solution has optimal substructure
7.a. while there are more pupils if pupil age >= 12 put into the above group else put into the below group endif endwhile
6.A)Forward 3, right turn 90, forward 3, right turn 90, forward 3, right turn 90,forward 3, right turn 90
5.D.150
4.B) false
3.B) false
2.A) linear
1.D) Searching

TOPPERS

4th year

Student's names	ygpa	Position
Sweta Shekha	9.91	First
Subhasis Pal	9.91	First
Sreyashi Nandy	9.91	First
Soumarya Samanta	9.91	First
Debdip Sarkar	9.91	First
Abhirup Ghosh	9.91	First
Sneha Priya	9.82	Second
Soumyadeep Bhowmik	9.73	Third
Sarfaraz Ahmad	9.73	Third

3rd year

Student's names	ygpa	Position
Reshma Ukil	9.80	First
Annapurna	9.76	Second
Sayan Mukerjee	9.76	Second
Shraddha Shaw	9.72	Third
Sriyak Saha	9.72	Third

2nd year

Student's names	ygpa	Position
Prasant Kumar	9.70	First
Ajmal Danish	9.70	First
Saurabh Patel	9.67	Second
Namrata Saha	9.67	Second
Vivek Kumar Saw	9.67	Second
Ashutosh Jha	9.67	Second
Pratik Roy	9.63	Third
Rakesh Saha	9.63	Third
Soumya Bera	9.63	Third
	9.63	Third

1st year

Student's names	ygpa	Position
Pritam Bal	9.97	First
Rani Bistu	9.58	Second
Debjit Roy	9.57	Third
Ankush Paul	9.57	Third
Atmodoy Chaudhri	9.57	Third
Siddhant Kumar Mahato	9.57	Third
Kajal Kumar Singh	9.57	Third

Collected and prepared by Ms. Jayita Chakraborty, Senior Technical Assistant, Department of Information Technology.We cordially thank the Admin Department, FIEM for providing us the needed data.

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Student

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