IT Insights

Newsletter - Department of Information Technology Edition: III (2021)

From the Desk of the Principal

Dr. Aloke Kumar Ghosh,
Principal, FIEM, Kolkata

Welcome to the digital frontier with the IT Department's newsletter! Dive into a realm where innovation meets expertise and technology reigns supreme. Our newsletter is your gateway to the latest trends, breakthroughs, and best practices in the dynamic world of IT.

Join us on a journey where we unravel the complexities of IT infrastructure, explore emerging technologies, and decode the secrets of digital transformation. Let's bridge the gap between imagination and implementation, as we navigate the ever-evolving landscape of technology together.

Let's shape a tomorrow where possibilities are limitless and technology is our greatest ally. Welcome to the forefront of IT innovation. Welcome to our newsletter.

Voice of the Department

Prof. Debjyoti Basu,
Assistant Professor,
Department of Information Technology, FIEM

The year 2021 brought unprecedented challenges, with the COVID-19 pandemic disrupting traditional education and work environments. Amidst this turbulence, the Department of Information Technology at the Future Institute of Engineering and Management (FIEM) stood resilient, addressing the unique needs of students and envisioning a path forward.

Understanding the toll the lockdown took on students, the DoIT at FIEM prioritized mental health and well-being. The message underscored strategies to overcome isolation, including virtual support services, counseling resources, and collaborative online platforms to foster a sense of community among students. To equip students with the skills necessary for the professional landscape, the DoIT emphasized the importance of the "Prastuti" pre-placement training program.

The message outlined tailored modules covering technical skills, soft skills, and industry insights, preparing students for successful transitions into the workforce.

Encouraging creativity and collaboration, the DoIT laid out plans for project competitions and the creation of a vibrant Wall Magazine. These initiatives aimed to showcase the ingenuity of students, fostering an environment where innovative ideas and projects could be celebrated and shared within the academic community.

Recognizing the pivotal role of coding in the IT industry, the DoIT introduced the formation of the Coding Club "Codex." The message highlighted the club's role in providing a platform for students to enhance their coding skills, participate in coding challenges, and engage in collaborative projects, creating a supportive community for aspiring programmers.

Acknowledging the challenges of adapting to a new normal, the DoIT provided practical suggestions for students to ease back into regular life. This included time-management tips, goal-setting strategies, and fostering a balance between online and offline activities to promote holistic development.

The Department of Information Technology at FIEM's message for 2021 not only addressed the immediate challenges brought by the pandemic but also outlined a roadmap for the holistic development of students.

From overcoming lockdown side effects to preparing for the professional world through programs like "Prastuti" and fostering a culture of innovation with initiatives like project competitions and the Coding Club "Codex," the department showcased a commitment to nurturing well-rounded, resilient individuals. As students navigate these initiatives and embrace the suggestions for returning to normalcy, the DoIT's vision for 2021 sets the stage for a future where FIEM graduates are well-equipped to thrive in the dynamic world of information technology.

Faculty Achievements

Dr. Niladri Sekhar Datta, an Assistant Professor of IT, authored the following articles in 'Applications of Artificial Intelligence and Machine Learning. Lecture Notes in Electrical Engineering' (ISBN 1876-1119), published by Springer in 2021

- A Review: Hemorrhage Detection Methodologies on the Retinal Fundus Image (Pg. 365-374)
- A Study on Retinal Image Preprocessing Methods for the Automated Diabetic Retinopathy Screening Operation (Pg. 375-384)

Down The Memory Lane

Arijul Haque, Assistant Professor, Department of Information Technology Techno Main Salt Lake Kolkata

Transporting us back to 2007, Future Institute of Engineering and Management, Sonarpur, stands as a nostalgic reminder of the cherished days we spent as the first batch of IT students. As we sift through the sands of time, our hearts brim with affectionate remembrance and each facet of our college experience unleashes a torrent of emotions. The classrooms, lab sessions, canteen, and playground reverberated with echoes of laughter and, at the same time, with invaluable life lessons.

Within the classrooms, new friendships were developed and new lessons were learnt. Our teachers encouraged questions. The friendly addas among our batchmates in the intervals between classes also rejuvenated us for the next class. Our teachers, like Joydip Sir (our then HOD), Biswajit Sir, our B. Tech project mentor, Arindam sir, who had taught us many courses in the third and final years and also tolerated, and sometimes entertained and even pampered a lot of undue naughty questions, specially from me, Kaushik Sinharay Sir, our beloved mathematics teacher, and many others were great to learn from. Each had their unique style of teaching/guiding and now I, as a teacher, have learnt from them to be more open-minded regarding the fact that there can be numerous effective and interesting ways of teaching the same thing.

Step by step, byte by byte, the lab sessions infused life into the theoretical concepts we learnt in the classrooms. The cluttering sound of keys pressed together, the code penned on screens, and the joy of seeing our codes running after a long session of debugging syntax and logical errors provided a sense of accomplishment beyond measure. Collaboratively troubleshooting, problem-solving, and exchanging ideas shaped not only our technical abilities but also our ability to work as a team.

The canteen, a melting pot of flavours, voices, and laughter, was the heart of our college universe. The heady aroma of chai, the sound of glasses clinking, and the contagious energy flowing through its corridors made it a focal point of countless memories. Here, friendships blossomed, stories were shared, and nourishment came in more than just food form. The canteen exemplified the warmth and inclusivity that defined our college experience, creating an unbreakable bond among students from diverse backgrounds.

The bounds of laughter and the pursuit of victories were a daily occurrence at our beloved playground. Amidst the exhilaration of competitive sports and the tranquility of introspective walks, we discovered the transformative power of physical activity. The essence of team spirit propelled us to new heights, both on and off the field.

As we flip through the dusty pages of memories, the memories of our college days shine brightly. Future Institute of Engineering and Management, Sonarpur, holds a nostalgic place in our hearts. The classrooms, the vibrant lab sessions, the friendly teachers, the lively canteen, and the ever-thriving playground remain constant reminders of the knowledge and joy that shaped our lives. Decades may pass, but the memories we forged throughout our college journey will forever glimmer, uniquely intertwining with the stories of an IT batch that dared to dream and do something in life.

About The Author

I am Arijul Haque, currently an Assistant Professor at the Department of Information Technology, Techno Main Salt Lake, Kolkata. I am an alumnus of Future Institute of Engineering and Management, Sonarpur.

I completed my B. Tech from that college in 2011. My primary interests lie in speech-signal processing, machine learning, and cryptology. My research area revolves around speech signal processing, which involves utilizing techniques from various domains such as machine learning and digital signal processing.

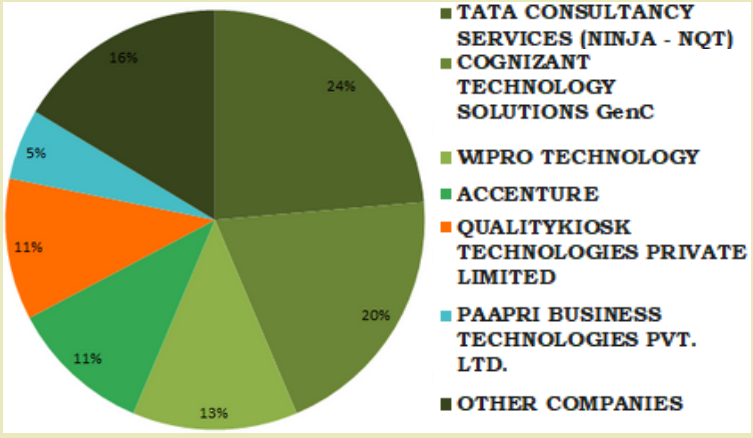
Additionally, I am pursuing a PhD in Computer Science from IIT Kharagpur, which I anticipate completing soon. Prior to my PhD, I obtained my Master of Science (MS) degree from IIT Kharagpur. During my time as an MS student, I also served as a Senior Scientific Officer (SSO) in a DIT-sponsored project at IIT Kharagpur, under the guidance of Prof. K. Sreenivasa Rao. Before that, I gained valuable industry experience working at Cognizant for one year after completing my B.Tech.

Teaching has always been my passion, and witnessing students engage in stimulating exchanges of knowledge and ideas with their peers and mentors in the classroom and elsewhere truly excites me. The noble profession of teaching was inspired by my father, who was also a Professor. His enthusiasm for education motivated me to embark on this fulfilling career path.

Placement Records

Sl. No.	Name of the Companies	Placed
1	TATA CONSULTANCY SERVICES (NINJA - NQT)	13
2	COGNIZANT TECHNOLOGY SOLUTIONS GenC	11
3	WIPRO TECHNOLOGY	7
4	ACCENTURE	6
5	QUALITYKIOSK TECHNOLOGIES PRIVATE LIMITED	6
6	PAAPRI BUSINESS TECHNOLOGIES PVT. LTD.	3
7	OTHER COMPANIES	9
Total		**55**

Ayush Patel of the Department of IT has managed to achieve a CTC of 6.50 - 7.00 LPA at COGNIZANT TECHNOLOGY SOLUTIONS (GenC NEXT) in the year 2021.



Prepared by *Ms. Jayita Chakraborty,*
Senior Technical Assistant,
Department of Information Technology.
We cordially thank the Training and Placement Cell, FIEM for providing the required data.

Impact of Climate and Geography on the Evolution of Languages: A Study through Machine Learning

Dev Nandan Sarkar, Assistant Consultant in Tata Consultancy Services

Abstract

This paper looks to establish empirical relation between the phonology of language(s) and the climate and geography of the region that it originated. Our hypothesis is that the phonology of languages adapt as per the surrounding environment. We base this hypothesis on the theory that humans have been adaptive to their surroundings since the first human diverged from primates. It is this adaptability, among other things, that have allowed humans to develop intelligence and evolve. Environment has been known to affect the general body structure, stature, facial features and skin-tone of people. Environment is responsible for both - providing the sustenance to survive and also the threat to survival. Environment played a role in determining whether societies chose to be nomadic, which in turn has influence on the culture. Every aspect of human behaviour is influenced to some degree by the environment. Therefore, it is highly likely that humans adapted the languages as their surroundings changed. We wish establish this relationship and implement a machine learning model that can perform classifications of languages indicating their region of origin and migration.

Introduction

One of distinguishing characteristics of a human is adaptability. As Everett (2013) notes, the languages that are spoken at higher altitudes contain ejectives. Ejectives are sounds produced with an intensive burst of air. A high altitude region is defined as being 4900 feet (or more) above the sea level. There could be a correlation between high altitudes and the ease of use of ejectives. We intend to explore and hope to establish relationship between phonology and other environmental factors such as average temperature, rainfall, flora and fauna.

Data Source

We will examine the syllable structures of 500 language samples from across to globe from The World Atlas of Language Structures and create a mapping with the geography and climate of the regions where they have originated.

Role of Machine Learning

Based on the mapping between the data from The World Atlas of Language structures and the data on ecology of the region we will develop a machine learning model that will take into account the features of ecology and phonemics. We propose that the model will then be able to predict a classification for kind of syllable structure is to be expected for a given set of ecology parameters.

Results

We expect to find significant correlation between environmental factors and development of languages. We hope to establish empirical relationship between the development of syllables and the surrounding environmental factors.

Discussions

Any relationship established in between environment and phonemics will augment the tools that linguistic and social anthropology have at its disposal. Social anthropologist already factors in the language in the study of societies and cultures. This research should now able to add a perspective to why those languages sound like they do and how those sounds have shaped the society.

References

- Everett C (2013) Evidence for Direct Geographic Influences on Linguistic Sounds: The Case of Ejectives. PLoS ONE 8(6): e65275. https://doi.org/10.1371/journal.pone.0065275

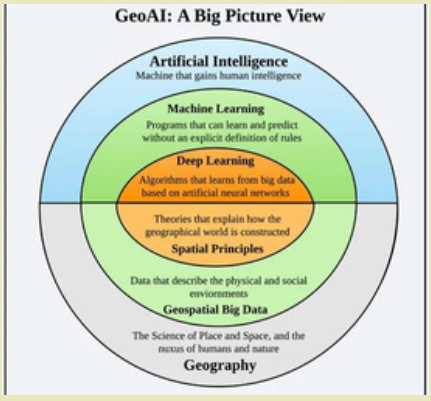
- Caleb Everett, Damián E. Blasí, Seán G. Roberts, Language evolution and climate: the case of desiccation and tone, Journal of Language Evolution, Volume 1, Issue 1, January 2016, Pages 33–46, https://doi.org/10.1093/jole/lzv004

- Ian Maddieson. 2013. Syllable Structure. In: Dryer, Matthew S. & Haspelmath, Martin (eds.) WALS Online (v2020.3) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.7385533 (Available online at http://wals.info/chapter/12)

About The Author

Dev Nandan Sarkar is currently working as Assistant Consultant in Tata Consultancy Services. He has been working in the industry for 10+ years. He is currently pursuing Master of Science (MS) in Data Science from Indian Institute of Management (IIM) Indore.

Dev Nandan passed out of the Information Technology Department,Techno India, Salt Lake in 2011 (known as Techno Main, Salt Lake now).



From the Pens of Teachers

Programming Languages Through History

Subhasish Mitra, Assistant Professor, Department of Information Technology, FIEM

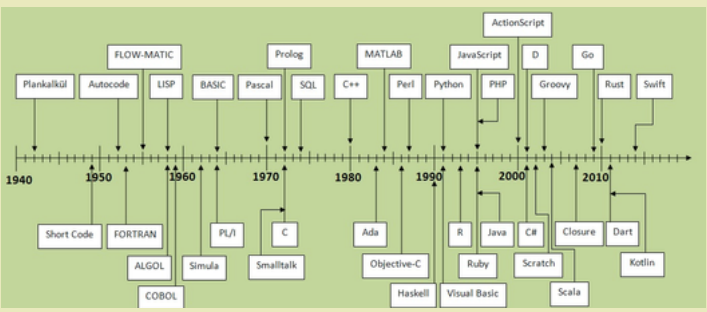
Programming languages have undergone a remarkable evolution, adapting to the changing landscape of technology. In the mid-20th century, the birth of assembly languages facilitated low-level programming, but their complexity led to the development of higher-level languages like Fortran and COBOL.

The 1970s saw the emergence of C, providing a balance between efficiency and readability. Object-oriented programming gained prominence in the 1980s with languages like C++ and Smalltalk promoting modular code design.

The 1990s introduced scripting languages like Python and JavaScript, emphasizing ease of use and versatility.

The 21st century witnessed a surge in dynamically-typed languages, exemplified by Ruby and Python, focusing on developer productivity. Concurrently, statically-typed languages like Java and C# gained popularity, ensuring robustness in large-scale applications.

Recent years have seen the rise of domain-specific languages (DSLs) and the increasing importance of languages like Rust for system-level programming and Swift for iOS development. The evolution continues, driven by the demand for efficiency, readability, and adaptability in an ever-expanding technological landscape.



Quantum Finance

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

Quantum finance is an emerging field that explores the intersection of quantum mechanics and financial theory. It represents a novel approach to address complex financial problems by leveraging the principles of quantum computing, a branch of physics that deals with the behavior of matter and energy at the smallest scales.

In classical finance, many models and algorithms are used to analyze financial markets, make predictions, and optimize investment strategies. However, as financial markets have grown in complexity, traditional computational methods have sometimes fallen short in providing accurate and timely solutions. This is where quantum finance comes into play, offering the potential to revolutionize the financial industry.

Quantum computing, with its unique properties of superposition and entanglement, has the ability to process vast amounts of data and perform complex calculations at speeds unimaginable with classical computers. This quantum advantage could lead to breakthroughs in various aspects of finance, such as portfolio optimization, risk assessment, and option pricing.

One of the key areas where quantum finance has shown promise is in the optimization of investment portfolios. Traditional portfolio optimization methods aim to balance risk and return, but they often struggle with large datasets and multiple variables. Quantum algorithms, like the quantum annealing approach, can help identify optimal portfolios by considering a multitude of factors simultaneously. This can lead to more robust and efficient investment strategies, ultimately maximizing returns while minimizing risks.

Quantum finance also addresses problems related to risk management and pricing of financial derivatives. Pricing complex financial products, such as options and derivatives, can be computationally intensive, and classical methods might not provide accurate results in a reasonable timeframe. Quantum algorithms, like the Quantum Monte Carlo method, promise faster and more precise pricing of these financial instruments, which is crucial for both financial institutions and investors.

Moreover, quantum finance holds the potential to enhance the security of financial transactions. Quantum cryptography, which utilizes the fundamental principles of quantum mechanics, offers theoretically unbreakable encryption. This could make financial transactions and data transfer more secure, reducing the risk of cyber-attacks and fraud.

While quantum finance offers promising advantages, it's important to note that it is still in its infancy, and there are significant challenges to overcome. Building and maintaining quantum hardware is complex and expensive. Furthermore, quantum computers are sensitive to environmental factors, requiring extremely low temperatures and stable conditions for operation. Another challenge is the need for expertise in quantum programming and algorithms. Financial institutions and professionals must invest in developing the necessary skills to harness the power of quantum computing effectively.

In addition, quantum finance has ethical implications, such as the potential for increased inequality if only a few powerful players can afford and access quantum technologies.

Despite these challenges, quantum finance represents a fascinating frontier with immense potential for the financial industry. Research and development in this field continue to progress, with the aim of democratizing quantum technologies, making them more accessible to a broader range of stakeholders.

In conclusion, quantum finance is a burgeoning field that explores the application of quantum computing to address complex financial challenges. By leveraging the unique properties of quantum mechanics, such as superposition and entanglement, quantum finance has the potential to revolutionize portfolio optimization, risk assessment, pricing of financial derivatives, and security in financial transactions.

While there are significant challenges to overcome, the promise of quantum finance as a powerful tool for the financial industry makes it an exciting area of research and development with the potential to reshape the future of finance.

Quantum computing has the potential to significantly impact the field of finance by offering unprecedented computational power. Unlike classical computers, which use bits to represent information as either 0 or 1, quantum computers use quantum bits or cubits, which can exist in superpositions of both 0 and 1 simultaneously. This property allows quantum computers to perform complex calculations at speeds that classical computers cannot match.

In finance, quantum computing holds promise for solving intricate problems that traditional methods struggle with. For example, quantum algorithms can revolutionize portfolio optimization by efficiently analyzing vast datasets and numerous variables, leading to more effective investment strategies. Pricing complex financial derivatives and risk assessments can also benefit from quantum computing's ability to provide faster and more precise results.
Furthermore, quantum cryptography, a subset of quantum computing, can enhance the security of financial transactions by providing theoretically unbreakable encryption methods.

This could protect sensitive financial data and reduce the risk of cyber-attacks and fraud.
While quantum computing in finance is still in the early stages of development, it represents a transformative tool that has the potential to optimize financial operations, increase security, and reshape the industry by addressing complex problems more efficiently and effectively.

AGILE Methodologies

Prasenjit Basu, Assistant Professor, Department of Information Technology, FIEM

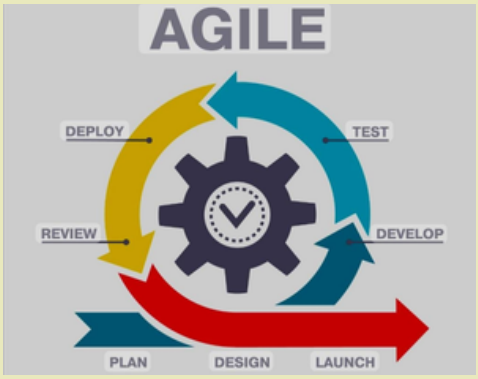
Agile is a project management methodology designed to enhance efficiency and responsiveness in software development and beyond. It emphasizes iterative development, breaking projects into short cycles, or sprints, to facilitate frequent reassessment and adaptation. This iterative approach accommodates changing requirements, ensuring that the end product aligns closely with user needs.

One of Agile's cornerstones is its commitment to collaboration and communication. Cross-functional teams work closely, holding regular meetings to discuss progress, challenges, and adjustments. This fosters a dynamic and transparent work environment.

Agile prioritizes customer satisfaction by delivering functional increments of a project at the end of each sprint. This contrasts with traditional models that delay delivery until the entire project is complete. Agile's focus on working solutions over comprehensive documentation enhances flexibility and accelerates development.

Self-organizing teams are a fundamental aspect of Agile, empowering members to decide how best to achieve their goals. This autonomy fosters a sense of ownership and accountability, contributing to a more engaged and effective development process.

Overall, Agile's principles and practices streamline development, enabling teams to respond adeptly to evolving requirements and deliver high-quality solutions.



Algo Trading Mathematical Models

Subhasish Mitra, Assistant Professor, Department of Information Technology, FIEM

Mathematical Model: Algo trading leverages tested mathematical models, like the delta-neutral strategy, to trade options and underlying securities. This strategy involves multiple positions with offsetting positive and negative deltas, ultimately maintaining a delta-neutral portfolio. Deltas represent the ratio of an asset's price change to its derivative's fluctuation, and algo trading software helps identify and execute such strategies. Expert traders often recommend using mathematical models for risk management in volatile markets.

Volume-Weighted Average Price (VWAP): VWAP is an intraday benchmark, calculating the average price of a security traded throughout the day, factoring in both volume and price. Investors aim to execute orders close to VWAP, breaking large volumes into smaller pieces to achieve desired closing prices. VWAP helps confirm trends, and stocks trading below it are seen as undervalued, while those above it are considered overvalued.

Time Weighted Average Price (TWAP): Similar to VWAP, TWAP averages the day's price trends, including open, high, low, and close points. Traders use divided time slots to execute orders smoothly, aiming to minimize market impact by trading near the average price between start and end times. High-volume traders find TWAP useful for efficient execution.

Mean Reversion: This strategy capitalizes on the idea that asset prices tend to revert to their mean values. Algo traders set price ranges and execute transactions when assets move in or out of these ranges, anticipating a return to the average rate.

Microarray-Based Approaches for Studying Protein-Protein Interactions

Ishani Das*, Assistant Professor, Department of Information Technology, FIEM*

Introduction:

Protein-protein interactions (PPIs) are fundamental to the functioning of biological systems, playing crucial roles in processes such as signal transduction, enzymatic activity, and cellular regulation. Understanding PPIs is essential for unraveling complex cellular networks and identifying potential therapeutic targets. Microarray technology, primarily employed for gene expression analysis, has found innovative applications in the realm of protein-protein interaction studies. This write-up delves into the use of microarray-based techniques for investigating PPIs and their significance in modern biological research.

Microarray Technology:

Microarrays are high-throughput platforms that allow simultaneous analysis of thousands of molecules, typically DNA or RNA. However, researchers have adapted this technology for studying PPIs through various innovative approaches.

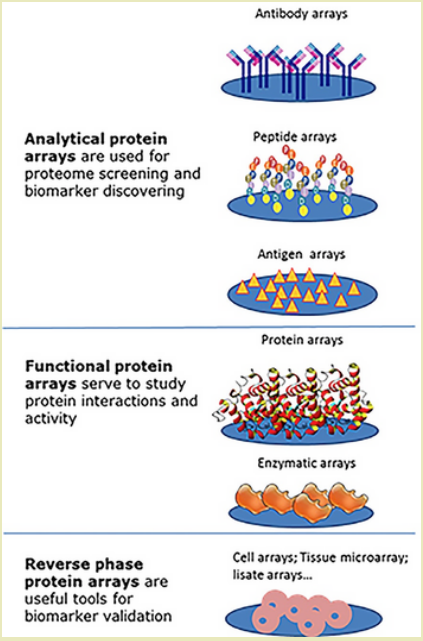
I. **Reverse Phase Protein Microarrays (RPPMs):**
Reverse Phase Protein Microarrays are a powerful tool for quantifying the relative levels of specific proteins and their post-translational modifications. RPPMs involve printing proteins or antibodies onto a solid support and probing them with biological samples containing potential interacting partners. RPPMs enable the measurement of multiple proteins simultaneously, providing insights into PPIs in a high-throughput manner.

II. Protein Microarrays:
Protein microarrays involve immobilizing purified proteins or peptides onto a solid surface and exposing them to protein mixtures, such as cell lysates. By monitoring protein binding events, researchers can identify potential interacting partners and map PPI networks.

Protein microarrays offer the advantage of exploring interactions in a systematic and large-scale manner.

III. Peptide Array Technology:

Peptide array technology employs a solid surface with immobilized peptides, representing potential binding sites or interaction domains. By incubating these arrays with proteins or protein mixtures, researchers can pinpoint specific interaction regions within proteins, facilitating the elucidation of PPI mechanisms.



Significance of Microarray-Based PPI Studies:

1. High Throughput: Microarray-based approaches enable the simultaneous investigation of numerous interactions, accelerating PPI discovery.
2. Systematic Analysis: These techniques facilitate systematic and comprehensive exploration of PPI networks within biological systems.
3. Quantitative Data: Reverse phase protein microarrays and protein microarrays provide quantitative data on interaction strengths and dynamics.
4. Biomarker Discovery: Microarray-based PPI studies contribute to biomarker identification and have applications in disease diagnosis and treatment.
5. Targeted Drug Development: Understanding PPIs aids in the development of targeted therapies that disrupt or modulate specific interactions critical for disease progression.

Challenges and Future Directions:

Microarray-based PPI studies have limitations, including potential false-positive results and difficulties in detecting weak or transient interactions. Researchers continue to refine and combine microarray techniques with other approaches, such as mass spectrometry, to improve accuracy and reliability.

In conclusion, microarray technology, initially designed for gene expression analysis, has found an essential place in the study of protein-protein interactions. It offers a high-throughput and systematic approach to mapping PPI networks, with far-reaching implications for our understanding of cellular processes, disease mechanisms, and drug discovery. As technology advances, microarray-based PPI studies will likely play an increasingly significant role in modern biological research

Quiz-Bee

Questions

1. What is an orphan record?
2. Define the term "Denormalization."
3. What is a Cartesian Product?
4. What does ACID stand for in database transactions?
5. Identify the SQL injection vulnerability term.
6. Name a NoSQL database model.
7. What is a "View" in a database?
8. What does the term "Deadlock" imply?
9. Define the SQL term "HAVING."
10. What is the purpose of the XOR operator in SQL?

Answers

1. Unreferenced
2. Redundancy
3. Cross Join
4. Atomicity
5. Bobby Tables
6. Document
7. Virtual
8. Stalemate
9. Filter
10. Exclusive

Prepared by Prosenjit Mukherjee,
Assistant Professor,
Department of Information Technology, FIEM

Class Toppers

1st Year

Name	YGPA	Rank
Sumantrini Das	9.68	1st
Pratik Roy	9.66	2nd
Anusha Mondal	9.63	3rd
Namrata Saha	9.63	3rd
Soumya Bera	9.63	3rd

2nd Year

Name	YGPA	Rank
Spandan Chatterjee	9.84	1st
Roshan Bang	9.84	1st
Soumit Bhowal	9.79	2nd
Aratrika Saha	9.79	2nd
Agniprabha Biswas	9.79	2nd
Pratik Vaibhav	9.79	2nd
Shubhanshu Jha	9.79	2nd
Annapurna Sharma	9.79	2nd
Sohini Basu	9.79	2nd
Sayan Mukherjee	9.79	2nd
Prakash Kumar Jha	9.77	3rd

2nd Year (contd.)

Name	YGPA	Rank
Vishal Nayek	9.77	3rd
Avik Baidya	9.77	3rd
Debojyoti Roy	9.77	3rd

3rd Year

Name	YGPA	Rank
Shromona Chakraborty	9.96	1st
Janhavi Ojha	9.93	2nd
Anushka Dutta	9.93	2nd
Sarfaraz Ahmad	9.91	3rd

4th Year

Name	YGPA	Rank
Ayesha Kumari	9.75	1st
Sunetra Dey	9.71	2nd
Bhim Kumar Shaw	9.71	2nd
Tiyasha Karmakar	9.69	3rd

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

Contributions

- Prof. Debjyoti Basu, Department of Information Technology, FIEM
- Prof. Subhasis Mitra, Department of Information Technology, FIEM
- Prof. Ishani Das, Department of Information Technology, FIEM