Wall For All

Digital India

Digital India is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy.

Machine Learning Algorithm in Hydrology

Hydrology is the study of the distribution and movement of water both on and below the Earth's surface, as well as the impact of human activity on water availability and conditions.
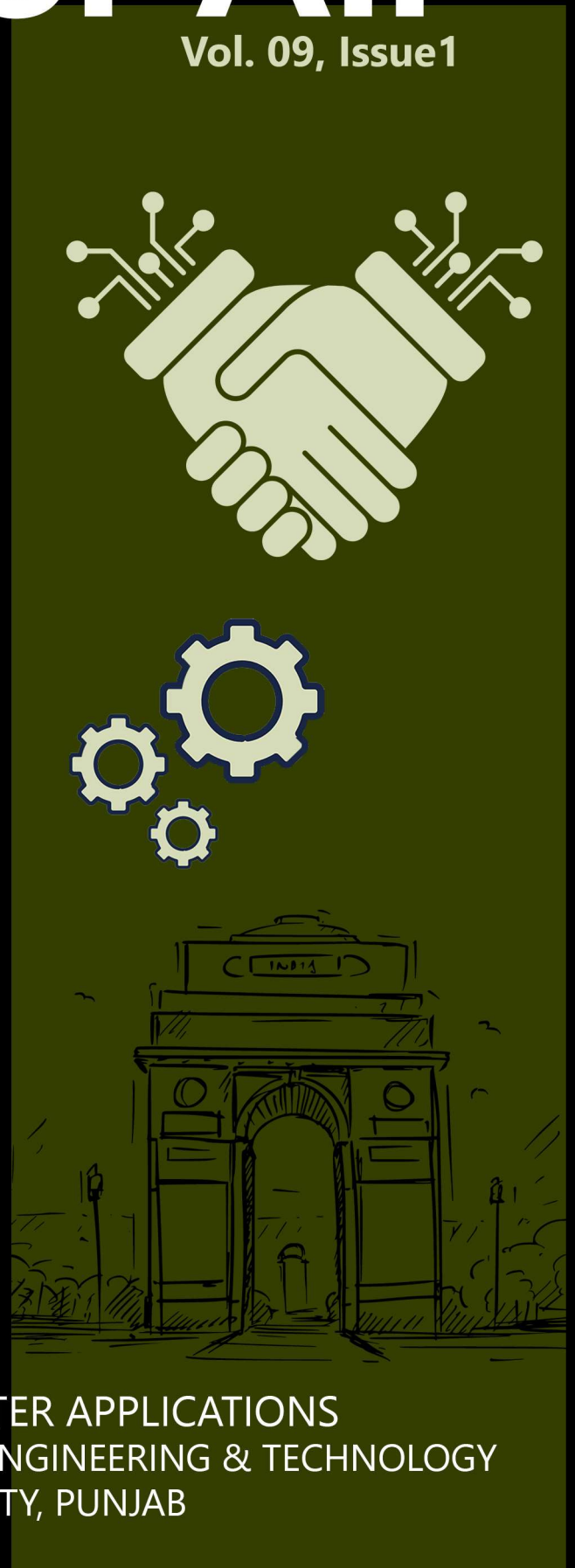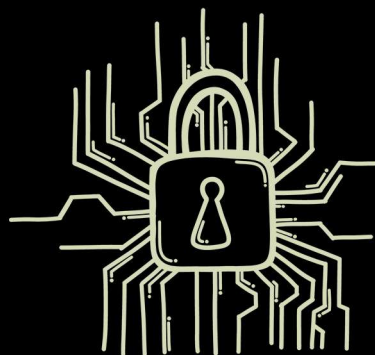
The nostalgic feeling that one experiences while sifting through the dusty old pages of the college magazine cannot be expressed in words.However, very few of us have retained those copies, and most of those precious articles that we wrote during those golden days with enthusiasm are lost forever. With the advent of e-books and other online media, the days of paper-bound college magazines are gone, and the digital platform has paved way to allow retention.

Wall-for-All, the e-Magazine published by the Department of Computer Applications, is one such effort that was started with an intent to provide achance to all students and faculty members to share their thoughts and knowledge, and hone their skills in creative writing.

I am happy to see the enthusiasm of eminent members of the department to contribute to Wall for All. This shows the positive and creative energy of the contributors. However, it would be really wonderful if we can see the articles contributed by more students in the next editions, for this e- Magazine is intended to be a writing pad for each member of the department.
            I proudly present the current edition of Wall for All.

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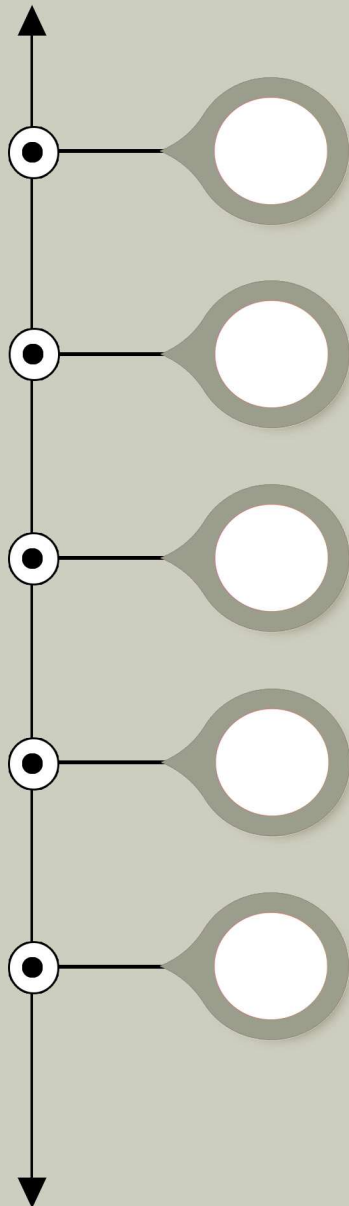Professor
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Prospects and Encounters of Digital India

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Abstract

The role of 'Digital India' in the Make in India programme in the IT and BPM sectors is examined in this study. Cities are becoming smart cities as the economy shifts to a digital economy, and governance is shifting to e governance. It will increase the need for IT hardware. Digital literacy was emphasised in the previous Union budget as a digital transformation programme. The Indian government has stated that by 2020, it intends to have zero imports of IT hardware. With the rise of cashless transactions, we may witness a jump in consumer IT hardware purchases. This study will assess several digital transformation trends and difficulties.

Keywords: Make in India, Digital India, and Job Creation, Financial Inclusion

1. Introduction

Seed of Digital India programme is sowed by Mr. Narender Modi in July 2015 with the intention to make citizens of India empowered with the Information and Communication Technology (ICT). Once Prime Minister Mr. Modi said: "E-Governance is an essential part of our dream of Digital India, the more technology we infuse in Governance, the better it is for India." Again according to Communications & IT minister, Mr. Ravi Shankar Prasad, "Digital India is more for the poor and underprivileged. It aims to bridge the gap between the digital haves and have-nots by using technology for citizen.

Under digital India Mission, Indian government wanted to integrate government departments with the people by providing government services electronically with the purpose to bring more transparency in govt processes, to curb corruption, benefits of govt schemes to the actual would be beneficiaries, financial inclusion and to bride the digital divide between rural and urban areas. This mission is majorly looked after by ministry of electronics and information technology along with ministry of finance under the patron ship of prime minister. In 2006, the Indian government announced the National e-Governance Plan (NeGP) with the name e-Kranti. Through e Kranti, government had chosen thirty one departments from different domains like Revenue, law enforcement, education, health and name a few for providing services to citizens. However NeGP fails at certain fronts due to weak integration among govt. applications and databases, and lack of will power to rebuild and restructure government processes. For the digital India mission, NeGP was revised and extended. Objective of writing this article is to understand i) the idea of Digital India ii) Benefits of Digital India to citizens. iii) Various bottlenecks faced during Digital India implementation.

2. Vision

Aim of the digital India is to transmute India into digitally empowered society and knowledge economy. Majorly Digital India mission is revolving around following three ideas:

i) Digital Infrastructure as a Core Utility to Every Citizen: Under this idea, government will provide internet, which is having high data transfer rate, to every citizen for availing services. Digital infrastructure would be the mean to include every citizen in to nation's economy safely ie each and every citizen have bank account and can access their bank account digitally (via mobile).

ii) Governance & Services on Demand: With the aim to bring more transparency, all the govt. departments or jurisdictions are integrated seamlessly. All the government services will be available in real time via online or through mobile platforms.

iii) Digital Empowerment of Citizens: Towards this vision, government has started to provide government services in Indian languages. Citizen are not required to physically submit the govt.

documents/certificates.

3. Objective

Objective of writing this article is to understand the following:
i) The idea/concept of Digital India.
ii) Benefits of Digital India to citizens.
iii) Various bottlenecks faced during Digital India implementation.

4. Methodology

For writing this article, an attempt was made to assess secondary data available in the subject of study. Study material is searched on Google Scholar using following keywords Digital India, e-governance.

5. Analysis and Observations
5.1 Idea of Digital India Program

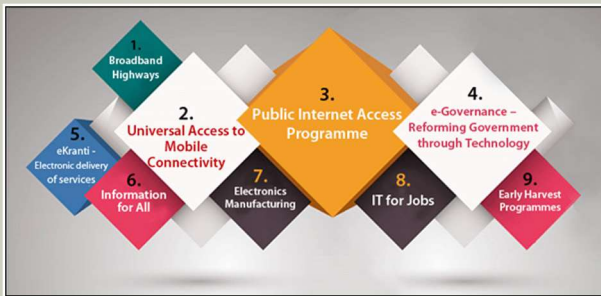Digital India program has given push to nine pillars of growth as shown in figure 1.

Figure: 1 Pillars of Digital India [1]

i) Broadband Highways: Aim of this is to connect all the particularly non-urban areas with urban area through fast speed networks. A milestone of 2, 50,000 village panchayats for broadband highways was fixed.

ii) Universal Access to Mobile Connectivity: This effort aims to increase network penetration and close connection gaps across the country.

iii) Public Internet Access Programme: This component aims to open common service centers and post offices to deliver public utility services, social welfare schemes, education and agriculture services.

iv) E-Governance: To make e governance possible, all government processes were reengineered to utilize IT for efficient delivery of government services to citizens. Due to government process reengineering, applications/documents are submitted and tracked online. Under this programme, online

repositories like DigiLocker are formed to keep documents.

v) eKranti: The objective of e-Kranti is to ensure a government-wide change by delivering all government services electronically to citizens via integrated and interoperable systems via numerous channels, while assuring efficiency, transparency, and reliability at affordable costs.

vi) Information for All: Citizens would benefit from open and simple access to information if information and papers were hosted online. Under this programme, online messages will be sent to citizens via email or short service messaging on special occasions. Platforms like mygov.in were launched to engage citizens in governance.

vii) Electronics Manufacturing: Electronic products demand is growing at a 22 percent compound annual growth rate (CAGR).It will be of 400 billion USD by year 2020. This pillars aims to make imports of electronic goods to net zero. To support this pillar, government is emphasizing on skill developments, research and developments in electronics, incubation centres etc.

viii) IT for Jobs: Under this pillar, government is providing training to youths in the domains which are required to get job in IT/IT enabled industry. IT trainings are imparted to the students particularly of rural areas and small towns.

ix) Early Harvest Progarmmes: The Early Harvest Program is made up of projects that must be completed in a limited amount of time.

5.2 Benefits of Digital India

Though the Digital India programme has had numerous obstacles in its execution, it does have some promising potential, as listed below:
i) Digital India will put curb the menace of corruption in the system and hence affect the economy positively.

ii) The Digital India programme intends to eliminate paper work, thereby saving trees [2][3] and protecting the environment.

iii) It benefits Indians in every village in terms of improving their knowledge through using the internet in their daily lives.

iv) The Digital India project has the ability to improve individuals' lives by creating jobs, improving the quality and speed of service delivery, increasing access to healthcare and education, and increasing social and financial inclusion [4][5].

v) Digital India will certainly have a substantial impact on business profitability and operations. Companies may streamline documentation, automate operations, and gain access to more efficient and cost-effective ICT capabilities by embracing digital technology[3].

5.3 Bottlenecks of Digital India's Implementation

The Digital India initiative confronts a variety of obstacles that must be overcome are as follows:

The poor pace of infrastructure development is one of the most significant issues facing the Digital India initiative.

To have a large-scale impact on individuals across the country, the digital divide must be bridged by providing last-mile connectivity in rural areas. Over 55,000 villages still do not have access to cell phones. This is largely due to the fact that providing mobile coverage in such areas is not commercially viable.

Data security has become a serious issue as a result of the growth of cloud-based services like DigiLocker. The latest data breach in August 2016, in which the debit card information of over 3.2 million customers was stolen, emphasises the need of putting in place flawless security procedures[6].

Contracting issues such as the following have impeded the implementation of the Digital India programme: i) Several PSU initiatives have been postponed because to issues with skills, experience, and technical capabilities. ii) Several government RFPs are ignored by competent private sector businesses because they are not commercially viable.

While internet penetration in India is quickly expanding, inexpensive broadband, smart gadgets, and monthly data bundles are essential to increase digital literacy. Despite the fact that India's internet data plans are among the cheapest in the world and the average retail price of cellphones is rapidly falling, approximately 950 million Indians still lack access to the internet [3].

India is home to around 1,600 languages and dialects. Because of this diversity, there are significant linguistic hurdles. Integration of local language and technology is essential to develop digital literacy in locations where people only speak their native tongue.

Fear of cybercrime and privacy breaches has slowed India's embrace of digital technologies. It is critical to raise awareness and educate people about cyber security, hazards, and data protection on the internet in order to urge people to convert to digital means.

6. Conclusion

Through digital monitoring and evaluation technologies, Digital India aims to accomplish process improvements, easier and faster access to government services, a lower human contact between government and citizens, and better transparency in government activity. All measures (such as faceless tax assessments, online audit of panchayat finances through Audit Online, and geotagging of newly produced public assets) are being done as part of Digital India for this aim. These initiatives clearly indicate a break from legacy systems and a shift in direction. Change is difficult to achieve at any scale, but especially so at the scale of government processes and systems. As a result, ongoing funding for Digital India is required. At the same time, to overcome people' resistance to digital initiatives, grievance redress in digital initiatives must be rapid, trouble free, and easily accessible. In federal systems, state governments have a larger role to play. Furthermore, because Indian states have more interfaces with citizens in their daily lives, their involvement and desire to digitise is critical for the final Digital India vision of citizen digital empowerment. As a result, states' embrace of the spirit of Digital India in their operations would lead to India's eventual and complete digitalization.

References

[1] "Programme Pillars | Digital India Programme | Ministry of Electronics & Information Technology(MeitY) Government of India." https://digitalindia.gov.in/content/programme-pillars (accessed May 08, 2022).

[2] India Submits INDC Climate Change Targets to the U.N. | Time." https://time.com/4059051/india-indc-climate-change-carbon-emissions/ (accessed May 08, 2022).

[3] P. Lavanya, K. Scientist, G. Reddy, L. Kumari, and G. Anupama, "Digital India: Opportunities and challenges of farmers," ~ 2469 ~ J. Pharmacogn. Phytochem., vol. 7, no. 2, 2018.

[4] "India Post Payments Bank to be a reality | Business Standard News." https://www.business-standard.com/article/economy-policy/india-post-payments-bank-to-be-a-reality-116060101947_1.html (accessed May 08, 2022).

[5] "Digital India | Welcome..." http://www.cmai.asia/digitalindia/ (accessed May 08, 2022).

[6] Maheshkumar Shankar Kedar, "Digital India New way of Innovating India Digitally," Int. Res. J. Multidiscip. Stud., vol. 1, no. 4, pp. 1–10, 2015.

Cypher Query Lanaguage – An Introduction

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Abstract

Its very challenging and important to learn that how to perform queries on graph data. There is a broad way to declare queries. Cypher query language is implemented and designed for the non relational graph database Neo4j. It is used in multiple commercial system, research projects and industrial applications. Cypher includes a material goods graph data model and graph pattern matching based on "ASCII Art." We describe the core component of Cypher's read-only part and its features in this paper., how it works on graph platform, relational operations. Using graph databases to manage graph structure support for graph data modelling, native indexing and storage for rapid graph traversal operations, and support for graph algorithms are just a few of the advantages. Graph language, the user to express complex pattern-matching operations. The goal of this paper is to provide the denotational semantics for a core fragment of the read-only part of the Cypher.

Keywords: Cypher, NOSQL, Graph Database, Neo4j.

1. Introduction

End users can save and retrieve data from the graph database using Cypher, a graph query language for Neo4j. The Neo4j platform aims to make query graph data simple to understand, use, and comprehend. Neo4j is the most popular graph database that provides a graphical platform to traversing and querying the data using graph operations. Neo Technology developed the query methods which are are written in Cypher Query Language [4]. Cypher is a neutral open graph query language. It provides ASCII-Art syntax [3], pattern matching of nodes and relationship with graphs. It allows the user what we want to select, insert, update or delete the data from the graph database. Through Cypher language user can easily use the **CRUD** (create, read, update and delete) functionality. Cypher look likes as SQL language [1,2]. A Cypher is a well-recognized language for updating and querying the graph database. Cypher is a declarative query language. It provides both the capabilities for querying and modifying the data. Cypher takes input as a property graph and output as a table. It allows a meaningful and well-organized query execution and update of a graph database [4]. Once you understand the Cypher language it become very easy to learn graph query language. However we have briefly introduced the cypher query langauge so that we can explore more interesting graph query in below section. Here we are presenting the Cypher Language that is used in Industry for their official definition of their data models and illustrates their work which is in progress for supporting graph projections and multiple graphs. Complex queries are executed easily in the Cypher language as compared to a relational database. Query language supports our notion of the role concept. This includes defining, updating and querying the data in simple words. This paper discusses the Cypher language, a well-known language for querying and updating property graph databases that had its start on the Neo4j platform. In Graph model, the relationships are as important as the entities themselves.

2. Syntax of Cyper Query Language

Neo4j has its query language that is called Cypher Query Language. Cypher query has its syntax similar to the syntax of the Structured Query Language (SQL). SQL is mainly designed for the relational database management system (DBMS) but Neo4j is used for the NoSQL DBMS, it means that it doesn't use the relational database and SQL. Cypher was designed especially for working with the Neo4j graph model, that uses nodes and relationship rather than rows and columns [5]. They support the CRUD operations to specify the nodes, properties and their relationship. Firstly,

you know how important concepts are related to cypher and Neo4j [8]. Property graph in Cypher query language takes as an Input and Table, Text, Graph and Code as an output. Cypher structures query Linearly. In cypher, RETURN [6,7] statement is used at the end of the query. It is also similar to the SELECT statement in SQL at the beginning of the query. The developer designed Cypher language is more easily read and understand by the user. It is easy to use and describe graphs using diagrams. Cypher permit user to ask the database to find the data that matches a specific pattern. We can explain this using to draw the diagram.

Example:-
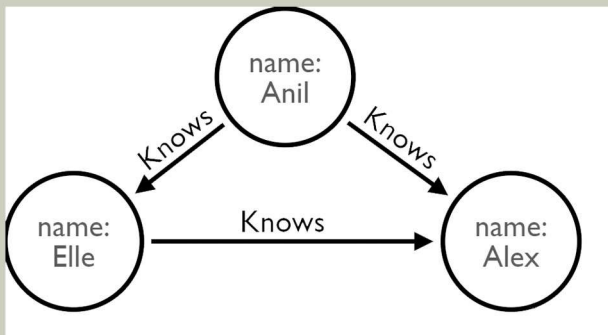(Anil)<-[:Knows]-(Elle)->[:Knows]-(Alex)-[:Knows]->(Anil)

Figure1: Graph pattern using a diagram in Neo4j

Cypher Keywords & Clauses

All Programming languages have their keywords, similarly, Cypher has few reserved keywords for specific action performed. They used CRUD [4] operations means to create, read, update and delete data in Neo4j and they help us to achieve their functionality. Create command is just like Insert command in SQL. It works like that command to insert the data into the database. Two common keywords are used mostly that are:- MATCH and RETURN

MATCH:- The MATCH [6,7] keyword is used to find out the existing node, property, relationship, label in the database. It is similar to the SELECT command in the Structured Query Language (SQL) [11,12]

Example:- Match (n) return n;

RETURN:- The RETURN [6,7] keyword is used to return the value of the result in the cypher query. You can also return the node, properties, relationship etc. according to your requirement.RETURN is not required when we used writing query methods, but it is needed to read-only. This keyword is also used in the

MATCH clause for the data you want to return.

CREATE:- The CREATE [6,7] command is used to create the new nodes and relationship in the graph.

WHERE:-

Things to remember:-
- Nodes are represented by parentheses – (node)
- Relationships are represented by an arrow – (->)

Information about the relationship can be inserted between square brackets- [: KNOWS]

Example:- (a)-[:KNOWS]->(b)
Firstly we will explain how to create a node in the Neo4j platform. After that, we create the next node and make a relationship between these two and more nodes using the cypher query. To create the nodes and their relationship between the nodes using the CREATE statement.
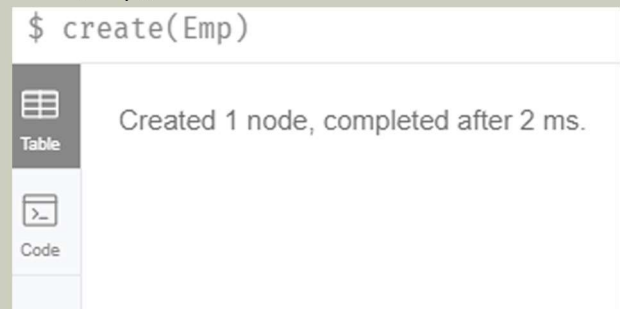
2.1. Creating a single node

Create (Emp);

Figure 2: Creating a single node

2.2. Create multiple nodes at one time
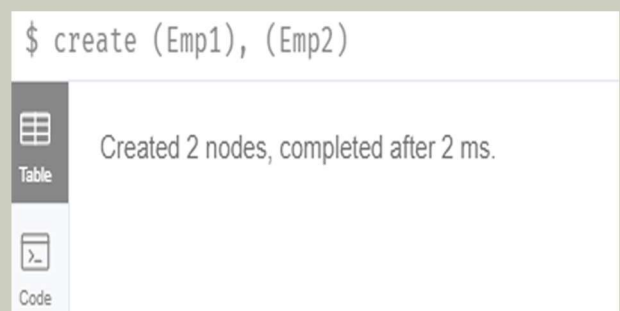
Create (Emp1), (Emp2;);

Figure 3: Creating multiple nodes at a time

2.3. Labelling the nodes and see the nodes on the interface

a. Create (Sukhman: Software_Engg)
b. match (n) return n;
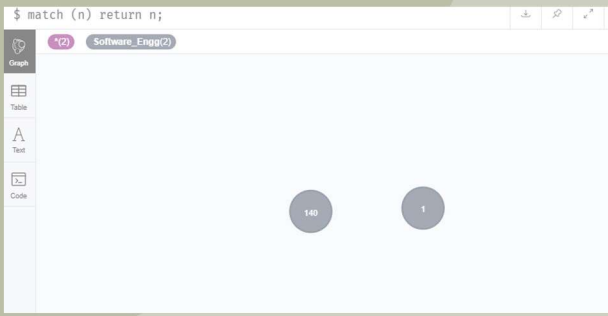   (To see the nodes on the interface we can use the MATCH clause)

Figure 4: Label the nodes with their Labels [6]

2.4. Creating a node with there multiple lables and id's

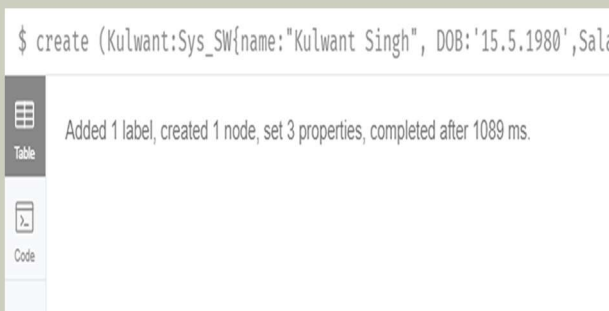Create (Kulwant: Sys_SW{name: "Kulwant Singh", DOB: '15.5.1980', Salary: '50000'});

Figure 5: Creating the nodes with multiple labels

2.5. Creating a relationship between the nodes

we will specify the relationship between nodes using the square bracket "[ ]" with their directions using an arrow "->"
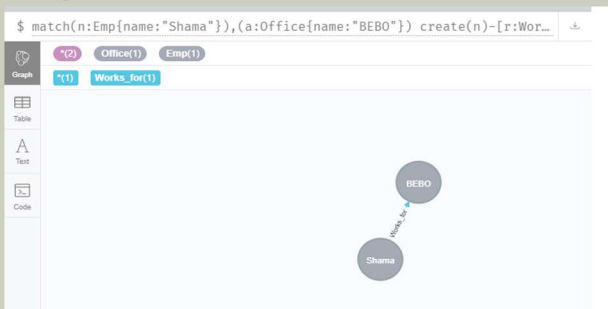

Figure 6: Creating Relationships

2.6. How to UPDATE properties of the node

Match (n{name:'Ram'}) set n.DOB=('1990-10-05') return n;(see figure 7)

3. Conclusion

The property graph data model is becoming more common in a wide range of application domains where data is naturally represented as a graph structure and the query language must allow for graph-oriented operations to be performed

Figure 7 : Update the exsisting node with new property (DOB-Date of Birth)

directly. In this study, we have explained the nature of the Cypher language and display the essential syntax of graph cypher operations. We have also covered the most important features of cypher Query Language. Cypher is a well-established declarative query language for the property graph model, and it's becoming more widely used in a variety of businesses and initiatives.

References

[1]. https://neo4j.com/developer/cypher/
[2]. https://neo4j.com/cypher-graph-query-language/
[3]. Francis, N., Green, A., Guagliardo, P., Libkin, L., Lindaaker, T., Marsault, V., ... & Taylor, A. (2018, May). Cypher: An evolving query language for property graphs. In Proceedings of the 2018 International Conference on Management of Data (pp. 1433-1445).
[4]. Guia, J., Soares, V. G., & Bernardino, J. (2017, January). Graph Databases: Neo4j Analysis. In ICEIS (1) (pp. 351-356).
[5]. Jadhav, P., & Oberoi, R. (2014). Comparative Analysis of Different Graph Databases. International journal of engineering research and technology, 3.
[6]. Junghanns, M., Kießling, M., Averbuch, A., Petermann, A., & Rahm, E. (2017, May). Cypher-based graph pattern matching in Gradoop. In Proceedings of the Fifth International Workshop on Graph Data-management Experiences & Systems (pp. 1-8).
[7]. Francis, N., Green, A., Guagliardo, P., Libkin, L., Lindaaker, T., Marsault, V., ... & Taylor, A. (2018, May). Cypher: An evolving query language for property graphs. In Proceedings of the 2018 International Conference on Management of Data (pp. 1433-1445).
[8]. Sun, C. (2018). A natural language interface for querying graph databases (Doctoral dissertation, Massachusetts Institute of Technology).
[9]. Holzschuher, F., & Peinl, R. (2013, March). Performance of graph query languages: comparison of cypher, gremlin and native access in Neo4j. In Proceedings of the Joint EDBT/ICDT 2013 Workshops (pp. 195-204).
[10]. Castelltort, A., & Laurent, A. (2014, July). Fuzzy queries over NoSQL graph databases: perspectives for extending the cypher language. In International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems (pp. 384-395). Springer, Cham.
[11]. https://neo4j.com/product/cypher-graph-query-language/
[12]. Betts, C., Power, J., & Ammar, W. (2019). GrapAL: Connecting the Dots in Scientific Literature. arXiv preprint arXiv:1902.05170.
[13]. Nihalani, N. (2010). An Intelligent Interface for relational databases. human-computer interaction, 6, 7.
[14]. Sreenivasulu, M. (2014). Information retrieval using natural language interfaces. International Journal of Computer Applications, 92(12).
[15]. Grewal, A., Jiang, J., Lam, G., Jung, T., Vuddemarri, L., Li, Q., ... & Lin, J. (2018). Recservice: distributed real-time graph processing at Twitter. In 10th {USENIX} Workshop on Hot Topics in Cloud Computing (HotCloud 18).

Cyber Security and its Challenges

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Abstract

Security has become a more sensible issue in real World as well as in Cyber World. Data collection often precedes an attack in the real world, rather than in cyberspace. Before digging holes, the intruders first get a bird's eye view of the victim's network. Cyberwarfare is a new component of warfare in the twenty-first century. Cyberspace's flaws have been exploited by developed countries in order to gain an edge over their competitors and nations. PRISM and Boundless Information, as well as Stuxnet and Disttrack, have shocked the world by demonstrating how industrialised governments abuse the internet. Although reliance on a dependable and secure cyberspace is lower in developing countries, some of their most important organizations, such as the government, military, and commercial sectors, nevertheless have a significant presence in cyberspace. The economies of these emerging countries are heavily dependent on Western products. Their essential organizations are vulnerable to cyber-attacks due to their inherent vulnerabilities and opportunities. Lot of work need to done by the governments of the developing countries to avoid the cyber attacks and to grow the economy in sustainable manner.

Keyword: cyber security, cyberspace, developing nations, cyber exploitations

1. Introduction

The issue of genuine messages being intercepted and replayed is addressed by cyber security. The endeavour to develop a safe computing platform is known as cyber security. the cyber security term used to describe the security of a cyber space [1]. Various antidotes that are inextricably linked. Cryptography, for example, is concerned with security issues such as Authenticity, Integrity, Access control, Repudiation and Key Distribution through certification putting in place firewalls, and so on.

The major attacks on DNS servers are causing a lot of hullabaloo around the globe. Auspiciously, the opponents reacted quickly and saved the Internet world from getting extinct. From the commencement of connecting computer networks, which resulted in a diminishing of the communication globe, a plethora of security vulnerabilities have arisen.

To address the vulnerabilities in network security, more complex security concepts are being developed on a daily basis. Our study takes a broad look at the several venues in which the modern cyber world revolves.

This is critical to design systems in such a way that the security system isn't continually reminded of the user. Users that deem security rules and systems to be overly restrictive will find ways to circumvent them. It is important to gather response to determine the improvement and help to reduce the organization's exposure to them [3]. Cyber security issues can be divided into five categories: (See Table 1)

• **Confidentiality:** Confidentiality refers to keeping information away from unauthorized users.

• **Authentication:** Authentication concerns who you are speaking with before disclosing confidential data or embarking into a professional transaction.

• **Nonrepudation:** Signatures are dealt with in nonrepudation.

• **Integrity control:** Integrity control is concerned with long-term businesses such as banking and online networking.

Cryptography, which gives ways and techniques of changing data into unreadable form for the authorized users so that they can access information from the destination and can solve these issues.

2. Introduction to Cryptography

The science of encrypting and decrypting data

using mathematical techniques is known as cryptography. With the help of cryptography, it becomes easy to store sensitive data or share it over insecure networks (such as the internet). So that no one save the intended recipient may read it. Cryptography refers to the data safety, however cryptanalysts are frequently referred to as attackers [4]. Cryptography and cryptanalysis are both included in the term cryptology.

Table 1: Demonstrate the categories of network security issues and protection methods

Characteristics	Description	Protection
Confidentiality	Only authorised people have access to the information.	Information that has been encrypted can only be read by those who have been given the key.
Integrity	Ensures that the data is accurate and that it has not been tampered with by an unauthorised person or malicious software.	Information that is encrypted can only be updated by authorised individuals who have the key.
Availability	Ensures that only authorised users have access to data.	Encrypted data can only be modified by approved personnel who have access to the key.
Authentication	Provides evidence of the user's genuineness.	Cryptography can be used to establish that the sender was genuine and not a forger.
Nonrepudiation	Demonstrates that a user took a specific action.	Cryptographic nonrepudiation precludes someone from claiming they were not involved in a transaction.

3. Cryptography Process Techniques

There are three techniques for the process of cryptography.

i. Symmetric-key encryption (one key): There is only one key in the symmetric-key encryption that is a private key. This key can only be used to encrypt and decrypt data. Private-key encryption is another name for this. In this method, the transmitter encrypts the data using a private key, and the recipient decrypts it using just that key.

ii. Asymmetric-key encryption (two keys): There are two keys in the asymmetric-key encryption. These are: Public key and Private key. In public-key encryption, two keys are used: a public key and a private key that are mathematically connected. Public-key encryption is also referred to as public-key encryption in contrast to symmetric-key encryption [5].

The public key can be shared freely between parties or stored in a public repository, but the private key associated with it stays private. Only the private key can be used to decrypt data encrypted with the public key. Only the public key can be used to decrypt data encrypted with the private key. A sender has the recipient's public key and uses it to encrypt a message in the diagram below, but only the receiver knows the related private key, which is needed to decrypt the message.

iii. Public key method: To improve the procedure, one-way hash function added to the public key. The input to a one-way hash function can be of any length. There's no word limit for the length of messages, a long message of even thousands or millions of bits can produce the output. If the information is modified in any way, even by one bit, the function assures that an entirely different output value is provided.

No one can steal the signatures of another person from a document and use it in another as theirs is no way to do such thing or even the person cannot change the once signed message to any other form, as these messages are secured by hash function. The online verification process declines to accept the signatures if there's even the smallest modification in the signed document.

4. Introduction to Steganography

Steganography has been the subject of a lot of debate over the last few years. One of the most basic methods for keeping data private is through steganography. Steganography conceals the existence of a communication by sending data via many carriers.

Its purpose is to keep a hidden communication from being discovered. Steganography literally means hidden writing and is derived from the Greek words stegnos (hidden or secret) and graphy (writing or drawing). Steganography is a technique for communicating information in a non-visible manner [6]. Steganography is utilised for a variety of reasons, and it is frequently used in important fields. It may be used to communicate without restriction, even in restricted or controlled environments. Steganography is a useful technique for concealing data and safeguarding it from illegal or unwanted inspection. However, stego is just one of numerous methods for ensuring data confidentiality. Digital image steganography is rising in use and application. People are employing steganography to get around regulations that prohibit cryptography and strong encryption, and to send these communications discreetly. Although, in the near future, steganography will become highly common.

5. Uses of Steganography

Steganography is most commonly used to hide information, such as sound or an image by using a stegokey to further disguise a message. As with

other forms of security, steganography can be applied to a variety of purposes, some of which are beneficial and some of which are not [7]. Steganography can also be used to create a one-way hash value replacement. Steganography can also be used to tag notes to photographs on the internet.

6. Applications Of Cryptography

Secure Communication: The most obvious use of cryptography is to encrypt our communications with other systems. Client software usually communicates with the server in this way. Examples include web browsers and web servers, and email clients and servers. Initially, only a few academics and government officials used the internet, and abuse of the system was rare. Because most networks communicate openly (without encryption), anyone intercepting network traffic can read the communication and passwords. Modern switched networks make eavesdropping difficult, but in some cases, like B. public WLANs, it's okay. Most communication protocols include encryption to improve the security of the Internet [8].

End to end encryption: One of the few places where encryption is not used widely is email.
It is encoded because it passes through various servers to reach to its destination. However, only the authorized people have the access to read the emails (for instance: the administrator of the server or the owner of our system). There are number of ways to use "end-to-end" email encryption.

7. Introduction to Cyber Security

A cybersecurity threat is act that seeks to damage the data and steal data or disrupt digital life of the human beings. There are number of ways that includes computer viruses, malicious software, Denial of Service (DoS) attacks, and other attack vectors. Intruders aims to gain unauthorized access to the high organization networks, damage, disrupt or steal the information/data and take the financial or other benefits. These threats can come by trusted users within an organization or from the unknown parties to harm the cyber space.
Types of Cyber Security Threats:
There is basic two types of threats. traditional notion of security, military forces and action are used or threatened. This concept of security endangers certain core values of a nation, such as sovereignty, independence, and territorial integrity.

Military action also poses a threat to the lives of citizens who reside within the territory. Traditional notions of security can either be external, i.e. threats emanating from other countries, or internal, i.e. threats emanating from secessionist groups or regions [9]. Non-traditional Security Threat are those threats that arise from non-traditional security threats.
Few examples of non-traditional security threats are resource scarcity, infectious diseases, climate change, irregular migration, and also involves international crimes. Dangers of this type are often multinational in scope, largely beyond the reach of unilateral remedies and demand economic and social – responses as well as the use of military force for humanitarian purposes. These threats are usually transcontinental in nature.

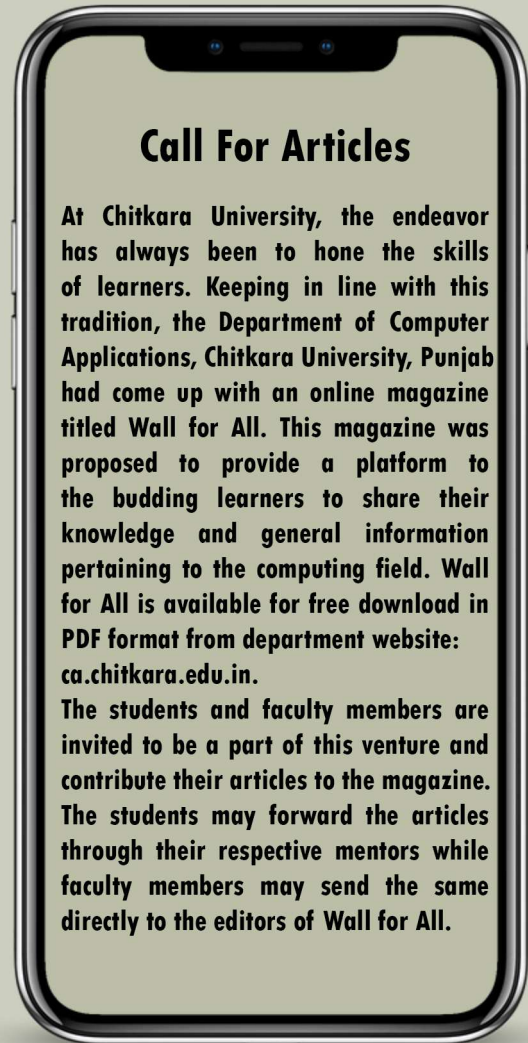Table 2 Area of cyber threats and its impact [10]

Areas of Threat	Type of Threat	Impacts of Threat
Military	This is a kind of traditional threat.	The internal information related to the weapons or other planning's can be harmed.
State records	This includes both traditional and non-traditional kind of threats.	This can harm the community or a person as an individual.
Continuity Safety of State	A kind of traditional threat.	This can harm the society in such a way that it could become difficult for the community to survive in a state.
Global Relations	It involves both traditional as well as non-traditional kind of threat.	In this information related to developing relations world-wide could be harmed.

8. Conclusion

Cyber security is a complex subject. There are various definition of "security" and to what extent risks are allowable. The first step in creating a safe network is defining what security means to your company. Everything else follows once that has been defined. The network of the organization can be assessed terms of the policy. The systems of the organizations, working on the various projects can be further divided into the various sections that help to regulate the proposed changes whether in proper manner or have conflict with the security rulebook. Securing the network requires everyone's collaboration, wise policies, and standardized procedures. Cryptography protects users by encrypting data and verifying other users' identities. The method allows the message recipient to verify the sender and ensures that the message can only be viewed by the authorised recipient. In addition, the message has not been tampered during transmission [11]. Cryptanalysis and Brute Force Attack are examples of cryptography attack tactics. Advance Cryptography Techniques are discussed in this work.

References

[1]. Thakur, K., Qiu, M., Gai, K., & Ali, M. L. (2015, November). An investigation on cyber security threats and security models. In 2015 IEEE 2nd international conference on cyber security and cloud computing (pp. 307-311). IEEE.

[2]. Coats, D. R. (2017). Statement for the Record, Worldwide Threat Assessment of the US Intelligence Community, Senate Select Committee on Intelligence. Office of the Director of National Intelligence. United States, 28.

[3]. Cebula, J. L., & Young, L. R. (2010). A taxonomy of operational cyber security risks. Carnegie-Mellon Univ Pittsburgh Pa Software Engineering Inst.

[4]. Delfs, H., Knebl, H., & Knebl, H. (2002). Introduction to cryptography (Vol. 2). Heidelberg: Springer.

[5]. Bahadori, M., Mali, M. R., Sarbishei, O., Atarodi, M., & Sharifkhani, M. (2010, June). A novel approach for secure and fast generation of RSA public and private keys on SmartCard. In Proceedings of the 8th IEEE International NEWCAS Conference 2010 (pp. 265-268). IEEE.

[6]. Kour, J., & Verma, D. (2014). Steganography techniques–A review paper. International Journal of Emerging Research in Management &Technology ISSN, 2278-9359.

[7]. Altaay, A. A. J., Sahib, S. B., & Zamani, M. (2012, November). An introduction to image steganography techniques. In 2012 International Conference on Advanced Computer Science Applications and Technologies (ACSAT) (pp. 122-126). IEEE.

[8]. Goyal, S. (2012). A Survey on the Applications of Cryptography. International Journal of Science and Technology, 1(3).

[9]. Wang, E. K., Ye, Y., Xu, X., Yiu, S. M., Hui, L. C. K., & Chow, K. P. (2010, December). Security issues and challenges for cyber physical system. In 2010 IEEE/ACM Int'l Conference on Green Computing and Communications & Int'l Conference on Cyber, Physical and Social Computing (pp. 733-738). IEEE.

[10]. Humayun, M., Niazi, M., Jhanjhi, N. Z., Alshayeb, M., & Mahmood, S. (2020). Cyber security threats and vulnerabilities: a systematic mapping study. Arabian Journal for Science and Engineering, 45(4), 3171-3189.

[11]. Stiawan, D., Idris, M., Malik, R. F., Nurmaini, S., Alsharif, N., & Budiarto, R. (2019). Investigating brute force attack patterns in IoT network. Journal of Electrical and Computer Engineering, 2019.

Call For Articles

At Chitkara University, the endeavor has always been to hone the skills of learners. Keeping in line with this tradition, the Department of Computer Applications, Chitkara University, Punjab had come up with an online magazine titled Wall for All. This magazine was proposed to provide a platform to the budding learners to share their knowledge and general information pertaining to the computing field. Wall for All is available for free download in PDF format from department website: ca.chitkara.edu.in.

The students and faculty members are invited to be a part of this venture and contribute their articles to the magazine. The students may forward the articles through their respective mentors while faculty members may send the same directly to the editors of Wall for All.

An Empirical Analysis of UI and UX on Web

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Abstract

In recent times, Web Development has taken new strides in modern technology and integrated itself with our day to day lives. Having a website for any organisation, institution or even individuals is normal in these days. UI and UX design are part and parcel of today's web development process. It allows the users to have meaningful experiences while maximizing the utility and usability of website. In modern web development, the service itself is not the only thing that determines whether a website is good but the experience and the aesthetic also plays a crucial part in it. This article focuses on the influence of User Interface and User Experience Design and how it has impacted web development.

Keywords: Web Development, UI/UX Design, User Interface, User Experience

1. Introduction

In order to understand how UI (User Interface) and UX (User Experience) have influenced web development as whole, let us first understand what these terms mean: User Interface (UI) – User Interface is the component of the website that is present to the users and they can interact with. User Experience (UX) - User Experience can be termed as the overall experience of the user that they undergo while interacting with the website. The user interface (UI) is the first thing that comes to mind when someone uses the internet [1]. The most basic function of a user interface (UI) for machines and software, such as computers, mobile phones, and other electronic devices, is to connect or translate information on the operating system in order to maximise the user experience. The User Experience (UX) refers to how a user feels when interacting with a system [2]. In a modern context, the system in question can be a website, software, or other computer application and programme that uses some type of human-computer interaction. In

a nutshell, UI/UX is the appearance of a website or application that is designed to be as appealing to users as feasible.

1.1 How UI/UX design impacts User Psychology

UI and UX are aimed at the psychology of the user and how to better understand and fulfil their needs. One of the most well-known examples of how a simple tweak can have a big psychological impact is Amazon's ecommerce website. With a few changes, the site made a $300 million profit. Amazon replaced its registration button with a new one that says 'Continue' on its website. The company reportedly earned $300 million from the change [3].

The answer is that this small shift had a direct impact on human psyche. Customers who saw the 'Register' button had the notion that they would have to fill out a long form with personal information. They mostly avoided clicking it since they didn't want to go through the 'registration' process [5] The customer assumed that by moving the button to 'Continue,' they were almost done or at least halfway through the process. Customers were 45 percent more likely to click the 'Continue' button as a result. This is a great example of how deeply the UX and UI design of a website can impact the user.
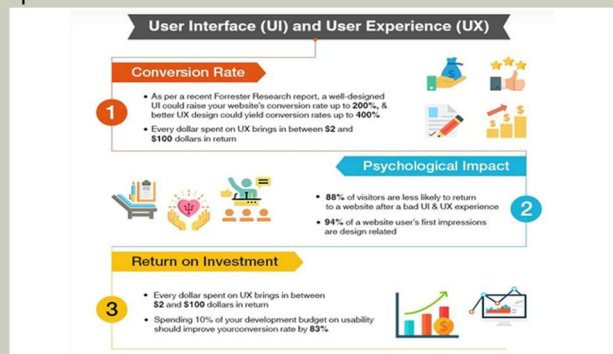

Figure 1: Financial and Psychological Impact of UI/UX Design on the Users[4]

2. The Power of Simplicity

'Keeping it basic' has always been effective in terms

of design. The true art of design is to convey complexity through simplicity, regardless of how complicated the product or service is [9]. A website that is overburdened with information is an undesirable sight for any visitor that wishes to interact with it. It is adequate to maintain a minimal design with essential and pertinent content that explains the essence of your products or services. Hence, a simpler UI/UX design can provide a superior experience and interference as compared to a more complicated one [10][12].
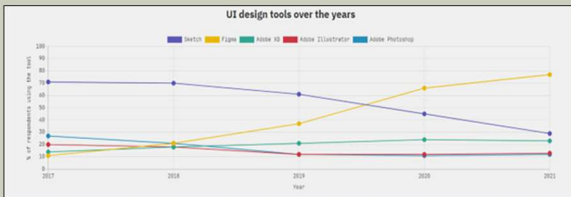

Figure2: Most Commonly used UI/UX Design Tools [7]

According to the research, 95% prefer to create interfaces with digital-based tools, which eliminates the need for users to install software that increase computer storage space. Figma was chosen by 77 percent of respondents as an interface design tool. Sketch takes the second spot with 29% of the vote. Adobe XD takes third place with 23% of the vote. Adobe Illustrator is ranked fourth, with a share of 13%. Adobe Photoshop comes in fifth place with 12% of the vote.

3. Literature review

Joo et.al [1] in this paper author mainly focus and use some designing techniques to clarify the concept of website designing by IT students. For this the authors divide the task into three groups for excellent, average and insufficient evaluation and their results are better for computer graphics as well as some CAD related designs. Wijaya et. al [2] gave emphasis in their research work to evaluate the satisfaction level of customers who deals with the numerous websites to manage the online art gallery. Nurpalah et. al [3] in their paper have a discussion with front end and back end data of particular websites. This is because client satisfaction level could be judged by appearance of the product available on website while they working of e-commerce websites. Ji, H et. al [5] have created a model to evaluate the cognitive behaviour of client on the basis of the design and appearance. They were successful to find out and set best designing approaches of website.

Hussein et. al [6] evaluated the feedback of the clients as per the design of websites. The authors use the waterfall model for getting the well-establish and integrated output. The Human Computer Interface (HCI) knowledge helped to evaluate the UX principle for web development process.

Vlasenko et. al [8] found the evaluating tool for UI and try to work on UX components for finding the better quality. Dinh et al [11] in their paper majorly found tools to evaluate the significant performance between front end and back end data and explore some software tools to solved the numerous issues such as flows with CSS, JavaScript. HTML and other designing tools. According to Massaro et. al [12], The User Experience (UX) is a useful technique for determining whether or not a web page is usable. The UX approach to web page design is a notion that has been applied in a variety of application sectors and is the subject of current research. The usability of a user interface as a result of its design is a crucial aspect influencing its efficacy, confirming the importance of UX in software interface design. According to Sfetsos et. al [13], a UX developer's responsibilities include designing and testing the usability of the website, assisting the development team, and assessing the framework to verify it is consistent with the design.

4. Conclusion

It is comprehensible that a clear and appealing interface design is a key component of an information system's success. As a result, many firms are committing resources to recruiting UI/UX specialists in order to improve the aesthetic quality as well as the usefulness of their information systems. A well-designed website is important to achieve its purpose, and it requires a systematic approach to ensure that the design meets the expectations of its users. Having a well-rounded and user-friendly interface is also critical to its success. User centricity, simplicity, credibility, and the usage of established conventions are all key characteristics of UX that contribute to the best-in-class experience for users. Thus, trying to understand the psychological impact of UI/UX and applying what one has learned can be used to create flawless and immersive design experiences. The effects of UI and UX design on web development have been portrayed in article and from it we can therefore conclude that, in essence, UI and UX design have been a massive influence towards how websites are perceived by users.

References

[1]   Joo, H. (2017). A study on understanding of UI and UX, and understanding of design according to user interface change. International Journal of Applied Engineering Research, 12(20), 9931-9935.

[2]   Wijaya, A., Wihalim, W., & Gunawan, A. A. S. (2021, October). The Effect of UI/UX Design on User Satisfaction in Online Art Gallery. In 2021 1st International Conference on Computer Science and Artificial Intelligence (ICCSAI) (Vol. 1, pp. 120-125). IEEE.

[3]   Nurpalah, A., Pasha, M. S., Rhamdhan, D. D., Maulana, H., &Rafdhi, A. A. (2021). Effect of UI/UX Designer on Front End. International Journal of Research and Applied Technology (INJURATECH), 1(2), 335-341.

[4]   https://www.hiddenbrains.co.uk/blog/whats-psychological-impact-ui-ux-design-website-development.html

[5]   Ji, H., Yun, Y., Lee, S., Kim, K., & Lim, H. (2018). An adaptable UI/UX considering user's cognitive and behaviour information in distributed environment. Cluster Computing, 21(1), 1045-1058.

[6]   Hussein, I., Mahmud, M., & Osman Md Tap, A. (2014, June). HCI knowledge for UX practices in the web development process. In International Conference of Design, User Experience, and Usability (pp. 116-126). Springer, Cham.

[7]   https://uxtools.co/survey-2021/

[8]   Vlasenko, K. V., Lovianova, I. V., Volkov, S. V., Sitak, I. V., Chumak, O. O., Krasnoshchok, A. V., ... & Semerikov, S. O. (2022). UI/UX design of educational on-line courses. In CEUR Workshop Proceedings (pp. 184-199).

[9]   Orlova, M. (2016). User experience design (UX design) in a website development: website redesign.

[10] Chen, A. (2020). Marketing and Design Applications in Website Development.

[11] Dinh, D., & Wang, Z. (2020). Modern front-end web development: how libraries and frameworks transform everything.

[12] Massaro, A., Giannone, D., Birardi, V., & Galiano, A. M. (2021). An Innovative Approach for the Evaluation of the Web Page Impact Combining User Experience and Neural Network Score. Future Internet, 13(6), 145.

[13] Sfetsos, P., Angelis, L., Stamelos, I., & Raptis, P. (2016, July). Integrating user-centered design practices into agile web development: A case study. In 2016 7th International Conference on Information, Intelligence, Systems & Applications (IISA) (pp. 1-6). IEEE.

Java Script Libraries : Quick Bytes

1). Anime.js :
If you want to add animations to your site or application, Anime.js is one of the best JavaScript libraries you can find. It was released in 2019 and is lightweight with a powerful yet simple API.

2). Chart.js :
Chart.js is a flexible and simple library for designers and developers who can add beautiful charts and graphs to their projects in no time. It is open-source and has an MIT license.

3). Granim.js :
Granim.js is a JS library that helps you create fluid and interactive gradient animations. This way, you can make your site stand out with colorful backgrounds.

4). Animate On Scroll:
Animate On Scroll works great for single-page parallax websites. This JS library is fully open-source and helps you add decent animations on your pages that look sweet as you scroll down or up.

5). Three.js :
Three.js is a cross-browser JavaScript library and application programming interface (API) used to create and display animated 3D computer graphics in a web browser using WebGL.

6). GSAP :
The GreenSock Animation Platform (GSAP) is a popular set of JavaScript tools for building animations on the web. Anything you see in your web browser can be animated with GSAP. Whether you want to build elegant UI animations or dynamic effects in web apps, games, and interactive stories; GSAP is up to the task.

Applications of Machine Learning Algorithms in Hydrology

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Abstract

Water is one of the most essential elements for life on Earth to survive. Despite the fact that water covers 75% of the earth, we continue to face disasters such as drought and other natural disasters. To counteract them, Hydrology is the study of the movement of water through the atmosphere from one state to the next and back to its initial state. The article that follows will explain how Artificial Intelligence (AI) is used in Hydrology

Keywords: Hydrology forecasting, regression, iterations, flood process selection algorithm, machine learning.

1. Introduction

Hydrology is the study of occurrence, distribution, movement and properties of water of the earth and its relationship with the surrounding environment as it changes form from liquid to vapor and back to its original state, this whole cycle is called "Hydrological cycle" or commonly known as "The Water Cycle". It is a continuous process through which the water is purified, during which water go through various physical, chemical and biological processes as it travels from atmosphere, over and beneath the surface of earth and plants. From the formation of lakes, ponds, river flow, +from global warming comes under hydrology and we can anticipate the future movement and state of them [1][2].

Machine Learning is study of computer algorithms, in other words making a computer or a device capable of doing this on its own, turning past events and happening into experience or data to learn from them in order to be more efficient and accurate in future repetition of events. The difference between AI and Machine Learning is that AI focuses on developing software which act and responds like a human whereas Machine learning is more specific field, it's a subset of AI which focuses on development of AI which learn from its past mistakes and gain experience with time [2].

Now, if we merge "hydrology" with "machine learning," we can easily make an AI which will perform all the calculations in a more time efficient and precise manner. We've been using machine learning in hydrology for a long time, and some of our everyday services, such as weather forecasts on our TVs and phones, are nothing more than prediction based on machine learning in hydrology [3].

The objective of this article is to inform you about different methodologies and algorithms to accurately predict the water level with the help of machine learning as it involves too many influential factors which cannot be simply put into a linear mathematical equation or a physical model. But if we can accurately anticipate the movement of water, we can predict floods, heavy rain, droughts, ground water locations and many more. All the data and information presented here is secondary data or second-hand data.

2. Literature Review

Sujay Raghavendra, Paresh Chandra Deka, T.R. Petty, P. Dhingra, Qing qi Pei, and Ning Lv are a few well-known experts who have researched and reviewed algorithms on machine learning in hydrology. A few of them are
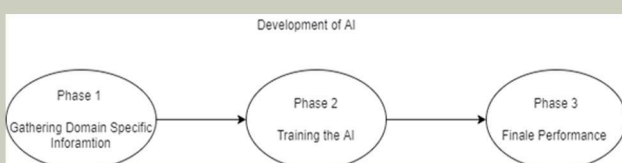**CRML:** A Convolution Regression Model Property destruction and casualties are common outcomes of hydrologic catastrophes. As a result, hydrological forecasting, particularly floods, has become a popular study topic in all countries a data-driven hydrology forecasting model based on the core idea of floods formation (Convolution Regression based on Machine Learning). This model may represent the influence of hourly rainfall on future flow changes, and flow changes might be anticipated by superimposing these impacts. Flood procedures were used to create a series of samples. After numerous rounds of iterations with suitable

settings, the convolution coefficients are determined. Finally, 10 flood occurrences were used to validate the CRML-based hydrology forecasting model. The results demonstrate that it has good accuracy in terms of flood peak and arrival time, and that it meets the hydrology forecasting criteria. Because of its physical meaning, the hydrology prediction model based on CRML can efficiently anticipate short and long lead-time floods[4].

Varying Parameter Detrended Fluctuation Analysis (VPDFA) The volume of water flowing through one stream or river during a set period is called streamflow. Streamflow can't be monitored directly in a river, for example. Rather, stream gauging must be used to compute it. By applying long-term planning (structural and non-structural interventions) and short-term emergency warning, streamflow modelling and forecasting can help to improve the water resources system and limit the impact of damaging natural catastrophes like floods and droughts. VPDFA can work well on the numerical and real-life series with no more than 20 irregular cycles. If the number of cycles exceeds 20, the natural drawback of polynomial regression to fit the periodic trends will cause the abnormal jump at large scales[5].

Streamflow Hydrology Estimate using Machine-Learning (SHEM) The SHEM model was tested in the Boise River Watershed Basin case study, with preliminary findings showing a "good" to "high" correlation of reliability among estimates and actual historical data. The model used only two data parameters that are stream stage and time.

The model was then applied to three more watersheds basins in Washington State: Naselle, Willapa, and Satsop, in order to further test the trustworthiness of these results. Both controlled and unregulated streams flowed through these basins. The model's results were thoroughly tested and confirmed in these places. The model's replicability, clarity, stability, parameter definition, and correlation correctness were all confirmed by comparing all of the sites[2].

Phase 1
Gathering Domain Specific Information

Phase 2
Training the AI

Phase 3
Finale Performance

Development of AI

Phase 1: Here are domain specific information will be the past records of water levels, stream flow and other related factors of the location or region.

Phase2: In this we select the most suitable methodology and algorithm for our AI. These may vary from region to region as the environmental factors are not always similar or identical.

Phase 3: This is final phase where we do the performance test with dummy data and scenarios to know how accurately it can evaluation the situation and what conclusion it gives.

3. Application of Machine learning in Hydrology

Surface Water Hydrology: The present study used rainfall & streamflow data from the Varahi River basin in India's Karnataka state. The Varahi River rises in the Western Ghats' foothills (730 meters above the sea level) and runs west for roughly 25 kilometres before joining the Arabian Sea, draining 457 kilometres. The daily streamflow record of the Varahi Basin is monitored by a hydrological observation station run by the Central Water Commission (CWC) of the Government of India at Haladi. The basin receives most of its rainfall during the southwest monsoon, which occurs from June to September, and hardly any rainfall from October to December.

The watershed contains a lot of lateritic soil, and the average rainfall in the area is roughly 3400 mm, which supports a lot of flora. The western ghats, which make up the basin's top and greatest component, are a hilly area with dense vegetation. On an annual basis, the day temperature ranges from 16°C to 42°C, and the environment is moderately humid year-round. Because of the wide range of meteorological and streamflow data, this case study is linked to a high level of hydrological complexity. As a result, in this case study location, building such a soft computing technology for modelling streamflow patterns is highly motivating and needed [6].

Ground Water Level Prediction and Quality Assessment: Water quality modelling and prediction are critical for environmental protection. The future water quality may be measured by developing a model employing powerful artificial intelligence algorithms. It will be more cost and time effective because, rather than excavating and finding it manually, we can simply design one gadget to do it by analysing the surface.[1]
India is the largest ground water consumer as over

63% of agricultural land is dependent on ground water. Significant groundwater storage depletion has occurred in the Indus-Ganges-Brahmaputra River basins as a result of widespread agricultural expansion connected to groundwater-fed irrigation for annual multiple harvests (i.e., rabi and kharif). Even though yearly rainfall is much higher (1200 mm), the majority (75 percent) of rainfall falls during the monsoon season (June–September), resulting in monsoon-dependent groundwater recharge Thus, the delicate balance between the elements of the nature-human composite system governs India's groundwater storage fluctuation. As a result, due to the system's great complexity, predicting groundwater amount is difficult[7]. Soil Moisture Estimation: It important to know some factor like moisture level, evaporation rate of a soil before deciding the crop to grow on. It tells the appropriate time to sow the crop.

The evaporation process is described as the transfer of water from the liquid state to water vapour, and it is a critical characteristic in the global hydrological cycle. Evaporation loss has grown dramatically in recent decades, especially in semi-arid and dry locations throughout the world. As a result, accurate evaporation rate estimation is critical for a variety of applications, including water budgeting, agricultural water management, hydrology, agronomy, and management of water resources. So it has become necessary in these areas to anticipate and manage the water resources[8].

4. Conclusion

Like stated before, predicting water movement includes a lot of factors and these factors vary from region to region, so in order to develop AI we may have to start from scratch in some cases, leading to an increase in time spent on gathering data and training phase, so sometimes it may be efficient or may be just effective but not efficient.
We are all aware of all the water crises the world is facing. This might not be the perfect cure to resolve those, but it can provide us with sufficient time to find it.

References

[1] S. Raghavendra and P. C. Deka, "Support vector machine applications in the field of hydrology: A review," Appl. Soft Comput. J., vol. 19, pp. 372–386, 2014, doi: 10.1016/j.asoc.2014.02.002.
[2] T. R. Petty and P. Dhingra, "Streamflow Hydrology Estimate Using Machine Learning (SHEM)," J. Am. Water Resour. Assoc., vol. 54, no. 1, pp. 55–68, 2018, doi: 10.1111/1752-1688.12555.
[3] T. H. H. Aldhyani, M. Al-Yaari, H. Alkahtani, and M. Maashi,
"Water Quality Prediction Using Artificial Intelligence Algorithms," Appl. Bionics Biomech., vol. 2020, 2020, doi: 10.1155/2020/6659314.
[4] C. Chen et al., "CRML: A Convolution Regression Model with Machine Learning for Hydrology Forecasting," IEEE Access, vol. 7, pp. 133839–133849, 2019, doi: 10.1109/ACCESS.2019.2941234.
[5] Q. Zhang, Y. Zhou, and V. P. Singh, "Detrending methods for fluctuation analysis in hydrology: Amendments and comparisons of methodologies," Hydrol. Process., vol. 28, no. 3, pp. 753–763, 2014, doi: 10.1002/hyp.9637.
[6] M. Wang, M. Rezaie-Balf, S. R. Naganna, and Z. M. Yaseen, "Sourcing CHIRPS precipitation data for streamflow forecasting using intrinsic time-scale decomposition based machine learning models," Hydrol. Sci. J., vol. 66, no. 9, pp. 1437–1456, 2021, doi: 10.1080/02626667.2021.1928138.
[7] P. Malakar, A. Mukherjee, S. N. Bhanja, S. Sarkar, D. Saha, and R. K. Ray, "Deep Learning-Based Forecasting of Groundwater Level Trends in India: Implications for Crop Production and Drinking Water Supply," ACS ES&T Eng., vol. 1, no. 6, pp. 965–977, 2021, doi: 10.1021/acsestengg.0c00238.
[8] A. Malik et al., "Pan evaporation estimation in Uttarakhand and Uttar Pradesh States, India: Validity of an integrative data intelligence model," Atmosphere (Basel)., vol. 11, no. 6, 2020, doi: 10.3390/ATMOS11060553.

Perfection is achieved not when there is nothing more to add, but rather when there is nothing more to take away

– Antoine de Saint-Exupery

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