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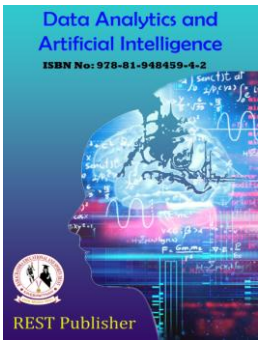

Software Development Techniques In Current Scenario

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Abstract: *Now a days, technology of Internet become very fast growing development and rapid advancement in software. Internet is very essential resource for the people. IOT, Machine Learning, Big Data technologies, Artificial Intelligence etc., are some of the new technologies with variety of applications all over the world. Predicting the future in the computing Industry is very harder. In the field of software introduces of key changes to the research process. As a result, the software research is blowing in increasing breath of topics that tends to Implementation. Software technology today is improving at a rapid growth, enabling faster change and progress, Causing an accelerating of the rate of change. It is not only technology trends and emerging technologies that are extend, a lot more has changed this year due to COVID-19. The software development techniques may tend to learning and relearning process.*

Keywords: *Automation, Big Data, Middleware platform, IoT, Wrangling*

1. INTRODUCTION

Software development keeps growing with constantly changing and new cloud services changing up. The reality demands that software development researchers may review their 2022 plans as modernize their aims, shaping their teams and practicing with software development tools, this tends to achieve their business goals like

- Developer experience
- Development workflow automation
- Deployment and operations

The software developer and firms must take of the new trends in the software productivity space and make needful of the markets in 2022. The challenges associated with the development of “only for ios”,”only for Android” or “only for windows”, software development enterprises are increasing exploring cross-platform development. Repetitive tasks in software development will be automated. Here, we discuss some emerging trends indicate that the future of software development will undergo significant change. We can see a constant advancement in major technologies like IoT(Internet of Things), Machine Learning, Block chain technology.

2. INTERNET OF THINGS

When there are millions of devices connected over the internet to connect and share data, it is called the Internet of Things. A specialised report by Ericson estimated that 29 billion devices would be connected by 2022. Concerning the report published by Statistical Research in the year 2019, it has been estimated that we will have the total number of devices connected worldwide would increase to 75 billion by 2025[1]. It, therefore suggests that the IoT is going to be one of the most robust technologies in the future.

The IoT Devices are the ones which have the following characteristics:

- **Connectivity:** All devices must be connected.
- **Dynamic and self-adaptive:** IoT devices should adapt according to their situations.
- **Interoperability:** refers to device interoperability, network interoperability and platform interoperability.

3. IOT ARCHITECTURE

The IoT Architecture consists of five layers, which are explained as follows:

Perception layer: This is the first layer, which involves physical devices to receive and collect data. Wireless networks are employed widely for this purpose. Sensors, actuators and mobile technologies are involved in both high level and low-level applications. Wireless Sensor Networks are commonly used in military and industrial applications [2]. Sensors are used to collect data such as temperature, humidity, pressure, geospatial coordinates, speed, acceleration, velocity etc. Actuators control other devices.

Transportation layer: Data transmission and routing are provided by this layer. The collected data is transmitted and received for Machine-to-Machine connectivity. There are different protocols used for data transmission. Large area networks use technologies such as ZigBee, LoRaWAN, 5G, Wi fi etc. Short-range coverage uses RFID and Bluetooth.

Middleware layer: It allows the interoperability between services and applications of the devices. It acts as a data aggregator and provides scalability, reliability, security and fault tolerance. There are various types of popular IoT middleware platforms:

- Open-source IoT Middleware Platforms: Thing-Speak, Kaa
- Publicly traded IOT Middleware Platforms: AWS IoT Platform, Microsoft Azure IOT Hub, Google IOT Platform, Oracle IoT Platform
- Developer friendly IoT Middleware Platform: Carriots, Temboo
- End to end connectivity IOT Middleware Platforms: Particle Cloud, Samsara [3]

Application Layer: This layer provides the applications to the end-users. It provides services and is responsible for the formatting of data and presentation and it is based on application protocols. Some common IOT Application layer protocols are MQTT, SOAP, XMPP, TCP-IP, STOMP, SSI etc. With the increase in the number of applications in IoT, there must be some changes to be made in the field of application protocols which allow specific issues to be addressed. In such cases, even Machine Learning is used for making changes.[4]

Business Layer: This layer includes data that needs to be assessed, classified and for producing advanced big data analytics. The result is achieved by using various methods such as deep learning, machine learning and Artificial Intelligence. Secure communication and encryption of IoT devices also matter a lot and privacy is protected by the authentication of IoT connected devices.

4. A PANORAMIC VIEW OF IOT DEVICES IN VARIOUS SECTORS

Healthcare and life sciences

- Personal care and Research are the application group
- hospitals, labs, clinics, home monitoring, drug discovery, surgical equipment are the target objects
- medical devices, imaging, RFID Tags, Readers connected to the PDA s, Telemedicine, Diagnostics and monitoring devices are the devices used.

Safety and Security

- Homeland security, surveillance, emergency services, and tracing National and Regional defence are under the application group.
- Banks, Schools, Airports, Vehicles, Baggage, Animals, Food, Customs are all the target objects
- RF Tags, Sensors, Smoke Detectors, Radar Systems, Fire Alarms, GPS Systems are the devices involved

Energy and Resources

- In this sector, Agriculture, Mining, Oil, Gas, Water, Supply, Demand are the applications
- The turbines, Generators, energy management, solar, wind pipelines, farms and nursery are some of the target objects.
- RF Tags, meters, substations, switches, sensors, actuators, and embedded devices are some of the devices involved.

5. MACHINE LEARNING

It is a technology which enables the computer to learn on its own with past data provided during the training phase. It is a subset of Artificial intelligence. It is capable to do the tasks that are considered tough for human ability. It is because, those type of tasks which uses huge amount of data will give erroneous results when manually done by humans. Thus, via Machine Learning the computer is made to do the tasks which is done with the use of various machine learning algorithms. Image recognition, face recognition, email filtering, speech recognition, friend suggestion by Facebook, self-driving cars are all some real time examples where machine learning is used. Now, let us look at the classification of machine learning:

- Supervised learning: The machine learning model predicts the output using the inputs that were provided for training the model eg: spam filtering
- Unsupervised learning: The training is provided to the machine with the set of data that has not been labelled, classified, or categorized, and the algorithm needs to act on that data without any supervision.eg: Eclat

- Reinforced learning: It is feedback-based learning where a reward is given to the model if the prediction is correct and the prediction improves in the long run. eg: robotic dog

Machine learning algorithms: There are various algorithms used for the construction of a model. The algorithms are classified into regression and classification algorithms. Regression algorithms: it is used to predict the outputs of continuous values when given as input. The following are the types of regression algorithms.

- Linear Regression Algorithm
- Logistic Regression Algorithm

Classification algorithms: the model first learns from the data set and the result is classified into different classes. For example, Pneumonia positive and Pneumonia negative. The following are some classification algorithms:

- Decision Tree Algorithm
- SVM(Support Vector Algorithm)
- Naive Bayes Classifiers
- KNN(k-nearest neighbours) algorithm

Machine learning utilities algorithms to analyze data without human knowledge . It involves series of commands, observation as inputs.

6. PLATFORMS USED FOR MACHINE LEARNING:

Machine learning commonly uses python and R language for data analysis. Anaconda is an open source platform for python and R and the relevant IDE can be accessed from here.

Lifecycle of Machine Learning: The entire process of building a machine learning model undergoes many steps which are referred as the lifecycle of machine learning.

- Collecting the data: It is the most important step in preparing the dataset
- Data preparation: The collected data undergoes some changes and the dataset is prepared after the removal of duplicate data.
- Data wrangling: The raw data is converted into usable form.
- Data analysis: Data is applied upon with the various algorithms to determine the type of problem.
- Training: Model is trained using various datasets in order to understand the features and patterns of the data.
- Testing: The model is tested by providing another data and the accuracy is obtained.
- Deployment: The deployment of model in real time.[5]

Data science vs machine learning vs deep learning:

- Data science helps to transform a research project into a business project. The mathematical statistics, big data and data analytics have combined and evolved over the times to result into data science. Machine learning cannot exist without data science as data has to prepared to create, train and test the model.[6]Machine learning and deep learning are the two main concepts of data science.
- Machine learning works best with smaller amount of data whereas the deep learning model is best for larger data. Deep learning is inspired from the neurons of human brain. Neurons are the statistical elements which perform convolution operation. Deep learning is best suited for image recognition.
- However, the deep learning model requires more training time than machine learning model. Convolution neural networks, residual neural network; recurrent neural networks and classic neural networks are some of the deep learning models commonly used.

Normalization in Machine Learning: It is a scaling technique applied during data preparation phase. Some of the numeric values of data are changed to bring it to a common scale. It uses minimum and maximum values for scaling.

Standardization in Machine Learning: It is also a scaling technique which uses mean and standard deviation. It is useful when distribution is normal. Data standardization is the process of bringing same format for sharing methodological tools and sharing collaborative research.

7. BLOCKCHAIN TECHNOLOGY

A Block chain technology was launched in 1982 by cryptographer David chaun. Further work on a cryptographically developed in 1991 by stuart Haber and W.Scott stornetta. Which makes easy to collect several document certificates in to one block? The first conceptualization of block chain was introduced by satoshi Nakamoto in 2008. The upcoming years Nakomoto implemented the crypto currency Bit coin, component as the public ledger under one network. Crypto currencies use Bit coin technology to record transactions, Face book's also planned this crypto currency platform. The Back of International settlements criticized block chains are used in public proof-of-work. In 2004 October the MIT Bit coin club provide students to access the bit coin.[10]

Block chain Architecture: A block chain is a list of records called Blocks, and also linked securely using Cryptography. Each Block linked with previous block known as Cryptography Hash. In 2016, April the International Organization for Standardization support Block chain technology for developing standards. The Block time is to generate one extra block in the Network. The time sequence is 14 to 15 seconds t set the Ethereum. The Hard fork is a rule change the validating according to the old rules to producing the new rules as invalid.

Types Of Block chain: Types of Block chains are Public block chain, private block chains, Hybrid Block chains and Side chains. [11]

Public Block chain

- There are no restrictions for accessing Public block chain.
- All Internet users can send transactions.
- This network offer economic incentives to utilize some type of a proof of stack.
- The largest block chains are the Bit coin block chain and the ethereom Blockchan.

Private Block chain

- This Block chain cannot give permission to join the network administrators.
- Distributed Ledger used for Private Block chain.

Hybrid Block chain

- Hybrid Block chain has a combination of centralized and decentralized features .
- The Hybrid Block chain can vary based on the portions of centralized and decentralization.

Side chains

- Side chain ledger runs parallel to a primary block chain.
- Entries from primary block chain can be linked to and from the side chain
- Side chain using consensus algorithm for keeping records.

Block chain Users in Various Sectors

BAAS (Block chain as a service): is the cloud based networks for building block chain applications. Some leading Block chain as a service providers are IBM, Azure, SAP, AWS, Oracle, and Chain stack.

Finance: Finance is the platform for providing trade sectors in different crpyocurrencies. In January 2018, Binance was the biggest Cryprocurrency in the world.

Bitcoin: The Implementation of Block chain is Bit coin. It was presented to the world as “A peer to peer Electronic cash system” by satoshi Nakamoto in 2008.

CA in Block chain (Certification Authority):In Cryptography, a certificate authority is issued digital certificate. CA manages transactions on Block chain connections between different users.[12]

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