Internet of Things, Cyber Physical System and Data Analytics: Open Questions, Future Perspectives and Research Areas

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Abstract. Due to recent/ rapid development in technology, i.e., from wired to wireless, the communication among human and devices/ machines has been move/ shifted to a new level. Some new technologies/ concept has been created in current day-today life. Internet of Things and cyber physical systems are one among them. Generally, Internet of Things is about connecting "Things" (Objects and Machines) to the internet and eventually to each other (also called internet connected things); while Cyber Physical Systems (CPS) is integration of computation, networking and physical process. On another side, Internet Connected Things (ICTs) allow integration of service with connecting Physical objects like Fridge, Air Conditioner (AC), etc. IoT make its data and services available more open. Internet of Things (IoT) refers to the fundamental part of a CPS which is Connection and Communication of entities through internet. IoT technology inter-connects of all types of devices to the internet that enables them to exchange data, optimize processes, and monitor devices. This inter-connection of things is of great benefits for the industry/ organizations, the economy of a nation, and the end user/ consumer. It forms new systems and services by creating a network of sensors, actuators, and devices

At last, the efficient tools (like Apache Hadoop, Apache Spark, Apache MLib, MongoDB, R Programming, Neo4j) we used in big data analytics based on popularity, feature richness and usefulness are being discussed. Hence, this work provides a detail discussion about the terms (discussed above) like Internet of Things, Cyber physical systems, its importance in various applications, importance to humanity/ benefits to society, issues, challenges and research gaps, etc., in detail. Also, conclude this interested topic with several future research directions for future researchers (who are working in these computing environments).

Keywords- Internet of Things, Cyber Physical Systems, Big Data, Data Analytics, Smart Devices**.**

1. Introduction - Internet of Things and Cyber Physical System

Internet of Things is about connecting "Things" (Objects and Machines) to the internet and eventually to each other; while Cyber Physical Systems (CPS) [1] is integration of computation, networking and physical process. CPS is more related to physical objects and machines, while the IoT is a little bit more abstract and allows the integration of service and not only physical objects. CPS is more concentrated on concrete development scenarios and does not target of providing data outside the original scenario. IoT make its data and services available more open. All IoT devices are Cyber Physical Systems, but CPSs are not necessarily connected to the Internet and thus, not necessarily IoT devices. Cyber Physical System (CPS) is a mechatronic system [2] in which entities are connected to each other through wired or wireless solutions with means of information and communication technology. Note that synonym for CPS is Industry 4.0 (i.e., a fourth generation of Industrial Revolution).
Cyber-Physical Systems collects a vast amount of knowledge of the environment by using sensors. These sensors are connected to all the distributed knowledge in the environment. This process can enable a more accurate action and task. In a proper definition, Cyber-Physical Systems consists of computation, communication and control components tightly combined with physical processes of different domains such as mechanical, electrical, and chemical.

1.1 Internet of Things

IoT technology makes them beneficial for the industry, the economy, and the end user. New systems and services can be formed by connecting the sensors and actuators and devices in a network. There are four innovative terms in trend which are Industries 4.0, Smart Factories, Cyber Physical Production Systems (CPPS) [3], and Internet of Things (IoT). If IoT is the basic infrastructure, then on top of that comes CPS, CPPS, and IoS, and the whole is industries 4.0.

- **For example, Cyber Physical System (CPS):** The interplay between computational devices that interaction with dynamical systems (differential equations), issues regarding discretization of these equations, and lack

of proper bit representation of continuous time in cyber world and how to work around this seem to be the common thread. Most commonly referred to application are smart grids.

- **For example, Internet of Things:** One common example used is "smart" refrigerators which can use sensors to find the amount and type of food in the refrigerator, and can automatically order food through the internet. Another example is smart traffic lights, where different lights can communicate over the network and collectively figure out how best to route traffic. As you can see, there is no direct actuation of the physical world (at least in a dynamical-systems setting).

Hence, the remaining part of this article is organized as:

- Section 2 discusses literature work related to internet of things and cyber physical systems.
- Section 3 discusses motivation behind this work, interested/ useful facts/ points behind writing this article.
- Section 4 discusses importance of internet of things and cyber physical systems in past, present and future.
- Section 5 discusses several one popular use cases related to internet of things and cyber physical systems.
- Section 6 discusses introduction of data and data analytics
- Section 7 discusses role or importance of scope of data and data analytics in this smart era.
- Section 8 discusses several essential tools required for analysis.
- Section 9 discusses many critical issues and challenges in internet of things, cyber physical systems and data analytics
- Section 10 discusses an open discussion in detail. This section discusses the role, necessity of data, data analytics, big data analytics, data science, with several point of views.
- Section 11 will conclude this work in brief.

2. Literature Work

Conspicuous hybrid architecture is proposed in [4-5] with components, multilevel organization and the implementation mechanism. However, in architecture models the infrastructure of communication system is not specified. Due to its effect on organizational and architectural models, the communication architecture specification is important. The infrastructure of communication defines how architecture-level interacts, how architectural components communicate, how they access distributed data and how behavior are carried out. In current trends there is a huge growth in the communications infrastructure. The use of communication patterns as a key for component-based robotics was taken into consideration by different groups [6-7]. They agree mostly with the following communication requirements, which can be found in a more detailed description [7]:

- Components must communicate with each other asynchronously via a predefined interface.
- Value should be passed to the communication objects
- Modular or interchangeable components
- Components need to be wired dynamically during operation.
- All communication and synchronization problems must be covered within the communications structure.
- Communications systems must provide the time required for interaction with predictability.

Furthermore, from my point of view, the design of the communications framework must take account of the various time limitations between hybrid architecture reactive and deliberative. The responsive stage performs tasks that have to respond to environmental changes. For instance, a task which prevents obstacles should react to the nearby sensor signals within a time limits determined by the robot speed, with all these tasks requiring hard real-time constraints. Traditionally, hard real-time execution is resolved by previously planning the execution of the processes. Yet new models are needed to solve challenging execution in real time [8] a system with dynamic changes and where processes are not a priori known (or open-label systems as mobile robot moves through unpredictable behavior in an unknown environment). The solution tendencies to describe structures that adjust dynamically by delegation or deterioration of their output and through periods for noncritical tasks to other nodes [9]. All the details correlated with its temporal information must be supported by a communication system. Therefore, tasks can use their time properties to verify useful data. Time information calculations tend to use mechanisms of temporary firewalls [10]. This strategy is focused on adding delays when all communication loads are accumulated. Presently, few architectures that follows these patterns such as GenoM / Kheops [11], CoRoBa [12], ORCA [13]:

- **GenoM:** Tool which helps to construct real-time software architectures. There is a judgment stage and a practical level of execution in the general architecture. Kheops is a practical level reactive control tool. In order to guarantee the execution in real time, Kheops requires an information base composed of proposal rules.
- **CoRoBa:** It is a computer reusability-based multi-mobile robot control system. It uses CORBA as a middleware for interaction, and does not target hard applications in real-time. There is inadequate mature implementation of the CORBA module design.

- **ORCA:** It is an open-source framework designed for mobile robotics for Component-Based Software Engineering (CBSE). A standalone system is an ORCA component. It interacts via a number of well-defined interfaces with other components.

Hence, this section discusses literature work that is concerned to form a combination of information that is mostly object linked in order to achieve placement of intelligent sensor. It provides an initial, easy and efficient solution that uses mobile computer agents that communicate through a communications network using different link buses to ensure time limitations. Now, next section will discuss motivation behind writing this article with respect to IoT, CPS and Data Analytics.

3. Motivation

Due to recent development in technology and shifting of industries towards Internet of Things (IoT) and cloud computing, many revolutions have been seen in the previous decade. Cyber Physical systems make an environment using variety of internet connected things together to perform tasks efficiently. Users performs and complete their tasks through wireless and wired connections (including unique addressing schemes in the smart things), these devices interact with each other and cooperate with other things to create new applications/services and reach to common goals of customers/ users. Today's IoT is being used in many applications like military affairs, including aerospace, military reconnaissance, intelligence grid system, intelligent transportation, intelligent medical, environmental monitoring, industrial control, etc. We can say big data also play its role to provide needful and effective decisions. Internet of things devices are collecting information of users or other devices / machines using its intelligent analysis. To integrate the collected information with the Internet and other networking, the system can provide efficient analyses results/ outcomes which can fulfil demand for intelligent communications and decision support in many sectors. The popular use case in this research article has been discussed in section 5, i.e., the way smart cities will think with integration of IoTs (in near future). Hence, our motivation behind writing this article is that such behavior or decisions (generated with information technology in background) can provide a practical, strong, and perfect application system for public management, public services, and public industry, improve governmental service efficiency, and improve people's quality of life. Hence, Industries 4.0, Smart Factories, Cyber Physical Production Systems (CPPS), and Internet of Things are the necessity of future technology.

Hence, this section discusses motivation behind writing this article related to IoT and CPS emerging areas. Now, next section will discuss importance of IoTs and CPS with explaining their uses in solving some real world's problems.

4. Importance of Internet of Things and Cyber Physical System

Internet of Things is a network of physical objects, which uses sensors/ embedded technology to communicate with other devices. IoT devices sense other devices or interact with other smart devices based on their internal states or the external environment [14]. Generally, Internet Connected Things with other smart devices via cloud, i.e., accessing service anytime and anywhere. The use of platforms is being driven by transformative technologies such as cloud, things, and mobile. On another side, Cyber-Physical Systems (CPS) represents the next generation embedded intelligent Information and Communications Technology (ICT) systems that are interconnected, interdependent, collaborative, autonomous and provide computing and communication, monitoring/ control of physical components/ processes in many applications. CPS as a multidimensional and complex system is a comprehensive calculation, network and physical environment. Cyber Physical System is the combination of computing, communication and control technology, the close integration of the information world and the physical world is realized.

Today we are entering into a revolution, i.e., IoT Based CPS infrastructure. Generally, along with the application of IoT in daily routine of people and progress of society, it also has importance in military affairs, including aerospace, military reconnaissance, intelligence grid system, intelligent transportation, intelligent medical, environmental monitoring, industrial control, etc. The medical services can be provided in either wired or wireless way. These services can be made more authentic and safer by using an application referred to IMS (Intelligent Medical System). Using internet of things, road, bridge, intersection, traffic signal and other key information will be monitored in real time in the area of Intelligent Transportation System (ITS). The large amount of information of many businesses/ applications is analyzed and released for further processing, for example, real time information of roads from road vehicles can be shared through IoT devices (internet connect devices). This information can be used to check the real time status of road management which in turn can observe the key areas in the system. The real time information can be used to control the urban traffic by providing the current information. One of the applications of IoT is its use in industry. By the means of network, the objects can be identified, positioned and monitored. IoT devices can be used in Medicare (Bio-medical) applications, to send alert message about health of a patient, i.e., to respective doctor.

As discussed in section 3, IoT is a fundamental function of CPS revolution or fourth industrial revolution. Some major changes will be there in near future

- Shaped by a design focus;
- Enabled by ubiquitous networks;
- Driven by application ecosystems;
- Enabled by different modalities such as flying drones, wearables and ingestible technologies;
- Reshaping industries through the adoption of autonomous computer systems, robotics, and 3D printing;
- Changing the nature of employment and restructuring the economy.

Now, the importance of Data and Big Data also is discussed in this section in brief.

Why Big Data Analytics (BDA) is important?

How much data is being generated by a person in his entire life? Such large amount of data may be helpful in making some interesting patterns on our life, which may help others to solve large/ complex problems. So, we prefer Big Data Analytics for analyzing this big data.

- Low Cost. Some technologies of Big data provide the advantage of storing large amount of data at low cost. These technologies such as such as Hadoop and cloud-based analytics also try to find more efficient ways of doing business.
- Making faster and better decision. In businesses, for analyzing of information, the analyzing ability of new sources of data can be combined with the speed of Hadoop and in-memory analytics. This would enable the businesses to make decisions based on what they've learned.
- New products and services. With the ability to gauge customer needs and satisfaction through analytics comes the power to give customers what they want. Davenport points out that with big data analytics, more companies are creating new products to meet customers' needs.

For Big Data, several competitive advantages are Create New Revenue Streams**,** Data Safety**,** Perform Risk Analysis**,** Re-Develop Products and Dialogue with Consumers. On another side, most product, marketing, and analytics teams live in constant pursuit of the question, "How are customers using the product, if at all?" Without Behavioral analytics, teams are getting difficulties stuck using insufficiently detailed demographic data and so-called vanity metrics. Some behavioral analytics tools used for consumer's behavior are: Bay Dynamics, Bottomline Technologies, Cynet, Dtex Systems, E8 Security, Exabeam, Fortscale and Gurucul Risk Analytics, etc.

Hence, this section tells us how IoT and CPS are changing life of people, loss of industries. Now next section will discuss how these both technologies can be more useful in near future or can change future transportation lifestyle of human beings.

5. Use Cases - Internet of Things and Cyber Physical System: From User's Perspective

Internet of Things is the new and growing technology, which connects other smart devices to solve real world's problem, i.e., through communicating via internet with exchange data, optimize processes, monitor devices. On another side, Cyber-Physical Systems consists of computation, communication and control components tightly combined with physical processes. Now, a popular example or a use case using of both technology (together, as new revolution) can be discussed as:

5.1 Smart City

A smart city involves many applications in it like smart homes, smart grids, smart transportation, smart drainage system, etc. There is a huge requirement of IoT devices for providing services with lower latency and fault tolerance. IoT devices provide such services conveniently to users/ people using information technology. In today's world, the major concern is developing smart cities. When information technology is used as background, it can develop a practical, strong, and perfect application system for public management, public services, and public industry. This in turn may lead to the improvement in the efficiency of governmental service and can also improve the quality of life that people live. The main criterion of a smart city is to provide ability to process reliable information. It could also provide a combination of resources providing information and management capabilities in order to achieve more coordination among the parts of the system. People, objects, networks, and industry become interconnected and mutually aware through interdisciplinary, cross-sectional, multi-level, and cross-regional cooperation, resulting in a formation of new models and new forms of urban development. These components combining together make smart cities efficient and easy to use (by citizen of a nation). Note that these components are called main functions or wisdom of smart cities.

But, due to rapid development of big data and current popular information technology, the problems include "how to efficiently use systems to generate all the different kinds of new network intelligence" and "how to dynamically

collect urban information", etc., problems are on emerging (every day). Internet of Things and powerful computers (like Turing machines, GPU-enabled system, etc.,) can imitate urban operations along with the operation with reasonable safety regulations. However, achieving sustainable development for a new urban area/ generation currently requires major breakthroughs to solve a series of practical (genuine) problems which cities faces normally.
But these examples face many attacks every-day and highly vulnerable/ critical to new updated software. Note that cyber security consists of technologies, processes and controls designed to protect systems, networks, programs, devices and data from cyber-attacks. When we face some critical attacks on smart/ IoT devices, we need to provide some effective and efficient mechanisms. For example, NPCIL (in India) faces some malware attack in October 2019, also some attacks in 2010 in Iran by Stuxent [15]. Hence, this section discusses a popular use case of Smart City using IoT and CPS. It shows that we can use integration of these technologies/ evolutionary technologies in solving some real-world problems in near future. Now, next section will discuss "How data comes into picture with IoT" and "How it can be helpful for future in terms of data analytics".

6. Introduction – Data and Data Analytic

It (data) has given birth to Data Science, which has further branched into Machine Learning, Artificial Intelligence, Deep Learning, and more. Big data accelerates the process of synthesizing and contextualizing generated information in conjunction with the cloud and enables how new knowledge can be assessed, acted upon and shared based on whether it was generated from a user or a computer.
Automated machines (D2D/ M2M) will connect autonomously to each other and can work perform every day task (without human intervention). This will be a major change in manufacturing industries, leading to uses of CPS. IoT and CPS build upon well-established protocols and use enterprise grade cloud hosting. There are multiple benefits of Big Data analysis in Cloud.

- Improved analysis
- Simplified Infrastructure
- Lowering the cost
- Security and privacy
- Virtualization

A detail about data and required machine learning techniques for this large data or Big Data has been discussed in [16]. In which we determined that (in near future) we require higher connectivity interdisciplinary technologies and analytical intelligence to make smart decisions. This data is too much useful because billions and billions devices are taking part in many applications or solving real world's problems. Now, next section will discuss role and importance of data analytics in many existing and possible applications in this smart era (or near future). Companies will use to analyze customer's data to improve Retention Rate (via churn prediction) in businesses.

7. Role/ Importance/ Scope of Data Analytic in Smart Era

As big data generated by IoTs devices and it increases and keep increases. Then opportunities to handle this vast data also increase. Many different roles are initialized/ created for fulfilling the requirement of customers/ industries/ organizations. Some of them are included here as:

- Big Data Engineer
- Big Data Analyst
- Big Data Analytics Architect
- Big Data Solution Architect
- Analytics Associate
- Metrics and Analytics Specialist
- Big Data Analytics Business Consultant
- Business Intelligence and Analytics Consultant

Also as discussed in section 7, this big data is used to improve customer's retention rate. Churn prediction is one of the most popular Big Data use cases in business. It consists of detecting customers who are likely to cancel a subscription to a service. Similarly, several other tools discussed in [16], used to analyze different types of data (belongs to different applications). For example, for genetic data analytics we use EDGE (Empowering the Development of Genomics Expertise) version 1.5, MDRE, etc. Similarly, for behavior analytics, we use tools like Bay Dynamics, Cynet, Exabeam, Fortscale, Gurucul Risk Analytics, etc. Later, this data use analytic process and presents content to us according to our moods, patterns/ habits (via using browsed patterns).
With technologies like artificial intelligence, Machine Learning, and IoT also relying solely on Big Data, this is really the technology of the future. For reader's convenience, in [16] authors have discussed about machine learning and

big data and every little information related to this. The future of Big data is bright, and will attract more and more businesses. Now, next section will discuss about existing/ available tools for performing analytics on vast amount of data for different applications.

8. Essential Tools required to do Analysis/ Analysis Big Data

As discussed in [16], many tools have been discussed in detail. And we find out that IoT is the main function for future revolution (internet related revolution) with CPS. All these emerging technologies that are already part of our life. Their adoption and use are expected to be more and more pervasive, making them important components of the future Internet. It is a novel paradigm where Big-data, IoT and CPS are merged together to solve some real-time problems and seen as problem solver for many application scenarios. Following tools [16] are used to for analysis purpose (mining data), machine learning Tools:

- KNIME
- RapidMiner
- Orange
- Apache Mahout
- Weka
- Apache Spark
- Others like R, C++, etc.

Some examples of machine learning tools with API's (Application Programming Interfaces) include:

- Pylearn2 for Python
- Deeplearning4j for Java
- LIBSVM for C

Note that data analyst extract valuable insight from large amount of data. As Data/ Big Data are increasing, so the opportunities are also increasing. Generally, three basic dominant types of analytics are Descriptive, Predictive and Prescriptive analytics. Now, next section will discuss several open issues and popular (critical) challenges available in IoT, CPS and analyzing Big Data.

9. Issues and Challenges in Internet of Things, Cyber Physical System and Data Analytics

In the past few years, there has been a trending development in Big Data which has led to the emergence of cloud. Big data using cloud has been the most feasible choice for many companies to access the large amount of data. However, the intersection of both Internet of things and big-data has created new challenges like data storage, integration and analytics. The term "Industries4.0" refers to the fourth industrial revolution. It originates from a project in the high-tech strategy of the German government, which promotes the computerization of manufacturing. That includes the integration of logistics and production. If IoT is the basic infrastructure, then on top of that comes Cyber Physical Systems (CPS), Cyber-Physical Production Systems (CPPS), Internet of Value (IoV), Internet of Vehicles (IoV) and IoS (Internet of Services), and the whole is industries 4.0. IoT issues [17] are like privacy, security, trust, standardization, etc. CPS Issues are like privacy, data ownership, and security, etc. Note that in common IoT and CPS have security and risk management issue.

Attacks on connected systems (cyber/ physical) from nation-state actors and non-state actors are also an increasing threat. Note that safety is an integral element of trust in an IoT based CPS system and a variable that can impact any entity (connected to the Internet/ external network/ world), but it is not a perfect solution. Devices will increasingly communicate and operate autonomously and independent of human oversight. For example, recently a motor vehicle involved in an alleged hit and run accident where the car/ vehicle reported about the accident to the respective authority (i.e., to police). The driver of the vehicle did not intend to report that accident, yet her connected vehicle/ did so autonomously. The regulatory landscape for IoT is evolving and regulators struggle to understand and support the rapid emergence of new services, products, and business models. The regulatory landscape includes licensing and spectrum management, switching and roaming, addressing and numbering, competition, security and privacy. IoT based environment can save many lives, but it also raised several other serious concerns like tracking the footprints of users, leaking of user's information to unauthorized user, etc.

Now, next section will provide an open discussion with considering some real scenarios (real world's examples) and then will listed some research gaps in BDA, IoTs and CPS, also will suggest some future research directions with respect to the same.

10. An Open Discussion: Discussing Research Gaps and Future Research Directions (Opportunities for Future)

There are many implications for unified CPS and IoT/ IoT based CPS infrastructure which include many opportunities for research communities (related to CPS and IoT) to work together, i.e., to develop unified, new, hybrid discrete and continuous methods for CPS and IoT design, operation, and assurance. These researchers will be able to highlight the importance of tight logical-physical linkage in near future, for example, robust sensing and actuation, secure systems, sound digital models, etc.
On another side, machines now interact and interface with other machines as well as human beings in new ways. The combination of artificial intelligence (AI), machine learning, the cloud, and IoT means that systems of machines will be able to interact with human beings, learn about them and adapt to their wants and needs. But, complete dependency on these smart devices may loss more than what we get. For example, in Hollywood movie "Die Hard or Live Free", villain tries to control on each and every systems of a country and use all devices according to his plans. Hence, issues in IoE (in the next 10 years) will be security, privacy and reliability would allow us to have open social and political discussions. Blockchain can be used in internet of things and cyber physical systems to provide secure communication/ infrastructure to business or industries.

10.1 Blockchain Benefits

Blockchain is a new concept, decentralized in nature, used to provide maximum trust to users (without using nay intermediary). Some benefits of Blockchain are: greater transparency, enhanced security, improved traceability, increased efficiency and speed, reduced costs will attract many industries and organizations. Today's many new ways of applying the Blockchain technology are arising nearly every week, but not all of them are realistically implementable. These projects are testing the ground of acceptance, testing how far they can get with this technology, exploring advantages and also disadvantages of this flexible technology.
Now coming to benefits of IoT devices, infection rates of any diseases through getting pre-alert message by smart devices can be reduced to a certain level. Big Data helps and enables some innovative business models (increased contextualization and optimization). Some issues like dark data, leaking of privacy, and generation of data (at a rapid rate), not-having sufficient analytics tools, black box problem of deep learning techniques [18], etc., for IoT devices, we will face in near future. In summary, future of big data is clear and unshakeable. For future research directions, we need following area to cover.

- In near future IoT, Machine Learning, artificial intelligence and many more technologies will come together to change the world [19].
- HR analytics, where HR associates are up skilling to Big Data analytics for optimized decisions on wage differences, appraisals, recruitment, budgeting and retrenchment.
- Genomic analytics will be also a hot topic in near future
- Also, disease example in section 9 can be extended like vehicle can provide information accident to police, doctor and insurance people, etc.
- Internet of value or Denaturalized web is also an aim of scientists/ researchers in future
- Work from anywhere or anywhere working will be a major change in near future.

In summary, designing or providing security in at the beginning and throughout a connected device's lifecycle. Also, future CPS need to be scalable, distributed, decentralized allowing interaction with humans, environment and machines while being connected to Internet or to other networks. Adaptability, reactivity, optimality and security are features to be embedded in such systems, as the CPS are now forming an invisible 'neural network' of the society [20]. So, readers are invited to go through the interesting issue one again and start their research work on the same. Hence, this section discusses an open discussion on importance of Big Data Analytics (BDA) in Internet of Things (IoTs) and Cyber Physical System (CPS) environment or in these emerging technologies. Also, it lists (identifies) several research gaps in the same and suggests several future research directions. In last, this work will be concluded with several interesting facts and information for future readers.

11. Conclusion

Generally speaking, the cloud allows users to perform work and access information with a safe Internet connection at any time and from anywhere (to improve efficiency and resource reuse). Cloud-based services may also include applications for medical image archiving and security services, allowing healthcare providers to exchange clinical data across a secure network. Note that an approx. of 1.3 million people are killed via road accidents (every year worldwide). With respect to this, IoT devices or smart devices technology can collect, analyze and automate appropriate responses and actions to real-time data from sensors and other devices in homes or other properties in a secure manner [21]. This kind of infrastructure called Cyber physical systems, whose operations are monitored, coordinated, controlled and integrated by a computing and communication core. We can see that IoT is a key

function of this revolution (evolution). Together this, big data analytics comes into picture for Internet of Things, to generate effective decisions, to check behavioral economics (via behavioral analytics).
There are multiple benefits of Big Data analysis in Cloud, like improved analysis, Simplified Infrastructure, Lowering the cost, Security and privacy and Virtualization [22]. Hence, this research work discusses several useful terms about internet of things, cyber physical system, its uses in near future, also discusses several open uses, challenges with future research directions. In that, we notice that in IoT and CPS, some issues are: center on risk, security, geopolitics, trust, and privacy. For future work, risk management and preventing breaches or damages in IoT and CPS are some popular issue s to overcome.

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