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"Machine learning a boon for modern society"

Dr. Brahampal Singh,

Professor (CS & IT), TIIPS, Greater Noida,

GGSIP University, Delhi, India,

Dr. Ravindra Kumar

Director, TIIPS, Greater Noida,

GGSIP University, Delhi, India

Abstract:

The internet has now become an integral component of our daily lives. Our lives are completely reliant on technology. There is a significant contrast between today's life and that of ten years ago. Almost all work was manual ten or twenty years ago, but now it is automated. We never imagined that in the future, before travelling from one location to another, we would be able to verify the exact location of traffic on that route. It was tough to conceive ten years ago that we could order food with a single click! We never considered saying "Ok Google" and expecting someone to respond. I'm not sure what I can do for you.

Our lives have been made much easier by technological advancements. Machine learning is getting more popular as a result of technical advancements. It underpins the revolutionary innovations that support our modern lifestyles, from prediction engines to online TV live streaming. The phrase "machine learning" refers to a collection of techniques and tools that enable computers to learn and adapt on their own.

Machine learning is a significant advancement in the ability of computers to learn. Machine learning takes data from cameras and sensors and applies a variety of approaches to extend the life of a network. Machine learning is based on predictive analysis and is used to anticipate both desired and unwelcome events.

Machine learning provides strategies for generating large amounts of data, extracting information from it, and using that data for a specific goal.

People now live in a smart environment thanks to machine learning. Machine Learning (ML) approaches are used to improve the intelligence and capabilities of a software application. Machine learning offers a variety of strategies that can be applied to smart transportation.

A survey of machine learning, applications of machine learning, contribution of machine learning in smart transportation, smart cities, smart homes, data generation capability of machine learning, uses of machine learning to convert human life into smart human life, and new inventions in this field will be the main focus of this paper.

Keywords: Intelligent Transportation System (ITS), Machine Learning (ML)

Internet of things (IoT),GIS (Geographic Information Systems), Internet of vehicle (IOV)

Automated Highway Systems (AHS)

1. Introduction:

Our lives are now completely reliant on technology. Our lives would be incomplete without the internet or technology. If we are to keep up with the times, we must be knowledgeable of current technology. The majority of our tasks have been converted from manual to automated technologies. This is owing to advancements in technology. Human life has progressed as a result of technical improvement. When ancient India and modern India are compared, it is clear that modern India is more technologically advanced. We can now use an online app to purchase food, make reservations, and so on. E-commerce allows us to buy products. We have the option of reserving a railway seat. We can open a bank account online. These days, there are so many services to choose from.

Computers have the ability to learn and adapt on their own. AI can learn without being explicitly programmed to perform the required action thanks to machine learning techniques. The machine learning algorithm anticipates and performs tasks completely based on the learnt pattern, rather than a predefined programme command, by learning a pattern from sample inputs. Machine learning comes to the rescue in a variety of situations when rigorous algorithms aren't feasible. It will learn the new procedure from past patterns and put what it has learned into action.

These days, machine learning is a popular technique. It is steadily increasing. Machine learning is a set of strategies for teaching computers to learn. This technology is in high demand right now for creating massive amounts of data.

We are using machine learning in our daily life such as Google maps, Google assistant, Alexa, etc.

2. Applications of Machine Learning

2.1. Traffic Alerts
2.2. Social Media
2.3. Transportation and Commuting
2.4. Products Recommendations
2.5. Virtual Personal Assistants
2.6. Self-Driving Cars
2.7. Dynamic Pricing
2.8. Google Translate
2.9. Online Video Streaming
2.10. Fraud Detection
2.11. Image Recognition:
2.11.1. Drones
2.11.2. Manufacturing
2.11.3. Self-driving cars
2.11.4. Military surveillance
2.11.5. Forest Activities

2.12. Speech Recognition

2.13. Traffic prediction:

2.14. Product recommendations:

2.15. Self-driving cars:

2.16. Email Spam and Malware Filtering:

2.17. Virtual Personal Assistant:

2.18. Online Fraud Detection:

2.19. Stock Market trading:

2.20. Medical Diagnosis:

2.21. Automatic LanguageTranslation:

2.22. Video Surveillance
2.22.1. Copper theft prevention
2.22.2. Abnormal event detection
2.22.3. Facility protections
2.22.4. Operation monitoring
2.22.5. Parking lots
2.22.6. Traffic monitoring
2.22.7. Shopping patterns
2.23. Sentiment Analysis
2.24. Product Recommendation
2.25. Online support using Chatbots
2.26. Google Translate
2.27. Online Video Streaming Applications
2.28. Image source – mobile syrup
2.29. Virtual Professional Assistants
2.30. Machine Learning Usage in Social Media
2.31. Stock Market Signals Using Machine Learning
2.32. Auto-Driven Cars
2.33. Real-Time Dynamic Pricing
2.34. Google Translate
2.35. Online Video Streaming Applications
2.36. Virtual Professional Assistants
2.37. Machine Learning Usage in Social Media
2.38. Stock Market Signals Using Machine Learning
2.39. Auto-Driven Cars
2.40. Real-Time Dynamic Pricing
2.41. Popular Machine Learning Applications & Examples
2.42. Social Media Features
2.43. Product Recommendations
2.44. Image Recognition

2.45. Sentiment Analysis
2.46. Automating Employee Access Control
2.47. Marine Wildlife Preservation
2.48. Regulating Healthcare Efficiency and Medical Services
2.49. Predict Potential Heart Failure
2.50. Banking Domain
2.51. Language Translation
2.52. Commute Estimation
2.52.1. Google's Map
2.52.2. Riding Apps
2.52.3. Commercial flights to use Autopilot
2.53. Email Intelligence
2.53.1. Spam Filters
2.53.2. Email Classification
2.53.3. Smart Replies
2.54. Banking and Personal Finance
2.54.1. Fraud Prevention
2.54.2. Credit Decisions
2.54.3. Check Deposit on Mobile
2.55. Evaluation and Assessment
2.55.1. In checking Plagiarism
2.55.2. Robo-readers
2.56. Social Networking
2.56.1. Facebook
2.56.2. Pinterest
2.56.3. Snapchat
2.56.4. Instagram
2.57. Medical Diagnosis and Healthcare
2.58. Personal Smart Assistants

2.59. Statistical Arbitrage

2.60. Learning Associations

2.61. Classification

2.62. Prediction

2.63. Extraction

2.64. Regression

2.65. Decision support

2.66. Customer recommendation Engines

2.67. Customer churn modelling

2.68. Dynamic pricing tactics

2.69. Market research and

Customer segmentation

2.70. Fraud detection

2.71. Operational efficiencies

3. Contribution of Machine Learning in Smart transportation

Because of the enormous population in modern society, everyone has mobility issues. Because it connects people, transportation plays a critical role.

Any country's growth is dependent on having the best transportation system. As we all know, the demand for transportation is increasing as the population grows. This is the age of globalisation, thus maintaining the economy's rate of growth is critical. Transportation is crucial in this regard. The number of vehicles on the road is increasing every day, resulting in traffic congestion, delayed traffic, and other issues. A significant number of roads and highways are required to manage big amounts of traffic. However, it is an extremely costly and time-consuming operation. However, as the number of automobiles grows, roadways become scarce.

This is not the ideal method of transportation management. Smart strategies should be used to manage large transportation systems.

Machine learning has the potential to play a significant role in this. Machine learning is a type of AI that is used to generate or collect massive amounts of data. Machine learning learns the most recent pattern of historical data in order to develop the analytical model building and to build the nature of the system. The goal of utilising machine learning in transportation is to reduce traffic congestion, improve safety and eliminate human errors, mitigate negative environmental consequences, optimise performance, and increase surface transportation productivity and efficiency.

Prediction methods in transportation, transportation network traffic flows and signals, public transportation, including air fleet, driving etiquette, electric cars, and car sharing are all discussed here.

Machine learning is a critical component of intelligent transportation. It explores interactions with highways, transportation traffic, environmental components, and traffic crashes using a deep learning model.

The amount of time spent travelling is crucial. It can be accomplished in a number of ways, both directly and indirectly. It can be done directly with a vehicle, toll station data, cell phone tracking, and a variety of other technologies. The assessment of traffic volume, speed, and occupancy in point sensors, as well as the vehicle trajectory, is used to calculate journey time indirectly.

The origins of traffic data collection technologies (such as GPS) are extremely useful for gathering massive amounts of traffic data and providing accurate trip time estimation. Machine Learning (ML) technologies are used to improve an application's intelligence and capabilities as the volume of acquired data grows. Route optimization, parking, street lighting, accident prevention/detection, road abnormalities, and infrastructure applications are all covered by smart transportation. Machine learning techniques are extremely beneficial in the development of a strong Intelligent Transportation System (ITS) using IoT applications.

It is clear from the evaluated articles that there is a possible shortage of machine learning coverage for Smart Lighting Systems and Smart Parking applications.

Additionally, the most prominent ITS applications among researchers are route optimization, parking, and accident/detection.

Road traffic management, traveller information systems, public transportation system management, and autonomous vehicles are just a few of the services and applications provided by ITS. It is envisaged that ITS will play a major role in future smart cities, contributing to improved road and traffic safety, transportation and transit efficiency, better energy efficiency, and reduced pollution. ITS is also a good place to generate vast amounts of data.

In the urban environment, the rise in traffic congestion has become a major worry. Traditional traffic control systems, which are plagued by inefficient human resource management, fail to maintain traffic discipline, resulting in increased traffic density and traffic violations. For large-scale vehicle traffic challenges, however, the intelligent transportation system (ITS) can bring safety, efficiency, and sustainability. To ensure a smooth flow of traffic, ITS combines machine learning with the available traffic control force and performs real-time police scheduling.

3.1. Data generation sources for building transportation smart

3.1.1. GPS and GIS data

Many new sources for creating transportation data, mostly travel-related data, are provided by GPS and GIS (Geographic Information Systems). GPS provides data such as distance, vehicle speed, travel time, and so on. There are two types of data that GPS generates. 1. Data from real-time time tracing: - It records the coordinates of a moving vehicle every second. 2. Recording GPS coordinates.

GIS (Geographic Information Systems) is a system for storing data on maps.

3.1.2. Traffic flow data source

These statistics include features such as traffic flow, lane occupancy, and average vehicle speed. Traffic data sources assist in the collection of data such as traffic flow. It relies heavily on sensors and detectors.

3.1.3. Smart card

The use of a smart card has the advantage of displaying the start, end, and direction of travel. Based on the frequency of various places, the management team forecasts and prepares traffic flow and schedules. It aids in the reduction of time and effort.

3.1.4. Mobile phone

It gives the user's exact position. It gathers information about the user's location at various destinations. In a smart phone, the power or battery backup should be adequate. Chargers and other data collection equipment should be available. It gives a high-resolution image of the path, including the vehicle-in and vehicle-out sections of the journey. Smartphone displays everything in a right manner because to its high visibility power and graphical support.

3.1.5. Call detail record (CDRs)

It's a one-of-a-kind feature that stores all of the device's calls in a database. It's a less expensive option. It is useful for transportation model studies because it correctly captures individual travel itineraries.

3.1.6. Connected vehicles

This technology is convenient for the driver because it allows him to profit from increased mobility. Our vehicle is connected to the internet, and this is referred to as vehicle internet (IOV). Using this car transforms it into a smart vehicle, and it transforms transportation into smart transportation. Vehicles are equipped with internet of things (IoT)-based technologies. The vehicle is a next-generation vehicle with advanced technology.

3.1.6.1. Connectivity in connected vehicles

With complete wireless communication, connected vehicles are smaller. It indicates that all wireless devices in the vehicle are operational. It can connect vehicles to sensors, vehicles to vehicles, vehicles to the internet, and so on. Apart from other options like as Bluetooth, Ultra-Wideband, and so on, technology is the most well-known infrastructure in linked vehicles.

3.1.6.2. Intra-vehicle connectivity

Sensors play a critical role in intra-vehicle connectivity. Sensors are critical for security and dependability. Sensors are utilised to strengthen the control system. Sensors are also beneficial in preventing vehicle collisions. When there is a lot of fog on the road, sensors inform the front and behind vehicles. High-speed sensors also trigger a warning.

Sensors of various types are now employed in modern automobiles for a variety of purposes.

3.1.6.3. Inter- vehicle connectivity

Inter-vehicle communication (V2V) plays a vital role in improving road safety, as we all know. VANET (Vehicular ad hoc network) is an acronym for "vehicular ad hoc network." Due to increased construction and high building heights, VANET has numerous issues such as low connectivity and limited V2V communication range.

3.1.6.4. V2I and V2R connectivity

It connects vehicles to ITS infrastructures such as street signs, traffic lights, and road sensors, and so plays a critical role.

The ability to connect to the internet has become a need in modern vehicles.

3.1.7. Safety in connected vehicles

This is an essential component for improving road safety. A vehicle that is connected to other vehicles, the road, and other infrastructure reduces the chances of an accident occurring. After connecting a car, it is important to be mindful of the speed limit, weather conditions, and road conditions. Sensors play a critical role in this.

3.1.8. Smart traffic management in connected vehicles

This function is critical for managing traffic on the road and avoiding congestion. It is also concerned with enhancing data quality. The clearest example of this is the AHS (Automated Highway System), in which all cars operate in a designated lane for automation and connection. It can ensure that the system is clear of collisions.

3.1.9. Clustering analysis in smart transportation

This technology is being used to create a smart transportation system. It's utilised for things like traffic zone division and trip distribution.

3.1.10. Trip generation

The primary goal of this project is to analyse traffic in order to determine the number of journeys. Trip generation [8] is the first stage in the standard transportation forecast model. The purpose of this stage is to estimate how many trips each traffic analysis zone produces or originates.

Traffic zone division

This is used to make challenging city traffic easier to navigate. It is built on the foundation of big data. It improves the precision and reliability of subsequent analyses based on traffic zone division data. It has a significant impact on traffic planning.

In conclusion, we feel that the articles in this special issue contribute to the advancement of the smart transportation sector and open new possibilities for future research into how machine learning may be used to create more sustainable and safer smart cities.

4. Machine learning for building smart cities:

The demand for smart cities is growing as the population grows and people's lives become more hectic. Machine learning and deep learning are crucial in this process.

The smart city is the necessity of the hour for making human existence easier, simpler, safer, and more uniform. Transportation in a smart city will be smart. Smart technology will also aid in the prevention of crimes and robberies, as well as providing a safe environment for all citizens.

Parking is a major issue in metropolitan areas as the population grows. There are many vehicles on the highways and in the city. In train stations, cinemas, shopping malls, and other public spaces, smart parking can help alleviate the problem. Sensor-based

parking can quickly locate a vacant parking space. It will help you save both time and money. Smart city polling can play a key part in solar energy generation, which can be used for a variety of purposes in the city. The distribution of power in a smart city is simple.

Smart cities can help alleviate traffic congestion on roadways by implementing current technology-based traffic and road infrastructure. Smart cities can also help to combat global warming. It is also effective for network congestion, just as it is for traffic congestion. Machine learning can help provide safe transportation as well as solve a variety of traffic issues.

Machine learning has the potential to help reduce pollution in the environment, which is a major issue in smart cities. It can also make human life easier and better.

Education

Machine learning has the potential to play a significant role in online education. It has the potential to improve student retention in online learning. This characteristic is also critical for smart cities.

Health

Machine learning and deep learning have the potential to be very useful in the field of smart health. Several new technologies in the field of health are currently being developed, including cytology pictures, MRI image segmentation methods, and an automated electroencephalogram (EEG) abnormal detection system based on deep learning.

There are a variety of mobile app solutions accessible these days that have gained appeal in terms of assessing diets and monitoring overall health and wellbeing-related features. These multi-access physical monitoring systems, which are frequently utilised in the form of wearable devices that are coupled with mobile apps, help to identify any anomalies in the body owing to nutrient intake inadequacies in people of all ages, resulting in a smart health environment.

Security and privacy of smart cities:

Machine learning and deep learning combined with IoT can play a significant role in ensuring security and privacy in smart cities, which are critical elements. As we all know, everyone is connected via mobile and other gadgets. Unauthorized access is a major concern in this context. Privacy and secrecy are also crucial. During foggy or gloomy weather, the connection will stay active. This will reduce network traffic, resulting in minimal data loss.

5. Machine learning for building smart homes:

Modern society has a huge need for smart technology, and machine learning can help meet that need. In a smart home, a homeowner can unlock the lock on his front entrance automatically from the top floor. All tasks are completed automatically or intelligently by technology. Assume that a person X is waking up with the assistance of a smart alarm clock. Suddenly, this bell sends a signal to the kitchen coffee maker to start brewing coffee for you.

Mr. X will shower and drink coffee until then. Mr. X was not awakened by the alarm clock until 10 a.m. on Sunday since he had taken a long nap that day. Mr. X left his house one day, but he forgot to turn out the light. With the help of his phone, he can turn off the light. He also failed to turn off his refrigerator and television, but thanks to connectivity, he can turn off any equipment using his phone. These are the sole functions that a smart house can accomplish.

How do Smart Home Systems Powered by Machine Learning Work?

There's a lot of misunderstanding about what a smart home is.

A smart home is a Wi-Fi enabled device in which sensors such as temperature sensors, motion sensors, and humidity sensors play a key role in controlling temperature, motion, and humidity.

Applications of Machine Learning in Home Automation

Although Smart Home solutions are unlikely to master context-based decision making in the near future, machine learning has the potential to make linked houses much smarter.

Recognition of people's faces

This is accomplished by the use of video cameras that are linked together. It recognises facial landmarks such as eyes, chin mole, nose, cheeks, and so on. This information is gathered from images captured by cameras. It can also prevent any suspicious person from entering the house.

Access Control Using Biometrics

This is crucial in the development of a smart house. It allows you to identify a person by looking at his photograph or touching his fingertips. Many businesses, like as Samsung, manufacture smart locks for the house. These locks work by scanning the owner's image, or by using the owner's fingertips or passwords. This will contribute to the security of the home or workplace. Biometric access control ensures that devices are used without error. In today's world, biometric devices are used to track employee attendance. Many gadgets contain security features such as fingerprint, pattern, and password recognition.

Processing of Natural Language

This is another crucial element of a smart house. Voice recognition technology is used in all of the gadgets. This technique is the subject of numerous studies. This owner exclusively uses his voice to open door locks. Voice recognition can be utilised in a variety of security equipment. This technology is being developed by a number of companies. The voice will be saved in this server's database. When a device recognises a voice, it will take the necessary action.

6. Machine learning and big data generation

Machine learning is a great way to collect a big amount of data. It aids in the creation of a large database on the server of a specific database. Because of this database machine, it has learned a great deal and acts accordingly. This is similar to the programme that we input into a robot, which works as expected.

Machine learning can also aid with large data analytics by improving decision-making algorithms. Machine learning algorithms are used to collect, analyse, and integrate data for large businesses.

As we all know, big data is extremely beneficial to advancement in today's environment. Machine learning generates a vast amount of data.

7. Future or scope of machine learning

In today's culture, machine learning has provided a plethora of cutting-edge equipment and technology that are extremely advantageous to human life. These technologies help people save time and effort. It also reduces the amount of manpower necessary. In numerous industries such as health, education, security, and transportation, machines or devices are now performing all of the labour. However, many new discoveries are still possible.
In the deployment of deep learning and machine learning technologies in smart cities, there are a number of interesting future avenues. When the training and testing data have similar feature sets and distribution models, it is recognised that a training model produces correct results.

Transfer learning is a research area in which the distribution of training and testing is changed or moved from one platform to another. Researchers should also concentrate on integrating semantic technologies into smart city applications in order to improve the interaction between smart gadgets and their users. The usage of virtual objects combined with DRL algorithms would aid in the creation of virtual representations of physical items that could be operated automatically. Finally, the use of smart devices is quite important. Smart city technologies and equipment are frequently mobile and wearable, requiring users to touch screens in small places, which might be difficult for less technically knowledgeable users and senior persons.

Speech recognition technology integration A promising study field is allowing smart gadgets to understand natural language. It is critical to recognise that in the process of developing such intelligent devices, we must not stop there.

8. Conclusion

Machine learning is a critical piece of technology for living a normal life. Machine learning is an effective method for collecting massive amounts of data. From this data, a gadget or machine can learn a multitude of things. Machine learning is critical in the creation of smart homes, smart cities, and smart transportation systems. All machine learning applications, such as speech recognition and picture recognition. Fraud detection, health, education, and transportation are all extremely beneficial in making our lives easier. Deep learning, machine learning, and artificial intelligence are only a few of the technologies that have been developed to improve human existence. Human life has been influenced by smart technology both directly and indirectly. This world is now awash in technology thanks to smart technologies. ITS stands for intelligent transportation system, which has made our transportation more modern, secure, and convenient.

9. Analysis

In this article a review on application of Deep Learning on several aspects of smart city like smart urban modeling, intelligent infrastructures, smart transportation, smart governance, sustainability, smart education, smart health solutions, security and privacy is presented. Several challenges of using deep learning on smart city data are also highlighted. In the end future research directions on usage of deep learning on smart city applications are suggested.

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