COMPARATIVE ANALYSIS OF VARIOUS AI TECHNIQUES FOR SMART CITIES WORK PROGRESS VISUALISING

Abstract

This Chapter will include the various AI Techniques introduction and these comparisons for visualising of Smart city work progress. This Chapter cover information about Artificial intelligence techniques its features, characteristics, application and wide utilization of a particular application for Smart city. In this way, I try to formulate the chapter structure. AI reflecting the human intelligence here this chapter include the intelligence for the smart city work visualization the work progress through AI technique chapter include the list of Artificial Technique for Smart city to be provided the best solution for the concern problem. The aspect of this chapter is to include the list of relevant problem in selected domain and its good solution while comparative study. AI Technique to suggest solution for concern problem of smart city domain for the proper structured an analysis is included in this chapter.

Keywords: Smart city, AI, AI Technique, Visualization.

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I. INTRODUCTION

In the Current Era for development of the smart city or its plan AI techniques and its tools are used, Deep learning model, various models of ML for training the data set, testing the data set, feature selection many more. Artificial intelligence (AI) techniques and method s is also used for represent the output in visual effect, this could be easy to understand by view in all aspects.

Proper planning and making the well structured policy for the smart without artificial intelligence it little bit complex and difficult. So this is the way to archive the trust, acceptabile solution for smart city through AI.

Case Study Problem 01- Using AI Smart Solution Proper Flood Monitoring Application:

This is o web based solution for monitoring the flood related things in smart city. The author are introduce the Semantic Web Technology under the consideration of 'Explainable Deep Learning Model". This is one kind of flood monitoring Application for smart city. The AI technical concept they were used misidentification of the Images such as Plastic bottles, leaves etc near by the drainage in crucial areas. As shown in the Fig mention below.

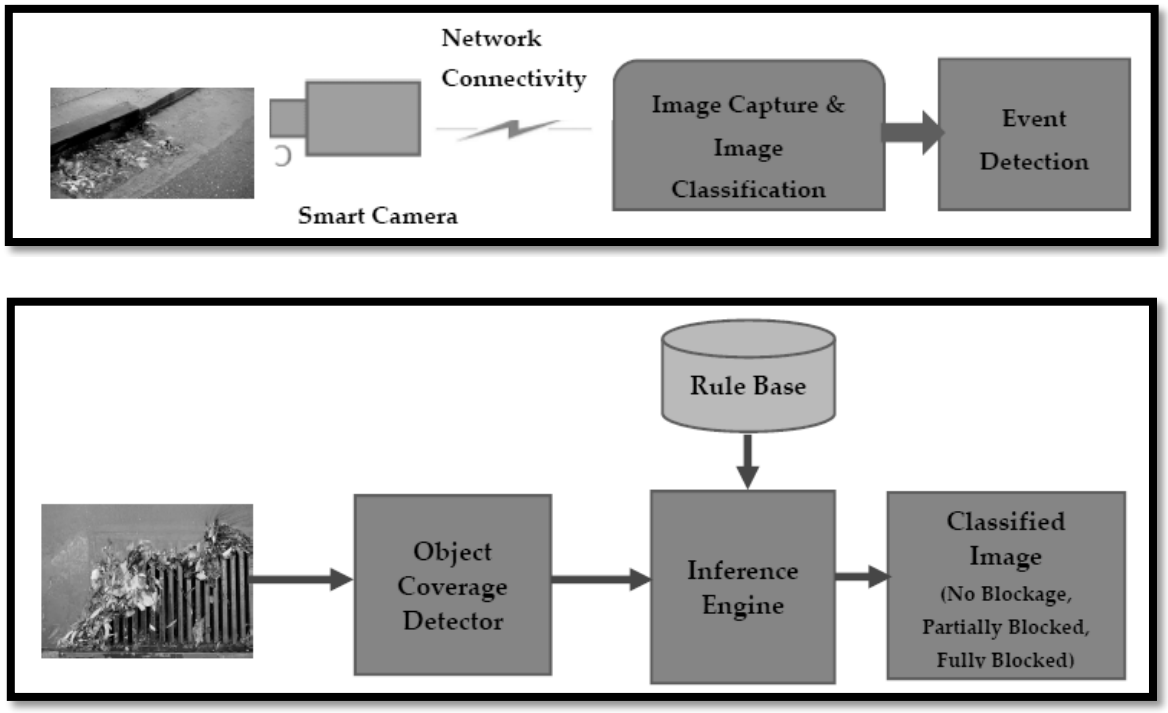

Figure 1: Conceptual flow diagram of Hybrid Image Classifier

Based on this authors implement the web based application using the DL- Based classifier to indentifying the above mention object. Here author capture the selected images through cameras in real time mode. This work highlights the AI concept with DL and Semantic web application solution with hybrid mode classifier. The working concept of are

as Hybrid classifier of DL component identifying the selected images and applying the semantic rule for the classification .This hybrid classifier able to provides the coverage relationships and image categories as well .

Experimental results from real use case evidence showed that this hybrid image classification method has an average betterment (F-measure) of 11% in image classification performance compared to DL-only classification. It has the distinct advantage of incorporating expert wisdom that defines decision-making rules to represent complex situations and uses such knowledge to explain outcomes.

The Concept of Smart City

If we want to define a smart city, smart cities use technology to serve citizens. Various electronic technologies and sensors are used to collect data. Data perception helps improve the capacity of waste collection, energy supply, transportation infrastructure, environment management and environmental services management.

II. FEATURES OF THE SMART CITIES

Smart cities have many advanced features including smart healthcare systems, governance, transportation systems, better security, smart infrastructure, better job opportunities and all other facilities and amenities for a comfortable life.

A smart city can be considered a city with the following characteristics:

- Society needs good healthcare, smart system for education, smart and up to date housing and smart technology based infrastructure.
- Able to give some services in smart manner to nearby community in a uniform and cost-effective manner.
- Good house.
- Growth of society.
- Use appropriate preventive measures.
- More career opportunities.
- For well-designed, ambitious data analysis and broad public participation
- Strengthening the local economy.
- Effective urbanization management and strategies to combat and reduce growth of population as well as maintain the change of climate using the smart technology and smart efforts.
- Use smart technologies to meet community needs
- The transport system is well maintained.

III. STEPS TO MAKE A NORMAL CITY INTO A SMART CITY

Here are the steps to build a smart and smart city

Step 1: Arrange information and data relevant the city and its some effective week areas for improvement.

Step 2: Set prices for what you want, including time available and budget.

Step 3: Start with 1-2 small projects and complete them on time. Municipalities and technology may change during project completion.

Step 4: Increase all roads in the city.

Step-5: Review the observation and start working on other projects to make a normal city a smart one

IV. LITERATURE SURVEY

The concept of smart city will include the smart technology such as AI, ML IoT, best smart infrastructure, top class sensor technology for the alert system in the integrated fashion. it is also include the smart hospital, smart education system, smart vehicle management, smart vehicle parking, real time monitoring system etc . The most important is use of exiting devices like IoT device is widely used for [23] collection for the data and these data is transformed for next processing task. Data processing through IoT is much easy less time consuming while compare with human expert.

The Smart Cities apps and its applications include the real time and also use the Internet of things ,smart AI technology for the decision making towards design ,plan should be much more systematically and easy to implement for development smart city. As of now most of the existing smart city concept include the AI Technology , AI methods , IOT , Sensors to maintain and monitors the smart city [23]. Human expert decision making was the main element in all analyzes and measures [24].

Human experts often make decisions based on the data that goes into any application. This is much more complex task to take. Decision for the smart cities because of the complex data, information and involvement of n number of stakeholders [25]. Various kinds of sensor and IoT-based application data are stored and processed in urban digital infrastructure to support decision making [26]. With the change in tools and techniques on digital platforms, disparate data from programs and other data sources are combined in real-time for analysis and decision making specific issues of the city [27].

Decisions to achieve certain goals require good information and value, which often leads to conflict. Therefore, all smart city applications should work better and update their work. Any modification should be based on the data used for the application and therefore the decision [28]. One of the key issues in making decisions in a smart city is how to process the information needed and how to use people's knowledge. Semantic web technology combined with data analysis has been used for expert-based recommendation systems [29, 30]. Semantic systems provide the flexibility to use human knowledge and control model prediction. In another software-based system, the use of semantic representation improves the level of performance according to semantic rules defined by the use of high-level data. These all the data and information collected from the various expert side and many relevant fields. [18] in this article authors include the several types of data with high transparency that will required for the smart city development .Now here flood monitoring and its management is

included with its high quality smart solution based on the AI technology. Here satellite images and rainfall data is used for to observe the flood scenario.

In the given example, semantics is only applicable for the descriptive methods through high level information and knowledge foe the recommendation system. most of the research for flood management system is based on the public domain only and based on images only .This paper include the contextual data based classification related task . Most of the analysis related work is based on the images analysis and its classification as well as decision making sense.

In this kind of analysis images and object are identified one by one and extract the most relevant information. This extracted information has been used for further classification and crate the classes of images like a cluster. Noise data will be removing from the analysis process and images can be classified into the multiple classes this is based on the types of object present and its context images. Multi class label concept is used for the classified images.

One of the classifier is used for the analysed the object and images. Now after the classifying the image and generated outputs will combine based on the probabilities and again classifying the images this is done in many time to improve the accuracy of result. Analysis of images and collected objects with semantic representation is sometimes used for the scene recognition for this segmentation approaches is used. Excluding these mention methods ontology based methods is also used for fetching the particular image form the data population or sample data set [31]. To identifying the image through ontology based methods for this computer vision and sometimes manual annotation are preferred.

V. LIST OF AI TECHNIQUE

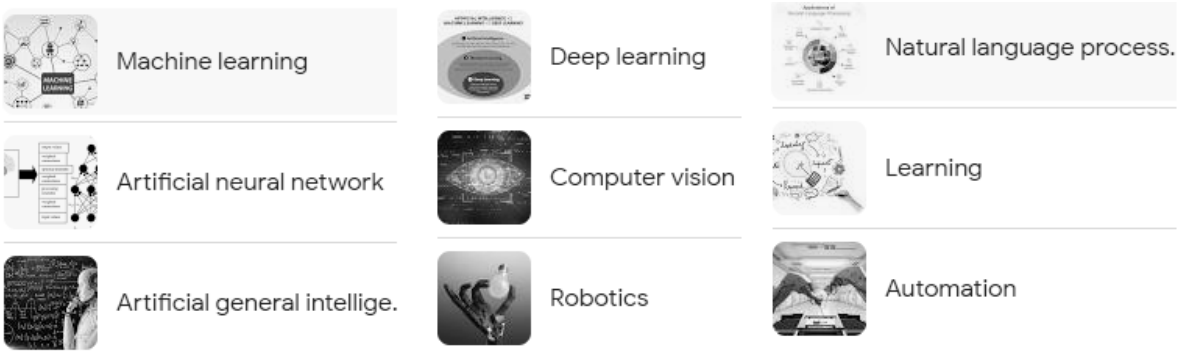

Figure 2: List of AI Technique

VI. LIST OF BENEFITS TO DEVELOPMENT OF SMART CITY

Widely use of smart technology such as AI for the development of smart city is much more beneficial for the humans and our environment. This kind of technology ready to provide the non-polluted environment, nature friendly environment and many benefits. AI technology show the multiple benefits to development of smart city some of the discussed below.

1. **Healthy Environmental:** The development of smart city also help to maintain the healthy environment .In this regard we can include many things such as vehicle pollution maintenance through AI tool and object detection , Plastic bags , E-waste management , smart dustbin etc .it is also benefited to development of energy efficient product that will able to generate the energy . Traffic management, which helps to curb pollution and makes the environment less polluted.

2. **Water Management and Reduced Energy Option in Smart City:** Water management and use of minimal energy is also the good benefits to development of smart city. These two factors are very important to provide the help to reduce the pollution. Using the Ai approach we can make the drinking water clean and healthy with less loss of water .Pre paid water meter, any time water, ATW to be develop under the smart city concept. This concept will reduce the waste of water and we save water with minimal use and smart use.

3. **Efficient Transportation system:** In the smart cities, good, clean and efficient transportation system is required for the goods delivery, services are need for all persons. These kind of Transportation system will include the smart booking counter, booking counter form home, easy pick and drop, product safety, real time tracking system of booked product etc .

4. **Public Security and Safety:** The smart city will also benefited for the every person and able to provide the security to them. This is most important factor for the all smart city. AI cameras are able to provide the high security to public in public place. The facial recognition technique is widely used in the AI cameras. This is also used for authentication and validation like a password.

5. **Smart Education:** AI based smart education system as well implementation of NEP with its impact over the education system. To reduce the industries Gap AI technology is most important to implement for the smart cities.

6. **Visualization Data Representation:** This section include the some data representation that will easy the understand the result , here mention figure is show the Discrete Data representation that is include the numerical related values Visualization of various Data Types in Data Analytics.

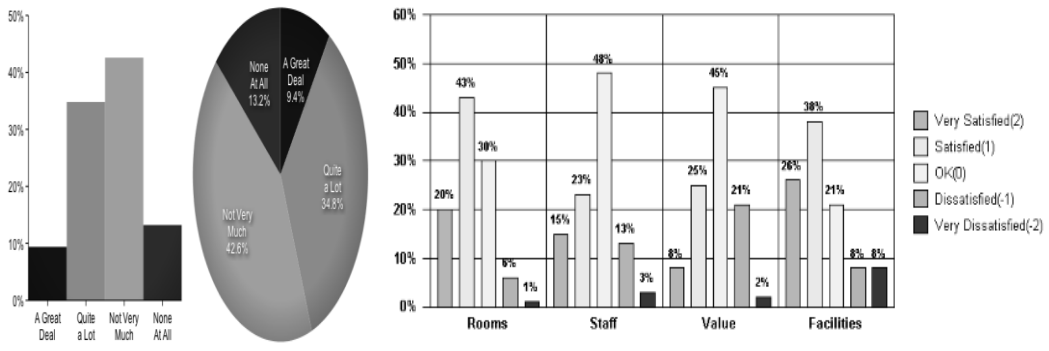

Figure 3: Ordinal Data Representation[33]

The use of AI for displaying the work progress in the form of graph, chart etc

7. **Smart Medical Facilities:** This is also the one of the very important benefits of smart city with smart health product. Now a day's many people are using the smart health belt to maintain the health records. It is in the secure manner the data of patient is store in the provided storage. When the patient needs this data then they will able to access these data from the storge. This is also providing the smart suggestion for early stage alert of decieses

8. **Location Recommendation:** AI technology based smart city concept also provides help to search the location. Such as nearby hospital, hotel, education hubs, marts etc.

9. **Better Governance and Planning Management:** While developing the cities or urban townships, AI or **machine learning** techniques can be used to map land use across time to generate crucial insights using the satellite imagery and aerial view 2D or 3D images of geographical areas.

10. **Parking of vehicle with smart traffic management:** Now a day's most of the person have car, bike, and huge number of public transports vehicle, auto etc. These all are in very high amount it is difficult to maintain the traffic and its proper parking is also very important for this AI will help .By using the smart AI smart CCTV cameras with including the per decided parking space in the selected area will help and suggest to all vehicle owner to used the present information .AI based traffic sensor system it will collect the real time data of vehicles while vehicle in the rod and these collected information send to the server centre in real time mode so it will also help .

VII. AI SMART CITY CHALLENGE

AI involvement is very difficult task for Achieving then smart cities , as we all know for making the smart cities here as many challenging task , such as limited technology, limited manpower , lack of funds , some of the issue mention below section:

1. **Costing and Infrastructure related issue:** Security point of view smart cities is required the security system that is including the AI technology based cameras including the some other security system, these all the tools are highly Costley. The maintains of these Tools is also bit of difficult. These all the tools may be damage and not working properly due to bad air quality, high pollution in the air, theft etc . Many Smart city concepts include the sensor based technology for analysing the collected information thorough CCTV camera, Traffic Signals, these all smart equipment's are used for to provide the help for quality traffic management, make a hour cluster during high rush in traffic etc. To maintain the equipment coset as well as mention the quality of this AI equipment is difficult.

2. **Issue related to Security and Privacy Concerns:** This is the another challenging issue to development of high security for the human begins those who are living in the Smart cities . This is difficult to arrange the good security for people. To maintain the security of people during the time slots such as night. To for monitoring the regular activity of a person is also time consuming and space consuming. This is comes under challenge of IoT and sensor technology. Now another issue with the smart cities is cyber -attack, leakages of data, hard ware security specially mobile data leakage etc.

3. **Socialization Risk Related Issue:** While development of smart cities for the urbanization location gives the high vulnerability of poor and persons living in slum areas. It means the development of these kind of cities what are the factor puts their influence these are also the very big challenge for smart cities such as data collection from age group, population gender, class, income group, etc.

4. **To Maintain the High Quality Data:** To maintain the data quality is also difficult task while collecting the data through the AI tools for maintain the sustainability of smart city. Data quality is indicate the resultant value for the smart cities related work. Data Quality is faced versatile issue and it is very challenging task to improve data quality. To improving the data quality is very time consuming and costly task generally done by Data pre-processing.

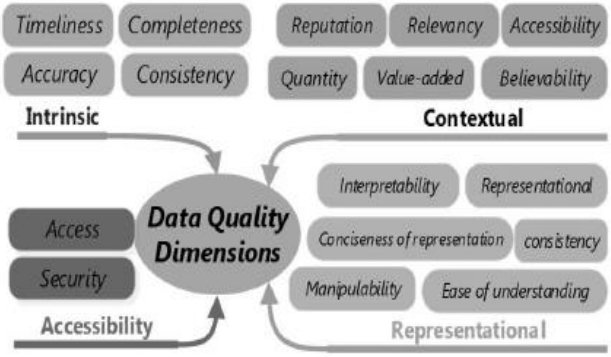

Figure 4 : Data Quality Various Dimensions[31]

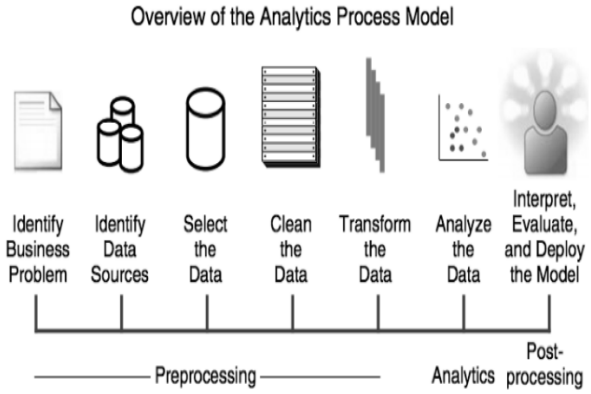

Figure 5: Analytics Process Model[32]

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