

# EDUNET FOUNDATION – Case Study Notebook

## Case Study 1: Artificial Intelligence and Smart City

A Smart city is an area that uses different types of sensors to collect data and then use this data to manage assets and resources efficiently. This includes data collected from citizens, devices, and assets that are processed and analyzed to monitor and manage traffic and transportation systems, power plants, water supply networks, waste management, crime detection, information systems, schools, libraries, hospitals, and other community services.

Cities are realizing interesting new ways to run more efficiently and effectively, thanks to the relative ease with which local governments can now gather real-time data, combined with the capabilities of Artificial Intelligence.

As our population grows and becomes more urbanized, improving cities has become the need of the hour. By 2008, half the world's population was living in urban areas, whereas this number was just 14%<sup>[1]</sup> in 1900. Also, there were just 83 cities in the world more than one million residents in 1950, while as of 2016, there were 512<sup>[2]</sup> such cities.

This case study will focus on how AI is being used in the cities right now by government and companies to:

- Learn how people use the city.
- Improve infrastructure and optimize the use of resources.
- Improve public safety in cities.

A city can become a 'smart-city' only when it is collecting more and better data. If an organization does not have the right kind of data, the predictions about how new policies will work can go wrong and even prove dangerous. Helping a city to gather and process data is one place AI is currently being used.

Using AI to improve and optimize infrastructure for a city

- A city generates abundant data each day from various sources such as ticket sale of public transports, tax information, police reports, sensors on roads, and local weather stations.
- One huge source of data that Artificial Intelligence is making more manageable is video and photos. NVIDIA predicts<sup>[3]</sup> that by 2020, there will be 1 billion cameras deployed in cities.

- It is impossible for humans to view and analyze this much data. This is where AI comes in
- **It can read license plates and recognize faces**
- **It can track the speed and movements of millions of vehicles to establish patterns**
- **It can process the huge volume of satellite data to count cars in a parking lot or track road use<sup>[4]</sup>.**
- Companies like NVIDIA, AT&T, Cisco, Deloitte, Ericsson, GE, IBM, Intel, and Qualcomm to provide solutions to process and analyze this torrent of videos and images.
- For example - **a solution, CityIQ sensor, developed by GE can be used to identify parking spots for drivers, help first responders, and identify dangerous intersections.**
- A large amount of existing public infrastructure is overused, underutilized, or used inefficiently due to the lack of real-time information among the authorities.
- For example - **drivers do not know where parking is available, passengers not knowing how long a bus will take have lower ridership than buses they can track<sup>[5]</sup>, residents do not know what is the right length of time to stop at a red light at any given time.**
- All the above-mentioned problem may seem like minor inconveniences but multiply that with a million residents in hundreds of cities, and it adds up to a considerable waste of resources.
- A solution developed by Google uses its network of drivers to provide real-time data of traffic and accidents to help individuals choose the most optimal route for their journey.
- Authorities and companies are also implementing vehicle detection and reporting in parking spaces. The number of available parking spaces is displayed outside the parking on a LED display and is shared with people on an open platform. It informs the commuters about the availability in particular parking spaces and in the long term, the data generated from this system will help the concerned organizations to make better planning and pricing decisions.
- Adaptive Signal Control Technology allows traffic lights to check the traffic flow in real-time and adjust the red and green light accordingly, without any human intervention. As adaptive signals with cameras capture the traffic

density and transmit the data to sensors, the signals will turn and remain green till the vehicles are cleared at the cross-roads or traffic junctions.

- According to the Department of Transportation (DOT)<sup>[6]</sup>, the United States, “On average [Adaptive Signal Control Technology] improves travel time by more than 10 percent. In areas with particularly outdated signal timing, improvements can be 50 percent or more”.
- Connected public transport technology lets the buses and trains to talk to each other and the general public. This, in turn, informs the commuters when a particular bus or train is arriving and whether it is running late or not, making the whole system more useful.
- The use of AI provides accurate estimates for generating energy maps which can be used for energy modelling and planning purposes.
- A mix of renewable energy sources can effectively act as a replacement for fossil fuels to meet up with the growing energy demand in a sustainable and efficient fashion.
- AI tools have successfully contributed to the identification of energy farms for optimal outputs<sup>[7]</sup>.
- AI is also used to learn the behaviour of electricity consumers and this information can be used to optimise the utilisation of power consumers and generators. This can lead to a reduction in peak loads in the power grid, balance the loads and stabilise the distribution grid, in addition to saving costs for unnecessary expansion of electricity grids.

#### AI to improve public safety in a city

- A smart city does not just reduce time to travel and save energy. The same infrastructure of sensors and cameras are being used to save lives and to prevent and fight crime.
- The same License Plate Recognition (LPR) technique used to monitor parking is also being used by the law enforcement agencies to track stolen vehicles and track criminals.
- The cameras utilized by adaptive traffic signals used to improve the traffic flow are also being used by ambulances and fire trucks to reach the scene of an emergency more quickly and safely.
- Behaviour prediction techniques and solutions are also being deployed in areas of interest to predict and detect any suspicious behaviour, leading to crime prevention.

- Indian Railway Ministry deployed IBM Intelligent Video Analytics<sup>[8]</sup> to monitor the crowd at railway stations and its adjoining areas during the Ardh Kumbh Mela, where 800 special trains were arranged for the pilgrims.
- During the same event, over 1,000 CCTV cameras were used to monitor various movements across the Mela area spread across 3,200 hectares, to track the crowd movement, assess crowd size and look out for any suspicious activities.
- In a first of its type initiative in the country, Google deployed<sup>[9]</sup> its Artificial Intelligence systems, to predict floods with better accuracy, in Patna which can give people more time to prepare for it and migrate to a safer location. The pilot project achieved an accuracy of over 90 percent in predicting floods and the affected regions.

## Concluding Artificial Intelligence and Smart City

The ultimate vision for a smart city is absolute interconnectivity:

- self-driving vehicles talking to each other and also with smart infrastructures such as highways, traffic lights, and parking garages.
- a highly connected system will save lives, save time, and save energy.
- having access to a wealth of data containing minute by minute breakdown of every block will assist engineers and city planners and promote safety, health, and economic growth.
- the potential for growth of such systems and the companies that make them are tremendous and it is not at all surprising that a large number of giant enterprises are putting an increased emphasis on smart city technologies.
- The expenditure on smart cities could also have an impact on a wide range of businesses since reduced traffic means cheaper shipping and workers being able to spend more time at the site and less time commuting between them.
- Safer roads and vehicles could drastically bring down the insurance costs, changing the perception of expenditure in residents.

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