DSAR Assignment-1: Solution

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No.	Question & Answer

01 What are the applications of AI in Transportation? Briefly explain any of the two?

Ans: Artificial intelligence is changing the transport sector. From helping cars, trains, ships and aeroplanes to function autonomously, to making traffic flows smoother, it is already applied in numerous transport fields. Beyond making our lives easier, it can help to make all transport modes safer, cleaner, smarter and more efficient. Artificial intelligence-led autonomous transport could for instance help to reduce the human errors that are involved in many traffic accidents. Currently, there are several ways in which AI is being used within transportation. As the artificial intelligence in the transportation industry evolves and becomes more and more mature, it is almost certain that the number of roles that AI can occupy and manage will increase exponentially.

(i) Autonomous Vehicles:

Autonomous vehicles are some of the most exciting new innovations to become a reality within transportation and could very well be the first step into a new future of autonomous transport. Artificial intelligence is vital within these driverless vehicles due to their processing, control and optimization capabilities. Within autonomous vehicles, real-time data transmission and processing is a vital function and any disruptions to these processes could prove catastrophic in a real-life scenario. An AI's ability to manage the transmission and processing of received data as well as optimize connectivity to ensure the best connection is always used will help make autonomous vehicles safer and much more widespread.

(ii) Traffic Management Solutions:

Another way in which artificial intelligence technologies are used within transportation is in the traffic management systems. Again, due to its processing, control and optimization capabilities, artificial intelligence could be applied to traffic management and decision-making systems in order to enhance and streamline traffic management and make our roads smarter. The predictive abilities of AI are also of huge benefit to traffic management systems as they are able to recognize the physical and environmental conditions that can lead to or be the result of heavier traffic flow and congestion. As an example, in India, Siemens Mobility is testing a prototype monitoring system which is using AI throughout traffic lights, to put a final victory to the dreaded traffic jams.

02 What is an example of how AI is changing transportation?

Ans: Four ways AI is transforming the transportation industry

From autonomous vehicles to traffic management, AI is changing the way people use transport, here we look at the role of AI in the transportation industry. The transportation industry has continuously evolved over the years. Since the introduction of the steamboat back in 1787, the industry has come on leaps and bounds with the invention of bicycles, motor cars, trains and aircraft. Now, as transportation becomes 'smart', artificial intelligence (AI) is at the root of many new advancements in the field and as a result, transport is becoming faster, more efficient, more reliable, and safer.

Here, There are five ways AI is reshaping the transportation industry.

AI and autonomous vehicles

Autonomous vehicles, or self-driving cars, are being developed and tested by a number of manufacturers across the globe including Waymo, Tesla and BMW. Using a combination of sensors, cameras and AI, the technology will be able to take people between destinations without the need for a driver.

Research has shown that the production of self-driving cars is expected to reach 800,000 units worldwide between the years 2023-2030. Despite concerns around the technology and its ability to safeguard passengers from harm, KPMG has predicted the adoption of self-driving vehicle technology could reduce the frequency of accidents by approximately 90%.

AI traffic management

Congestion is a significant transportation problem that many face on a daily basis. Set to solve this issue, AI can be used to prevent traffic jams as smart systems can now process complex data and recommend the best route for travellers.

Sensors and cameras, when embedded on roads, collect a large number of traffic details. This data can then be sent to the cloud, where analysis of traffic patterns will be done with big data analytics and an AI-powered system. With this analysis, commuters can be provided with valuable insights and information on traffic predictions, accidents, or road blockages.

On top of this, AI systems can then use this information to provide drivers with the quickest routes to their destinations.

Delay predictions with AI and computer vision

In the aviation industry, flight delays pose a real, and costly, problem. The estimated costs due to flight delays are US$39bn dollars in the US, according to a study conducted by researchers at the University of California, Berkeley. With passengers footing a large chunk of the bill, airline providers can utilise AI to reduce the chance of this happening, improving the customer experience.

By leveraging data lake technology and computer vision, the industry can offer an improved service to passengers in cutting down passenger's wait times and enhancing

their journey experience. The technology can continuously monitor weather conditions and other factors with the aim to reduce unplanned downtime.

AI can also be used to detect hidden patterns to provide the air transport industry with insights on other possibilities that can cause flight delays and cancellations.

Fleet integration and AI

A number of industries requires organisations to operate large fleets of vehicles, which in turn, require fleet managers to monitor and orchestrate a large number of moving parts.

Dispatchers need to be able to track and communicate with drivers to ensure efficiency and reduce problems with the fleets.

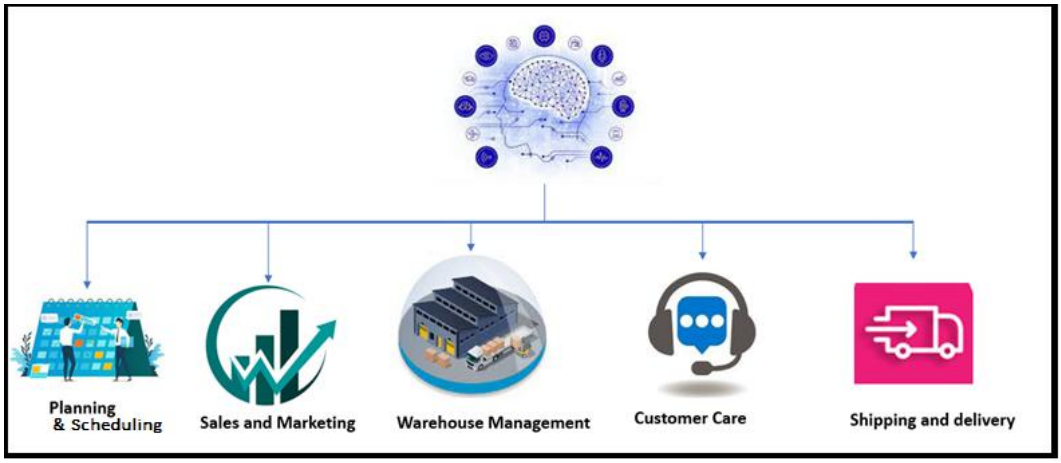
This process can take a significant amount of time and effort. To make this simpler, fleet managers can turn to AI. AI systems can help manage fleets by providing real-time updates to all members of a fleet team, streamlining the process. The technology to simplifies data management and helps fleet managers identify problem areas before they become an issue and help create real-time coaching and training programmes.

03 How is AI helping transportation and logistics corporations?

Ans: "Logistics is the management of the flow of different products between different locations."
In the logistics sector, AI is actively contributing to safer driving environments for the drivers and optimization of vehicle maintenance and performance, to enhance the overall transportation businesses/Logistics Industry. Besides, AI doing greater millstone and actively involved in the development of the introduction of self-driving or driverless cars.

The research says that 60-65% of the industry leaders believe that logistics, transportation, and supply chain would require profound transformation. The report by Accenture reveals that 36% of large, mid-, and small-size organizations have successfully adopted AI capabilities for their logistics and supply chain processes.

The survey and research say that AI is absolutely claimed to increase productivity by more than 40-45% by the year 2035. And revenue growth in the logistics domain would increase and renovate the industry in different aspects and reaching their customer deeply and increase the market competition in this domain with AI.



Planning & Scheduling

Planning is required for any industry to supply the demand based on the market and potential for the same. It should synchronize the overall supply chain as a continuous process and effective supply chain platform.

AI/ML determines patterns in supply chain data, with appropriate model selection based on the nature of the day by exploring the history and It, also enhances the experiences of the customer and improves the logistics processes.

The imbalance between demand and resource availability and inadequate area mapping/ vehicle breakdown are the major challenges here. AI/ML has the capabilities to enable logistics industries to use real-time data in their demand and forecasting formulation. Following models we can do in our supply chain domain "***, Moving Average, ARIMA and other time-series models."***

Predictive Analytics – Planning & Scheduling (Supply Chain Planning)

Predictive analytics is the process of estimating customer demand by extracting and organizing historical data by applying the analytical test on them. With various demand forecasting methodology, the organization can improve their decision-making processes in the following area ***Capacity planning, Resource planning, Risk assessment, sales, and marketing operations Strategy, etc.***

Sales and Marketing

In the Logistics industry sales and marketing activities is one of major pillar and leader should concentrate on this and take care of all aspects to improvising the sales and marketing, Even S&M also enhanced by artificial intelligence, here few of them are "***Sales and Marketing Analytics, E-mail Marketing, Predictive Sales Analytics, Sales content customization, and analytics, Decision guidance for a Sales representative, Sales representative chatbot, In-store sales robots and many more.***"

04 How AI-Powered robots help in detecting oil sleep?

Ans: Mobile Robots

Offshore oil and gas, especially in deep or ultra-deep waters, offer enormous scope for AI-enabled robots, not only to save humans from working in such harsh conditions but also to find hydrocarbons more efficiently and effectively.

Collaboration between ExxonMobil and MIT is producing an AI-enabled submersible subsea robot.[i] Programmed by dedicated software, the robot operates autonomously to monitor oceans, map deep regions, and analyze changes over time. Slow-moving, it navigates above the ocean floor to detect and analyze natural seeping oil and gas from rock fissures. ExxonMobil expects to increase its discovery rate by applying

technologies, first used by NASA, from its Mars exploration.

The offshore energy infrastructure of pipes, platforms, and rigs needs regular inspections and maintenance. To save human workers, Shell, in collaboration with Subsea 7,[ii] have created an Autonomous Inspection Vehicle, which, it is claimed, is safer and produces better inspections than humans, as well as delivering significant cost savings. This AI marine robot can navigate without human aid, has a 24-hour dive time, can reach depths of 3,000 meters and travel 40km. In time, machine learning could train this robot to conduct routine maintenance tasks such as turning a valve underwater.

Onshore, Total's ARGOS challenge [iii] (Autonomous Robot for Gas & Oil Sites) of 2017 was won by a 1.04m high weighing 90 kg robot named Argonauts. It moves on tracks and has an articulated arm with a span of 1.3 m. It is expected to start operating on industrial sites by 2020.

Also onshore, the UK's National Centre for Nuclear Robotics (NCNR)[iv] is developing machine vision, artificial intelligence, and advanced robots to decommission the country's 4.9m tonnes of nuclear waste. Robots equipped with similar technologies are being used to inspect power plants, refiners, and power networks.

05 List out the five basic applications of AI in the OIL industry?

Ans: Artificial intelligence has opened up a whole new spectrum of possibilities in the oil and gas value chain, enabling proactive and predictive asset management, boosting data-driven decision-making, building a connected employee base, and ensuring the health and safety of the workforce.

1. Smart asset management using Digital Twins

The asset-intensive nature of the oil and gas (O&G) industry demands continuous asset monitoring, management, and maintenance. According to research, 63% of oil field assets are past the halfway point of their expected lifetimes. As a result, equipment reliability is a significant issue warranting data-based asset management and maintenance.

In this regard, the concept of digital twins has brought about a revolutionary change in asset management and maintenance in the oil and gas industry

As the digital asset is updated with all current operational data, including schematics, operating information, maintenance history, and troubleshooting processes, a centralized repository of asset data is created. This data repository is analyzed by AI algorithms in real time. Machine learning algorithms identify variations from usual patterns to enable the following:

- To pinpoint early signs and stages of asset failure and enable proactive equipment maintenance by gathering real-time information from sensors. This prevents unplanned downtime, extends asset life, and reduces the cost of operating and managing O&G assets.
- Eliminate the high costs of asset maintenance by reducing the need to hire costly

maintenance personnel and travel back and forth between the field

2. Driving workplace safety

Powerful technologies like AI, machine learning, IoT, and Big Data monitor on-field operations to identify fatal signs, such as hazardous gas levels and unauthorized personnel access.

AI-enabled chatbots then issue real-time alerts on mobiles and smart wearable devices, such as health or lockout emergency notifications, permitting them to work on-field, thus creating a more connected on-field workforce.

Additionally, smart watches, safety helmets, biometric vests, and bluetooth tags monitor workforce activities, track field operator location, identify signs of workforce fatigue, and enable access to critical information on the field.

IoT and AI can detect and troubleshoot on-site hazards in real-time or send notifications to dispatch experts as and when required.

3. Optimizing production and scheduling

Budget and schedule overruns are common problems that plague offshore oil projects. Factors such as weather delays, resource constraints, and scheduling risks play a key role here.

What makes the process more complex is the large number of siloed activities, such as drilling and platform installation, comprising the buildup period of oilfield development. In this context, it is vital to find robust project planning and scheduling models that take into consideration the interdependence of these interacting components and the risks involved therein.

Cloud-based platforms capitalize on powerful analytics and AI algorithms to study incoming data for anomalies, signaling signs of trouble in monitored equipment.

4. Analytics-based decision-making

Oil and gas firms generate reams of siloed data, including reservoir characterization, seismic and microseismic data, drilling time, performance and recovery, shipping and transportation data, and much more, produced by multiple business lines and processes across different geographies. However, these companies often lack the ability to use this data to arrive at meaningful insights and conclusions.

Employing data scientists to analyze this data is time and cost agnostic. AI-based applications help create a unified data platform with knowledge-mining capabilities to make information searchable and derive intelligent and meaningful insights and predictions from it.

By integrating, analyzing, and visualizing such diverse data (using ML, big data analytics, and mobile devices), oil and gas enterprises can achieve the following:

- Pinpoint better areas for drilling to optimize production
- Analyze the economic viability of drilling to optimize production costs and improve efficiencies
- Enable predictive asset maintenance
- Optimize inventory management, scheduling, and procurement
- AI chatbots can send status reports on demand, answer employee questions, and send the required information on-field

5. Smart inventory, procurement, and supply chain management

AI, machine learning, smart track-and-trace technologies, and cloud networks help the oil and gas industry augment enterprise resource planning (ERP) and optimize inventory, logistics, and warehouse management. They also enable smart procurement, shipment transparency, replenishment, and digital category management.

IoT-linked sensors and intelligent devices transmit fleet data such as vehicle performance, fuel consumption, and inventory to schedule maintenance and avoid equipment failure.

Low-code AI-based ERP solutions can digitize and automate the material master request (MMR) authorization process, reducing manual intervention, expediting document approval, eliminating paper-based material request approvals, and providing 100% accuracy and traceability in the MMR process.