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Machine Learning: A Contributor to Sustainable Development Goal

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Abstract

Machine Learning has become a buzz word these days. In this paper we have review what exactly is Machine Learning and how it can be used in various industries providing a Competitive Advantage to Organizations to outperform its competitors and also sustain in the market. Machine Learning helps an organization or an industry to grow leading to growth in economy also while being committed to the various Sustainable Development Goals.

After the Pandemic, Industries and firms have realized the importance of going Digital to stay and sustain in their respective businesses. This has provided a push towards the ML to make smart business processes for critical cost cutting, efficient economic recovery, informed decision making and as a result improving the ROI (Return on Investment).

In this paper we have understood Machine Learning and reviewed various Services provided by ML for industry growth. Also, we have highlighted various applications of Machine Learning in different industries and how it can push the Indian Market towards expansion for its products and services resulting to a healthy and growing economy.

At Last we have provided some suggestions as how MLcan be implemented in the Indian scenario of Oil and Gas Industry which plays a crucial role in a growing economy while committing and fulfilling the Sustainable Development Goals.

Introduction

In today's modern world the technology has revolutionized to an extent that everything is moving towards an autonomous environment which helps us to be productive without losing any time. The technology driven solutions when focused at can be acknowledged in each and every sector and in all the industries. The Technology plays a vital role in sustainable development of a business or firm at micro level and even development of our nation if we dive into the macro level. The technology or the technological infrastructure a country has gives that country a competitive advantage over other countries giving them a special position where all the other countries want to trade with

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them and deploy the same technology in their country which leads to a growing GDP.

So, we discussed how continuous technological advancements are so important for a firm and even a nation. In this context we can never forget the role of the “Artificial Intelligence” which has led to a new industrial revolution. Artificial Intelligence or AI is actually the ability of machines to think, learn and act like humans. And when we highlight the phrase “act like humans”, it literally means more than that as todays machine have a kind of machine intelligence that they can even do tasks that can be difficult for humans to achieve in a short span of time. Artificial Intelligence can help achieve difficult tasks and solve complex problems in a very short duration which takes the productivity to a whole new level.

In this era, we can see AI or Artificial Intelligence deployed everywhere. Some of the examples where we can see AI in everyday life are:

- E-commerce
- Advertising
- Web Search
- Digital Personal Assistants like Alexa, Siri etc
- Language Translation
- Smart homes, cities and infrastructures
- Cars
- Cyber Security

AI or Artificial Intelligence is a much broader term. If we break down Artificial Intelligence and dive into the basics of AI, then we come to know about “Machine Learning” which helpsus to achieve the machine intelligence. Machine Learning is a subfield of AI.

Machine Learning is a branch of AI and computer science that understands and analyse acquired data to provide with future predictions and optimal solutions. Machine Learning learns from data, deploys its algorithms and provide with useful and reliable results.Machine Learning is more of like building applications or models that learns from data, improve their accuracy, provide desired results without being programmed to do so. The typesof Machine Learning are:

- Supervised Learning: Labelled Datasets
- Unsupervised Learning: Unlabelled Datasets (Clustered Data)
- Reinforcement Learning: Labelled as well as Unlabelled Datasets (Reward/Penalty)

Now we have to understand how we can use Machine Learning to its full capability and for thebetterment of its users. MLaaS or “Machine Learning as a Service” comes into the picture whenwe think of deployment of AI solutions for businesses and firms that wants

to sustain in the market while being competitive enough.

MLaaS or Machine Learning as a Service is a set of cloud based intelligent tools that helps usto analyse and process the data as to provide variety of business solutions. We can embed MLaaS into our businesses and feed it with data as to produce desirable outputs. The data thatwe input into our smart systems also plays an important role. The models and algorithms of MLaaS is designed in a way that the output is accurate and reliable.

MLaaS can help businesses achieve a competitive advantage over others in the market as it helps to improve efficiency of the business and lower the costs. These days we can see use of MLaaS in different industries such as:

- Transportation
- Manufacturing
- Healthcare
- Finance
- Advertising
- E-commerce

So, the MLaaS as we can evidence has a considerable growth rate in the market with very good potential. This arises a need of further research that how can MLaaSbe used to gain a competitive edge in an industry and lead to innovation. Moreover, Machine Learning can help us for gaining a better score in the Sustainable Development Goal Index by contributing for better fulfilling of:

- ❖ SDG 3: Good Health and Well-being
- ❖ SDG 8: Decent Work and Economic Growth
- ❖ SDG 9: Industry, Innovation and Infrastructure.

Background of the study and Objectives Background of the study

After the pandemic there was like a disruption in the market while many companies shut downtheir processes or manufacturing units leading to huge losses for the company. Then there wasa breakthrough as everyone started adapting to the situation as there was a rise of Digitalization.Digitalization was a transition that made everyone realize the importance of the social platforms and new ways of learning and delivering. Digitalization was something out of the picture before but as we come out of the pandemic it is something that is going to stay forever.

With Digitalization many firms have realized the role of Machine Learning, that how ML embedded into their systems can help them sustain in the market while improving their efficiency and reducing time and costs. If we see the scenario globally, we can evidence that MLaaS is used by most of the firms that are big players in their domain

area. So, this opens upan opportunity for provider of Machine Intelligence solutions to cater their services to Indian Businesses by which they can unlock their underlying potential and get a headstart to capture the market.

Objectives

- Explore Machine learning and Machine Learning as a Service
- Explore Industries that are embedding AI solutions globally and potential of theseservices in Indian Industries
- How MLaaS can be useful in Oil and Gas Industry in India
- Domestic players in Oil and Gas industry that can be prospects for an AI solutionsprovider
- Aligning Machine Learning with practices to achieve Sustainable Development Goals

RESEARCH METHODOLOGY

Type of Research: Descriptive Research

Sampling Technique: Non-Probabilistic method of convenience sampling willbe used. The data will be collected from easily available and cost-effective sources.

Data Source Secondary Research

For the optional examination, a wide cluster of industry sources is alluded, which ordinarilyincorporates, be that as it may, are not restricted to:

- Company SEC filings, yearly reports, organization sites, dealer and monetary reports, andfinancial backer introductions to know the serious situation and state of the business
- Patent and administrative information bases for comprehension of specialized and legitimateturns of events
- Scientific and specialized compositions for item data
- Regional government and factual information bases for full scale investigation
- Authentic new articles, web-projects, and other related deliveries
- Internal and outer restrictive data sets, key market pointers, and pertinent public statements formarket gauges and conjectures.

Data Analysis and Interpretation:

Machine Learning as a Service

MLaaS or Machine Learning as a Service are actually the different services that are offered bya set of cloud computing tools using raw data and processing it to a useful

end product that canhelp in smooth functioning of a business by lowering additional costs and time. Moreover, thiscutting-edge technology understands data, learns from data, understands our needs and provide with output leading to better operations management and contributing to better performance ofthe organisation as a whole.

Various Services that are offered by Machine Learning as a Service Models or the AI Solutionsare Predictive Analytics, Information Processing, Image Analytics, Video Analytics, Natural Language Processing and Speech Recognition. These Services will be discussed in detail further.

Some of the benefits that can be offered by Machine Learning as a Service are:

- Improve Product Abilities and Offerings
- Optimize day-to-day Business Operations
- Reduce Non-Productive Time
- Enhance Customer Service (Chatbots)
- Reduce Additional Costs and Time
- Formulate alternative Business Strategies

Need for MLaaS

There is a huge amount of data generated globally by different data sources such as social media, mobile applications, Search engines, Websites, news network, society, political institutions, and the economy. With adequate storage and processing of this data we can yield better outputs of consumer behavior, energy consumption, different trends of the user which can help us to develop business excellence. The recognition of pattern in a data and then predicting the future trend out of that data is a common example of some of the capabilities of ML. Machine Learning Algorithms thereby, helps us to extract important information out of data.

Simultaneously, collection of data from various sources without breach of privacy becomes equally important to understand the growing trend and sustain in the business by reacting very quickly to the market conditions. This reduces the risk of a business going bankrupt and helps it to grow eventually. AI capabilities for businesses is a new emerging sector that is growing these days and soon will be a whole new industry while more investments flow into this area.

Large Organizations have the financial freedom to develop their own AI solutions while Small Organizations must outsource these services due to lack of in-house capabilities. Example of some Machine Learning solutions by some large corporations include Amazon Web Services, Google Cloud Platform, IBM Cloud, Microsoft Azure, Alibaba Cloud etc. The above AI services have provided its owner company to achieve smart business operations and business excellence in what they do. ML has contributed majorly to many companies' success, staying competitive and bring new innovations and technology into the market.

Moreover, Data Science and Artificial Intelligence are some new trends in the market as mostof the businesses have started adopting MLaaS for efficient business operations. Even MLaaSpresence can be evidenced in many industries in terms of digital transformation of manufacturing processes as well which has led to a new Industrial Revolution i.e., Industry 4.0.

Industry 4.0

We are in the middle of a transition which is taking place in the way we manufacture products.The traditional manufacturing has been there now for ages which is very vital for a company'sproduction but now after the introduction of machine learning and internet of things, everyoneis seeing this as the start of a new industrial revolution i.e., Industry 4.0. The transition is so evident that it is been known as the fourth industrial revolution which is an advancement of the third industrial revolution which was the adoption of computers.

IOT or Internet of Things refer to the network of millions of physical devices which are installed with sensors and also shares the data to the internet which makes intelligent machinesystems able to identify the object and respond respectively. This becomes very useful when applied to the manufacturing of products as the machines can identify the object and send it for further process decreasing the cost of manpower. This technology has contributed to the birth of the fourth industrial revolution.

Services of MLaaS

- **Predictive Analytics**

Predictive Analytics is a service that predicts the future trends by identifying patterns in data acquired in the past. The data is combined with statisticalmodelling, data mining techniques and ML to provide with efficient and reliable results. Businesses deploy predictive analytics to find patterns in the data basedon which the machine learning models and algorithms provide with the upcoming trendwhich in some cases can be almost precise. This precision of future predictions helps businesses to optimize its business operations accordingly and actually stay ahead of time.

Predictive Maintenance is a part of Predictive Analytics while making use of IOT by installing sensors into the equipment helps us to predict that when the equipment will be needing a maintenance. Using this we can prevent the unknown equipment failure reducing the Non-Productive time of the operations.

Predictive Analytics will help firms determine the future possible risks that they can have in their business so that the decision makers of the firm can minimize the risks before it starts impacting the business which allows the firm to be pro-active rather thanbeing reactive.

- **Information Processing**

Information Processing is the ability of an algorithm to convert data from one form

to another that can be used to enhance the productivity of any business operation and solve any complex problem.

Graphs, movies, charts, tables, photos, and a variety of other formats can be produced as a result of this entire process, depending onthe task at hand and the machine's requirements. The steps involving Information Processing are:

- **Image & Video Analytics**

Image & Video Analytics is the process when smart algorithms start identifying the small key features in an image or video. These key features help to recognize the objectin the image or a video which in result with the help of information processing helps the smart systems to provide valuable and reliable results. The day-to-day life examplecan be seen in terms of security in devices which is known as biometrics which results in facial recognition. The face detection is used widely these days as none other can unlock the phone except the one who owns the device using face detection technology.The various services that can be provided through Image and Video Analytics are-

- **Natural Language Processing**

Natural Language Processing also known as NLP is the ability of a program to

understand the text's language or a spoken language in the same way as humans can so, further it can be converted to any language with the same exact meaning and the same emotion behind the text.

In Natural Language Processing, the computational linguistics is integrated with machine learning and deep learning models to provide a desirable output. In turn, integration of these technologies lead to computers being able to process the human language in form of text or audio, understanding the whole meaning out of it with even the speaker's intent and sentiment while writing that text.

This feature becomes useful to understand a text written or spoken in a different language overcoming the linguistic barrier. This makes interaction of people around the world easier as they are able to understand what people on the other side are speaking and what do they actually mean by that. Google Translate is a perfect example of NLP which is a platform that helps to convert one language to other very precisely, therefore growing popular.

- **Speech Recognition**

Speech recognition or speech-to-text is a feature that allows a computer program to convert human speech into text. Many times, speech recognition is misunderstood as voice recognition, but it is a way different. Voice Recognition is identification of a specific user's voice usually used for bypassing the security or getting access to a private data whereas speech recognition is the program used for understanding the speech of an user and thereby converting it to text for better convenience and utilization. The ability of a machine to recognise speech rely heavily on machine learning and AI as to interpret human speech the algorithm needs to combine grammar, syntax, and composition of voice and audio signals to give a desirable output.

MLaaS in Different Industries

The presence of Machine Learning as a Service can be evidenced in many industries as weprogress towards the Industry 4.0. Some of the industries are as follows:

- **Transportation:** The application of ML in transportation industry is already evident as automobiles are becoming more autonomous and are able to identify real-life objects like roads, signals, parking, zebra crossing, people etc. After identification of these objects by ML algorithm it can react quickly to the real-time situations giving birth to self-driving cars. An example of self-driving cars are Tesla cars that can auto-drive the car and in situations like a driver falling asleep can save his life by identifying any threat that can be caused while driving. This takes the safety to a whole new level which will be implemented in the future in each and every car. Some of the applications of ML in transportation industry are:
  - Autonomous Vehicles

- Passenger Transportation
- Smartphone Apps
- Traffic Management
- Law Enforcement
- Delay Predictions
- Drone Taxis

- **Manufacturing:** Machine Learning capabilities can advance nearly every operation of a business, from sales & marketing to even manufacturing. The ML used in manufacturing is an emerging sector as more and more businesses have started integrating Machine Learning with IOT in their manufacturing plants for making operations more autonomous and less time consuming by reducing the non-productive time.

  According to a study published by Global Market Insights, on the base of data analytics produced results that ML application in manufacturing will grow from $1 billion in 2018 to a market of $16 billion by 2025. Simultaneously there will be a constant need for cost optimization in the process of manufacturing which will lead to better implementation of ML and IOT technologies. Services like Predictive Maintenance and Machine Monitoring will become a part of most of the manufacturing operations globally.

  The applications of ML in manufacturing industries are:

- Maintenance
- Quality Control
- Logistics and inventory management

- **Healthcare:** Machine Learning and AI capabilities have started to revolutionize the healthcare industry as well. ML algorithms have the potential to increase the accuracy of treatment protocols and identifying a disease at an earlier stage making the consultation more precise. Nowadays Hospitals have started implementing Deep Learning algorithms for radiology and medical imaging. Deep Learning is basically a form of complex Machine Learning program that helps a machine to process information in the same way as humans and in some cases even better. Nowadays, Deep Learning algorithms can detect, recognize, and evaluate different tumors from images and therefore classify the type of tumor using neural networks that is a self-learning program to solve complex problems without being programmed to do so.

  Some of the applications of Machine Learning in Healthcare Industry are:

- Managing Medical Data
- Helps in Medical Diagnosis
- Detecting Disease at an earlier stage

- Machine Learning in Medical Assistance
- Machine Learning in Decision Making
- Personalized Machine
- Helps Analyze the errors in Prescriptions

- **Finance:** Machine Learning is being growing popular in Finance Industry as well as it helps the financial institutions to embed smart systems that increases the security and risks related to the industry. AI capabilities help business to advance and automate their FinTech (Financial Technology) services and retain maximum customers. Some of the applicationsof Machine Learning in finance industry are:

- Fraud Detection and Prevention
- Loan Underwriting
- Portfolio Management using Robo Advisors
- Algorithmic Trading

- **Advertising**: Machine Learning systems are smart systems made of various algorithms that can draw correlations between datasets and finally provide with desirable output. These smart systems when fed with data can identify consumer behaviors and patterns in data that can help us to reach the right audience for our products and services. In Advertising industry, ML can be useful in replicating the mind of an experienced buyer with help of past acquired data about the buyer and thereby make predictions about what the buyer would like to buy. Then the buyer can be targeted by showing advertisements that are the best match for him which will result in buyer buying the product. This utilization of ML can save more time, can provide better convenience, and yield great profits for the company which makes it a win-win situation for the company as well as the buyer. Some of the applications of Machine Learning in Advertising are:

- Better Personalization
- Better and informed advertising decisions through Machine Learning
- Better creativity based on data
- Reaching the right audience for our product/service by reaching the right influencers

- **E-commerce:** Machine Learning in E-commerce industry helps websites like Amazon, Myntra, Flipkart, etc. to market their product more

effectively and efficiently. ML can be used to understand consumer buying pattern and consumer behavior which can help e-commerce companies to sell their products more effectively. For example: Myntra has achieved a competitive edge in the market of fashion apparels and accessories due to its implementation of AI engine known as "VORTA". AI engine Vorta helps Myntra to maximize the inventory turnover and also predicts the upcoming trends and react to the market conditions accordingly. Because of such ability Myntra was able to position itself in a growing market and therefore launched two of its fast fashion brands named as "Moda Rapido" and "Here and Now".

Therefore, ML can benefit E-commerce industry in a major way which makes this industry an early adopter of ML and AI. Some of the ML applications include:

- Personalization
- Site search
- Maximize Inventory turnover
- Prediction of upcoming trends
- Managing supply and demand
- Churn Prediction
- Fraud Detection
- Improved Customer Service

MLaaS Scope in Indian Oil and Gas Industry

MlaaS has a lot of scope in many industries in India including oil and gas while we can see many businesses starting embedding the machine learning powered AI solutions for accelerating their economic recovery and start generating ROI as early as possible. The ML suite will improve the cash flows of the company while providing support for operational excellence, efficient cost recovery, time management and achieving a competitive edge in themarket.

DSF Operators

DSF Policy was launched by the government of India in 2015 according to which bids will be invited in the DSF bidding rounds which gives the freedom to any private or non-private player to produce hydrocarbon from small field discoveries which was explored in the past by government owned PSU'slike ONGC but was found commercially unviable so never went on the production phase. These fields are now be given to anyone who wins the bid for the blocks and is able to produce commercially viablehydrocarbons. So, the contractors who wins the bid and will be the operator for the block awarded is known as DSF Operator.

DSF Bidding Rounds	Year	Fields	Total Contract Areas
DSF Round 1	2016	67	46
DSF Round 2	2018	59	25
DSF Round 3	2021	75	32

- The DSF Round 3 is on the process and many new private players will also emerge outas they will place their bids. These new private players will be having very less experience or maybe no experience in oil and gas production. So MlaaS can play a crucial role in providing these new players a support by accelerating the economic recovery while boosting operational efficiency.
- There will also be an active participation and interest from other private players that have taken part in previous DSF rounds and also have the experience to produce oil andgas. They will also be keen towards upgrading their systems into smart AI systems which can reduce costs and time and they can make the most profit out of these fields.
- The Discovered Small Fields (DSF) are considered to be commercially unviable in thepast so be it experienced or non-experienced players every one will be wanting to keepthere cost as low as possible so they can earn the maximum profit out of these fields.

OALP Awardees

The Hydrocarbon Exploration Licensing Policy (HELP), which replaced the previous New Exploration Licensing Policy (NELP), was launched in March 2016 with introduction of new revenue sharing model and eliminating the loopholes in the previous policy. This policy offered better transparency within the system. The new Hydrocarbon Exploration Licensing Policy was followed by OALP which was the Open Acreage Licensing Policy along with the NDR (National Data Repository) in 2017. These new policies were launched for influencing and accelerating more investment in Exploration & Production (E&P) activities in India.

Open Acreage Licensing Policy or OALP is the policy in which companies can carve out the areas where they want to explore oil and gas. Companies can put up EOI or Expression of Interest for the blocks where they expect the oil and gas reserves and wants to explore that area further. A company can put up an EOI throughout the year but these interests are accumulated thrice in a year in which the blocks are put up in auction. The effective implementation of the HELP regime, has led to increased E&P activities in India.

The **OALP Awardees** are the contractors who win the bid for exploration in these carved outareas and further go for exploration. There are bidding rounds in regular

intervals so the privateand non-private players can show EOI (Expression of Interest) and win the acreage where theywant to explore the oil and gas in.

But not much interest is shown by private players in OALP bidding round because of some lack in understanding of the policy by the private players. In the latest bidding round-V all theblocks were awarded to the government owned PSU's i.e., ONGC and OIL.

OALP Bidding Rounds	Year	Basins	Blocks Awarded
OALP Round 1	Oct 2018	11	55
OALP Round 2	July 2019	7	14
OALP Round 3	July 2019	10	18
OALP Round 4	Jan 2020	3	7
OALP Round 5	Aug 2020	8	11

- The OALP Awardees can also be targeted for the MLaaS Suite as they will also be wanting to have efficient cost recovery so they can start generating ROI as soon as possible.
- These Fields are untouched and have not been explored before so ML can help in manyways like accurate modelling, know where exactly to place the well, compare the geologies etc. This will reduce operational time and costs will be saved.
- MLaaS using its statistical tools and models can tell us whether to go for conventionalor unconventional production.
- Moreover, the MLaaS Suite can also be integrated very easily with the ONGC owned MIS or Management Information System which when combined together will increasethe operational efficiency and optimize the overall business operations.

Some Services that we have discussed before and can be catered to DSF Operators and OALPAwardees are:

- Predictive Analysis
- Information Processing
- Image Analytics
- Video Analytics
- Speech Recognition
- Natural Language Processing

Some Benefits for DSF Operators and OALP Awardees are:

- Efficient Cost Recovery
- Determine NPV
- Accurate Modelling
- Determine the geology
- Know where & how to drill
- Well Placement
- Predictive Maintenance
- Choice of Hydrocarbon Production
- Production Optimization
- Evaluate different oil recovery techniques
- Asset Performance Management
- Safety
- Risk Assessment

Conclusion

Now after studying various aspects of Machine Learning, we can understand its applications across all the industries and how crucial it can be to achieve business excellence and its relevance for a healthy growing economy. Machine Learning and Artificial Intelligence is thetechnological innovation that will revolutionize all the industries and helping industries to sustain in the new era of digitalization. ML helps organizations to react very quickly to the changing market dynamics, therefore providing a competitive advantage over other organizations.

The Pandemic Outbreak has forced many businesses to shut down as they were not able to sustain the changing market dynamics as everything is becoming digital. The Pandemic has provided a massive push towards the new era of Digitalization. So, to adapt to the new normalbusinesses should start embedding Machine Learning into their systems for accelerating their cash flows by efficient economic recovery, better cost cutting, informed decision making and react very quickly to the changing market dynamics.

Moreover, the Machine Learning is the new industrial revolution that will itself become morecomplex, advance and therefore, gives a birth to a new industry as more and more investments flow in it. More innovation in this industry will provide opportunities to firms for more Research and Development in this industry to make our present world more advanced and solvereal-life problems like energy security, environmental challenges, climate change, hunger andpoverty. The Adoption of AI

will provide a technology boom to industries leading to better productivity, innovation and better infrastructure of India.

Hence, we can say Machine Learning and Artificial Intelligence is the Future which also helpsa country in fulfilling its commitment to the sustainable development goals and continuously improve its score of sustainable development goal index by 2030. Some of the SDG's that Machine Learning helps to accomplish are:

- **SDG-3 (Good Health and Well-being)**

As discussed above ML has various applications for healthcare industry.

- **SDG-8 (Decent Work and Economic Growth)**

ML provides businesses with a competitive advantage and helps them to sustain in themarket, resulting to better economic growth.

Moreover advancement of ML for Energy industry also results to growth in economy as Energy plays a crucial role in a growing economy.

- **SDG 9- Industry, Innovation and Infrastructure**

Relevance of ML in various industries specifically Oil and Gas Industry is clearly visible which leads to better innovation for cost cutting and increase of ROI.

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