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The use of AI to Improve Efficiency In Downstream Operations

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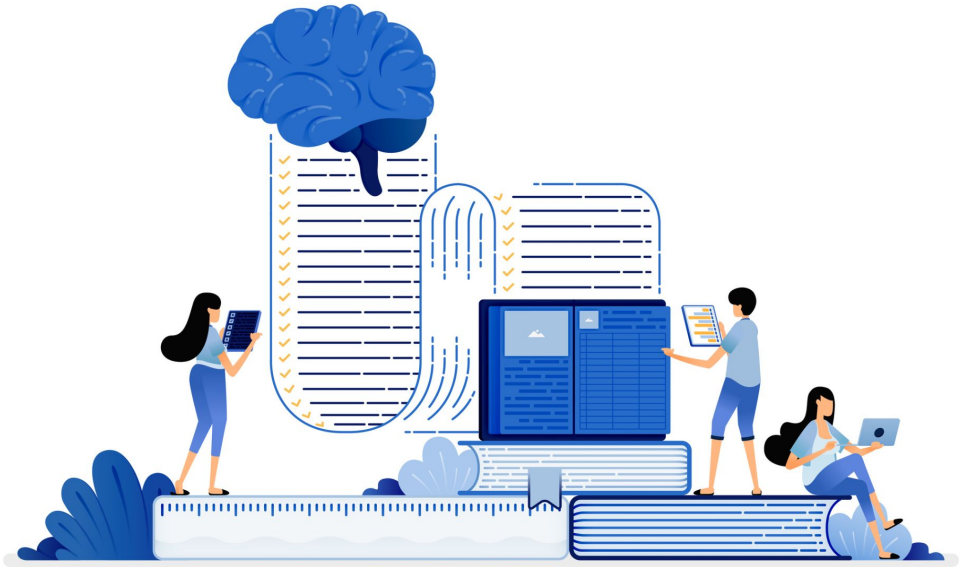
WHAT IS AI?

Artificial intelligence, or AI, is technology that essentially replicates human intelligence in computer systems, enabling machines to perform tasks like learning, reasoning, problem-solving, and perception, just like humans.



AI Fundamentals & Big Data Insights

How Does AI Work?

- AI mimics human intelligence, enabling machines to learn, decide, and act.
- It's powered by machine learning, deep learning, and natural language processing.

The Basics of Big Data

- Big data: massive volumes of data from various sources.
- Tools like distributed computing and data mining help us make sense of it all.

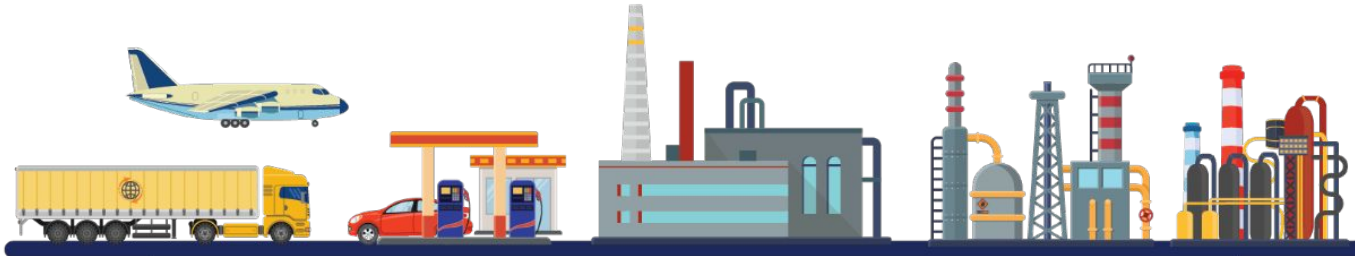
Putting AI to Work

AI in Action

- Predictive Maintenance: Using machine learning to foresee and fix equipment issues before they disrupt operations.
- Demand Forecasting: Leveraging predictive analytics to anticipate product demand, keeping inventory and supply chain smooth.

AI IN DOWNSTREAM OPERATIONS

- **AI transforms downstream operations** by analyzing extensive data from Gas and Oil processes.
- **Data sources include** production, maintenance, supply chain, logistics, sales, and daily operations.
- **AI processes data in real-time** to detect patterns, predict equipment failures, and optimize workflows.
- **Machine learning and predictive analytics** empower informed decision-making and resource optimization.
- **Result:** Reduced costs, enhanced productivity, and proactive, data-driven operations.



BIG DATA AND AI

Data Generated → Data Stored → Data Processing → Predictive Analysis

BIG DATA | **ARTIFICIAL INTELLIGENCE**

Inputs-
Historical data
(supply chain documents,
sales records, etc)

Data is collected
and stored in databases, servers

Data processing using CPU/GPUs
and AI algorithms to detect patterns

AI predicts trends,
behavior patterns, future demand

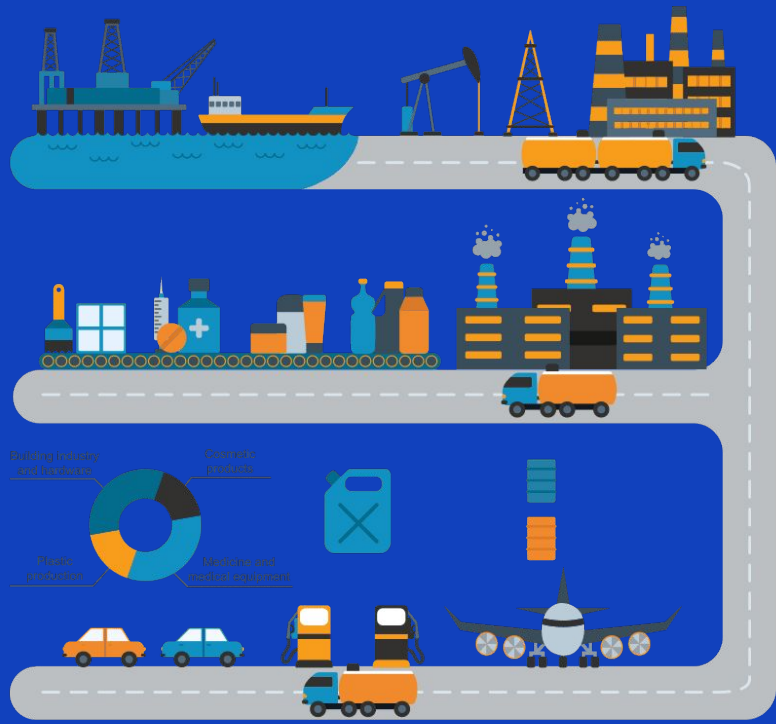
Streamlining Transportation and Logistics with AI

Problem:

- ABC Company in the Oil and Gas sector faces tough challenges in managing transportation and logistics.
- Difficulty in predicting transportation needs leads to inefficient route planning, higher costs, and delayed deliveries.
- Massive amounts of data from various documents make it hard to find useful insights manually.

Solution:

- ABC Company is turning to AI for a smarter way to handle transportation and logistics.
- By analyzing years of data from invoices, orders, and other documents, AI can forecast future needs with precision.
- This enables better route planning, resource allocation, and decision-making.
- Result? Lower costs, boosted efficiency, and happier customers.



Process Overview

Data Preparation & Upload:

- Gather & Cleanse Data: Collect and clean documents from the past years.
- Upload to Analytics Tool: Transfer cleansed data for analysis.

Running Analysis:

- Initiate AI Processing: Begin analysis to identify patterns.
- Monitor Progress: Adjust as needed based on data complexity.

Implementation & Feedback:

- Execute Plans: Roll out and monitor against forecasts.
- Iterate for Improvement: Refine models based on ongoing data collection.

AI Analysis:

- Configure Models: Set up AI models for transportation & logistics.
- Customize Parameters: Tailor parameters to match requirements.

Review & Planning:

- Generate Reports: Forecast truck, driver, and fuel consumption for the future.
- Form Action Plans: Strategize fleet management, driver recruitment, and fuel use.

Driver Staffing Optimization

How It Works: AI analyzes historical delivery data, including volumes and routes, to predict optimal driver numbers. It considers factors like vacations and peak delivery times.

Application: Facilitates hiring and training planning to maintain optimal staffing levels at the Company.

Truck Fleet Optimization

How It Works: AI forecasts truck needs based on past orders, distances, and capacities. It also considers growth projections for fleet adjustments.

Application: Guides Company in strategic vehicle procurement or leasing to align with demand and avoid last-minute costs.

Predictive Maintenance for Trucks

How It Works: AI models use historical maintenance and breakdown data to forecast future repair needs and schedules, identifying wear and tear patterns.

Application: Company can proactively schedule maintenance, minimizing downtime and extending fleet lifespan.

Fuel Consumption Optimization

How It Works: The AI analyzes routes, vehicle types, and fuel usage history to predict fuel needs and suggest efficient routes and driving adjustments.

Application: Enables Company to budget fuel costs accurately and identify opportunities for fuel efficiency improvements or sustainability measures.

Enhancing ESG Strategy and Emissions Reporting with AI

Background:

In the Oil and Gas industry, ESG considerations are vital. ABC Company aims to accurately report emissions and improve ESG performance. The challenge is the complexity of calculating and reporting emissions across operations due to numerous variables.

Objective:

Utilize AI for precise, real-time emissions calculations and reporting, enhancing the ESG strategy with accurate data from operations' raw materials, goods, and services.

Process Overview

Enriching AI with Emission Data:

- Compile extensive emission data dictionary from industry organizations like PIDX, WBCSD, the Open Group, etc.
- Educate AI models with this data to apply correct emission factors for Company's operations.

Precision through Sample Calculations

- Provide AI with sample calculations showcasing typical emission scenarios.
- Refine AI's accuracy using sample calculations, validating against industry standards.

Emissions Reporting and Insights Generation

- Automate emissions calculation across operations using educated AI.
- Analyze AI-generated reports to identify emission hotspots and reduction opportunities.

Strategic ESG Initiatives

- Develop targeted ESG initiatives to reduce emissions through operational changes.
- Establish benchmarks and goals for continuous ESG performance improvement guided by AI analyses.

Use Case: AI-Driven Emission Reporting for Transportation (Distribution)

Scenario

Focus: Sustainable distribution, including crude oil and natural gas transportation.

Challenge: Emissions from vehicles contribute to carbon footprint.

Goal: Accurate emissions monitoring and reporting using AI and trusted data sources (PIDX, WBCSD, The Open Group).

Solution

Emission Data Integration: Integrate emission dictionary from trusted source into AI for transportation activities, covering vehicle types, fuels, and distances.

Data Collection and Preparation: Collect historical transportation data from distribution operations. Cleanse and preprocess data for AI analysis.

AI-Driven Emission Calculation: Utilize AI to analyze data and calculate emissions, considering vehicle types, fuel efficiency, loads, and routes.

Real-Time Monitoring and Reporting: Deploy real-time monitoring with sensors on vehicles. Integrate AI for analyzing real-time data, generating emissions reports for stakeholders.

Predictive Analytics for Future Product and Service Needs in Oil and Gas Downstream Operations

Background:

- In Oil and Gas Industry, forecasting demand for products and services is crucial for efficiency.
- Company seeks to enhance forecasting using AI to adapt to market changes.

Objective:

Use AI predictive analytics to forecast Oil and Gas demand, reducing errors and subjective judgments.

Process Overview

Data Aggregation and Preparation:

- Collect diverse datasets including sales records, market trends, and economic indicators.
- Clean and preprocess data to ensure quality for modeling.

Predictive Analysis and Forecasting

- Deploy trained AI models to analyze current data and predict future demand.
- Evaluate multiple scenarios and forecasts based on comprehensive data analysis.

Model Development and Training

- Train the models on historical data, continuously refining them with new data to improve accuracy and relevance.

Integration and Application

- Integrate predictive insights into operational planning and decision-making processes.
- Develop a flexible operational framework to adapt to predicted changes.

Forecasting Human Resource Needs for Sales and Customer Support

How It Works: Using AI and machine learning, AI analyzes various data sources, including past sales data, customer inquiries, market trends, and economic indicators, to predict consumer demand for Oil and Gas products over the next five years.

Application:
Based on the AI predictive analysis Company forecasts a 20% rise in product demand, prompting a 15% expansion in the sales team and a 25% increase in customer support. This allows timely recruitment and training to meet demand.

Predicting Service Demand for Maintenance and Repairs

How It Works: AI predicts service demand by analyzing data on requests, product life cycles, and customer feedback, including tasks like facility light bulb replacements and equipment repairs.

Application: The predictive model foresees a 30% rise in maintenance and repair needs over the next two years due to aging equipment and facility expansion. ABCDE Company can preemptively contract service providers, avoiding downtime and optimizing maintenance, cutting costs and boosting equipment efficiency.

CONCLUSION

> AI dramatically **enhances efficiency** and decision-making in downstream Oil and Gas operations. By adopting AI, companies can **streamline processes**, **reduce costs**, and **stay competitive**.
> Let's innovate and lead the way to a **more sustainable and profitable future**.

Thank You!

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