India
SMART UTILITY
Week 2025

Session : Deep Dive Session on AI, ML AND Robotics

AI/ML-Powered Enterprise Analytics for State Discoms

Presented By

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AI/ML enabled Customer to Network

Strategic Network Intelligence
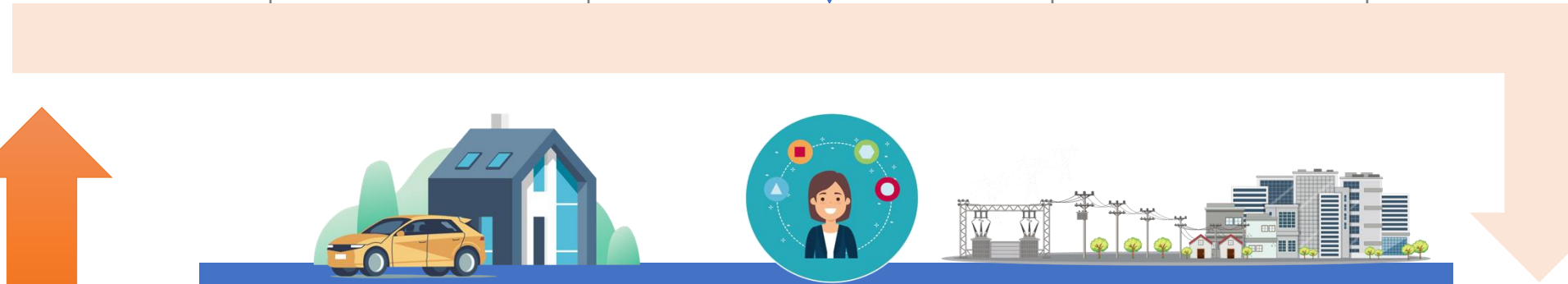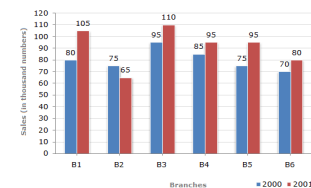
AI/ML-Driven Predictive Insights via Advanced Network Management System

- AI-Powered Anomaly Detection
  - Leverage Machine Learning algorithms to continuously learn from historical and real-time network data.
  - Automatically detect abnormal patterns, reducing dependency on manual monitoring.

- Predictive Asset Failure Modelling
  - AI/ML models trained on asset performance and environmental conditions to predict equipment degradation.
  - Enable DISCOMs to shift from reactive to predictive maintenance strategies.

- Load Forecasting & Grid Optimization
  - ML-based demand forecasting to optimize load flow and prevent congestion.
  - Intelligent switching decisions to balance supply-demand in real-time.

AI's Role in Enhancing Grid Operations

- AI/ML models process large volumes of real-time SCADA, AMI, and IoT sensor data from the grid.

- Manage faster integration of Distributed Energy Resources (DERs), such as rooftop solar and energy storage systems.

- ML-Based Grid Resilience Enhancement
  - Dynamic simulations of weather, load, and asset data using AI models.
  - Strengthen grid resilience against natural disasters and peak demand events.

- Real-Time AI Insights for Control Rooms
  - AI-generated alerts and recommended actions integrated into Network Management Systems.
  - Support control room operators with fast and accurate decision-making tools.
  - AI enables predictive grid responses to fluctuations, reducing downtime and improving grid reliability.

- AI for Renewable Energy (RE) & Electric Vehicle (EV) Integration
  - AI-powered forecasting models predict RE generation variability and EV charging load patterns.
  - AI facilitates grid flexibility by mitigating the intermittency challenges of RE and the surge demand of EVs.
  - Enables utilities to plan grid capacity expansions and EV charging infrastructure with higher accuracy.

AI/ML for Distributed Energy Resources (DER) & DERMS

- **AI/ML in Distributed Energy Resource Management System (DERMS)**
  - AI-based DER aggregation and control for seamless grid-to-DER coordination.
  - ML models enable predictive control of DERs to avoid grid congestion and improve stability.
  - AI-driven market optimization: real-time bidding strategies for aggregated DERs in energy markets.

- **AI/ML for DER Integration**

  - Predictive analytics for RE generation (solar/wind forecasting) to manage DER variability.

  - AI-driven load forecasting for DER-rich networks to balance demand and generation dynamically.

  - Supports DER participation in ancillary services like frequency regulation and voltage support.

AI/ML for Smart Customer Service

- **AI-Driven Chatbots & Voice Bots**

  - Automate customer interactions through AI-powered chatbots and voice assistants, providing 24/7 support and reducing response times.

- **Personalized Service Offerings**

  - Leverage AI/ML to analyze customer data, enabling tailored recommendations for energy-saving programs, customized billing plans, and proactive service notifications.

- **Intelligent Self-Service Portals**

  - Integrate AI into self-service platforms to empower customers to resolve common queries independently, improving satisfaction and reducing operational load.

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THANK YOU

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Links/References (If any)