

Data sets and algorithms for AI/Machine learning-based approaches to accelerate the carbon-neutral transition in electricity and mobility

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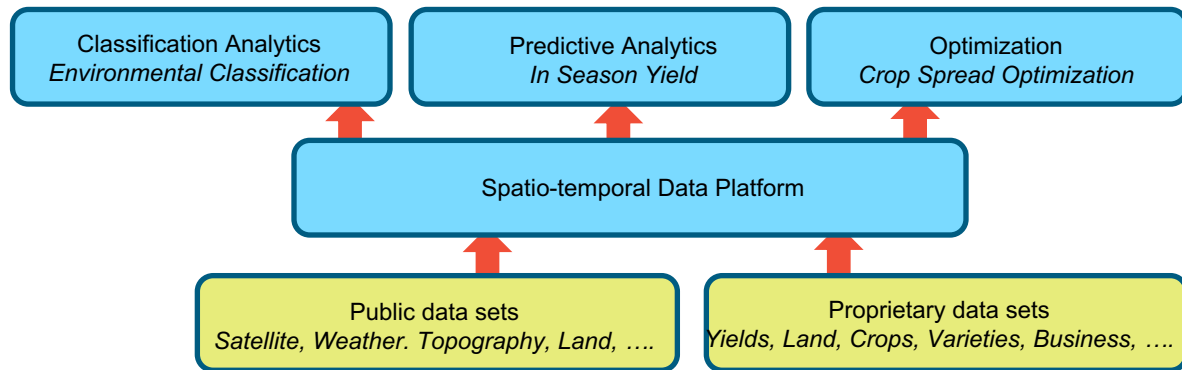
The Sustainability Challenge and the role of AI

How can we accelerate our efforts to mitigate the carbon footprint across industries?

Unique integration of AI with environmental, climate, weather, and operational data has been shown to successfully assist industries with sustainability mitigation and adaption solutions.

AI Platform for Driving Sustainability in Seed Production Supply Chain

- Goal: develop and implement an AI driven decision science platform for supply chain sustainability



Key Benefits:

- ~\$10M annual savings by reducing seed production footprint
- ~5% annual cost savings in land utilization
- enterprise-wide Agriculture data platform backbone developed for future development and deployment of data science at scale.

- **Classification Analytics:** operates at a scale of millions of acres to define environmentally stable sub-field level zones.
- **Predictive Analytics:** provides early visibility into predicated seed supply (allowing better planning for harvest and positioning of products for sales).
- **Optimization Analytics:** model provides means to better maximize the efficiency of land utilization & reduce risk to profitability.
- **Data Platform:** highly scalable data ingestion, integration, querying and joining across multiple environmental data layers.

Data and AI for Managing Sustainability – Key Components

- **Monitor** - operational data
 - big data platforms
- **Gain insights** - measure and report
 - summarization (structured and unstructured)
- **Predict** - sustainability metrics
 - machine learning, neural networks, deep learning, spatio-temporal modeling
- **Prescribe** - mitigation strategies
 - mathematical optimization, reinforcement learning

Environmental Intelligence Suite

Unique integration of AI algorithms with environmental, climate, and weather data

Following the GHG (Green House Gas) protocols, new AI-based, general-purpose carbon footprint reporting, tracking, and optimization capabilities that help clients account, reduce, and optimize emissions from their business processes and supply chains.

New carbon footprint APIs use AI and natural language processing algorithms to move carbon accounting and optimization from manual aggregation and measurement processes to an automated method.

Using the Carbon Accounting APIs within EIS for a Large Vehicle Fleet

Carbon accounting APIs within the Environmental Intelligence Suite was used to collect data at a granular level to track how much fuel each truck consumes.

Using the same API, mobile emissions are computed into carbon equivalence. This individual fleet carbon footprint would then be aggregated to generate an operational view to capture the carbon footprint of a full trucking fleet.

After this process, the operational fleet data would then be analyzed with other dimensions of carbon emissions accounting to produce an enterprise-wide view. These visualizations can help teams to better interpret source data, how these emissions were calculated and tracked, and where they can act to reduce emissions moving forward.

These carbon performance APIs can also be applied to chemical usage, fuel consumption in industrial plants, energy usage for heating and cooling, process operations, and all types of transportation expanding to more categories.

Data sets and algorithms that can be used for AI/machine learning-based approaches to accelerate the carbon-neutral transition in electricity and mobility

Public Data

Climate data

Weather data

Satellite data: Topography, Land, Roads.

Public/Private Data

Renewable energy data

Vehicle data

Electric vehicle data

Energy consumption data

Algorithms

Machine learning algorithms

Optimization algorithms

Reinforcement learning algorithms

Neural networks

Deep learning algorithms

Recommendations

- **Go big on data**
 - **Invest in Building Open Data Repositories for Community Use**
 - **Provide Platforms for supporting integration of private data for developing proprietary industry solutions**
- **Leverage emerging AI**
 - **Explore large-scale spatio-temporal-series data as a basis for self-supervised learning of generative AI models for simultaneous prediction/prescription**

