

AI-based Vegetation Indices

Solution Details

1. Executive Summary

The AI-based Vegetation Indices Solution enables precision farming by analyzing satellite imagery (RGB, NIR, SWIR) with AI/ML models to deliver actionable crop health insights.

By generating indices such as NDVI, EVI, and NDWI, the system helps farmers and agribusinesses optimize resource allocation, prevent yield losses, and support sustainable agriculture.

2. Industry Context & Business Drivers

- Agriculture faces rising demand, resource scarcity, and climate unpredictability.
- Precision farming and remote sensing adoption are accelerating, with global AgriTech investment surpassing \$6.5B in 2023.
- Data-driven crop monitoring reduces costs, boosts yields, and supports sustainability initiatives.

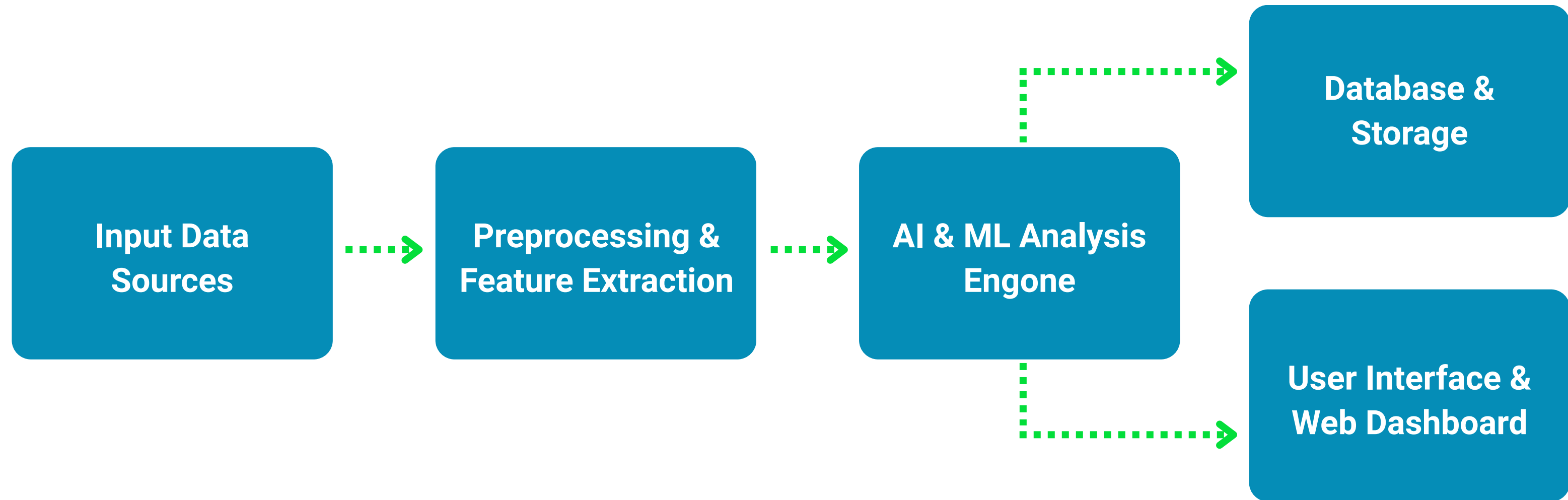
3. Business Challenges

- Manual monitoring is labor-intensive and limited in coverage.
- Early stress detection gaps lead to 15–25% annual yield losses.
- Resource mismanagement (water/fertilizer) drives higher costs.
- Lack of predictive capability limits proactive interventions.

4. Solution Approach

- Analyze multispectral imagery (RGB, NIR, SWIR) from satellites.
- Compute vegetation indices (NDVI, EVI, NDWI, SAVI) to assess crop health.
- Deliver real-time zoning maps and actionable recommendations.
- Enable farmers, cooperatives, and agri-businesses to make data-driven decisions.

4.1 Solution Architecture



5. Core Capabilities in Depth

- **Multi-band Image Analysis:** Analyzes RGB, NIR, and SWIR bands for a complete spectral profile of crop conditions across large farmlands.
- **Vegetation Indices Computation:** Generates NDVI, EVI, NDWI, and SAVI indices to detect crop stress, moisture deficit, or healthy growth regions.
- **Zoning & Targeted Intervention:** Classifies fields into stressed vs. healthy zones, enabling precise input application and resource conservation.
- **Actionable Insights:** Recommends irrigation schedules, fertilization levels, and early disease management strategies.
- **Real-time Crop Health Reports:** Produces comprehensive reports instantly, enabling fast decision-making without manual field inspections.
- **Scalable Architecture:** Processes thousands of hectares efficiently, making it suitable for large farms, cooperatives, and agribusinesses.

6. Business Value Delivered Across Functions

- Farm Operations: Cuts manual monitoring costs by 70% and saves significant time during growing seasons.
- Agri-Business Strategy: Provides accurate yield forecasts, improving planning, supply chain, and pricing strategies.
- Finance & Risk Teams: Enables data-backed insurance claims and financing decisions with reliable vegetation metrics.
- Sustainability Officers: Demonstrates measurable reductions in water and fertilizer use, aligning with ESG goals.
- Procurement & Supply Chain: Anticipates crop yields early, supporting efficient procurement and distribution planning.
- R&D & Agronomy: Delivers field-level spectral and vegetation data for research, trials, and innovation projects.

7. Real-World Impact & Benchmarked Results

- Reduced manual inspection needs by 70–80%.
- Prevented up to 20% yield losses by identifying crop stress early.
- Optimized water and fertilizer use, lowering input costs by 15–25%.
- Delivered reliable yield predictions with 85–90% accuracy in pilot tests.

8. Technologies Powering the Solution

- Data Sources: Sentinel-2, Landsat-8, MODIS, ISRIC SoilGrids, NASA POWER.
- ML/AI Models: Random Forest, SVM, CNNs, U-Net.
- Libraries: Rasterio, GDAL, Geopandas, OpenCV, Pandas, NumPy.
- Deployment: Dockerized, scalable across farms and regions.

See It in Action

Experience how real-time object detection and automated quality checking can transform your operations.

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