![Xoriant logo]

COMPUTER VISION AND DEEP LEARNING FACILITATES PRECISION AGRICULTURE THROUGH SATELLITE-BASED PHENOTYPING FOR A LEADING CHEMICAL COMPANY

Enabled remote crop phenology monitoring. Reduced cost and manpower.

Client Background

The client is a leading chemical manufacturing company based in US. The company works with farmers and governments to monitor and improve crop production. Accurate understanding of crop growth stages enables better planning of inventories and improves overall yields due to timely application of pesticides and insecticides. The client's crop phenology monitoring process is based on local sensors to identify crop growth stages. This requires multiple local sensors to cover entire field area and involves substantial costs and manpower. The client wanted to harness power of remote sensing and satellite image processing to compute crop phenology mapping and farm boundaries to optimize costs and manpower.

The key objectives of the client included:
- Use satellite images for data collection instead of expensive sensors
- Enable automatic detection of farm boundaries
- Identify the 4 crop phenology stages assess yield health
  - Start of season
  - Peak of season
  - End of season
  - Valley of season
- Monitor crop phenology and farm boundaries remotely

KEY BENEFITS

- 90% reduction in the use of offline sensors for phenology computation
- 90% reduction in manual effort in farm boundary data collection
- Increased accuracy in yield health assessment
- Streamlined crop phenology monitoring process
- Automated solution deployment for additional geographical regions
- Improved planning of future spraying regime with access to historical data for analysis

Xoriant Solution | Key Contributions

With strong knowledge of computer vision and deep learning along with expertise on cloud frameworks, Xoriant proposed a solution that leveraged cloud-based data

processing and web interfaces to facilitate seamless phenotype data collection across different global locations and low processing times.

Our key contributions included:

- Selection of right satellite data sources and right bands of data for processing to achieve the optimum cost to accuracy ratio
- Processing data from 2 different satellite data sources – Farm boundaries detected data from Bing maps and assessed crop phenology with data from Sentinel-2 satellite
- Preprocessing data to remove cloud masks and interpolate missing data based on cloud cover percentage
- Data preprocessing for cloud mask removal, missing data interpolation and filtering based on cloud cover percentage
- Data collection, cleansing and augmentation from various sources for training boundary detection deep learning models
- Selection and training of the best deep learning models and post processing the data for conversion and accurate mapping to geo co-ordinates
- Historical data analysis to compute phenology trends
- Developed cloud-based modular architecture to include additional data bands for crop phenology computations, users, and data management

Client Testimonial

" *Xoriant team developed the complex solution in a quick span of 12 weeks, and it's delivering impressive results* "

Technology Stack

Sentinel Hub | Bing Maps | React | AML | Key Vault | Cosmos DB | Azure Functions