CELEBAL TECHNOLOGIES

Corrosion Detection

Microsoft Solutions Partner

Infrastructure (Azure)
Data & AI (Azure)
Digital & App Innovation (Azure)
Security
Biz Applications

Celebal Specialization and Strength

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Microsoft
AI Partner Of The Year 2023
Global

databricks
Partner Of The Year 2022 & 2023
Asia Pacific and Japan
2 YEARS IN A ROW

databricks
Migrations Partner Of The Year 2023
Asia Pacific and Japan

Partnerships

Microsoft Solutions Partner

databricks Elite Partner

SAP Silver Partner

Red Hat Ready Business Partner

Advanced Specialization

- AI & Machine Learning
- Analytics
- Infra and Database Migration
- Kubernetes
- Cloud Security
- Low Code No Code
- Intelligent Automation

INDIA | USA | CANADA | APJ | MIDDLE EAST | AUS

2800+ Employees

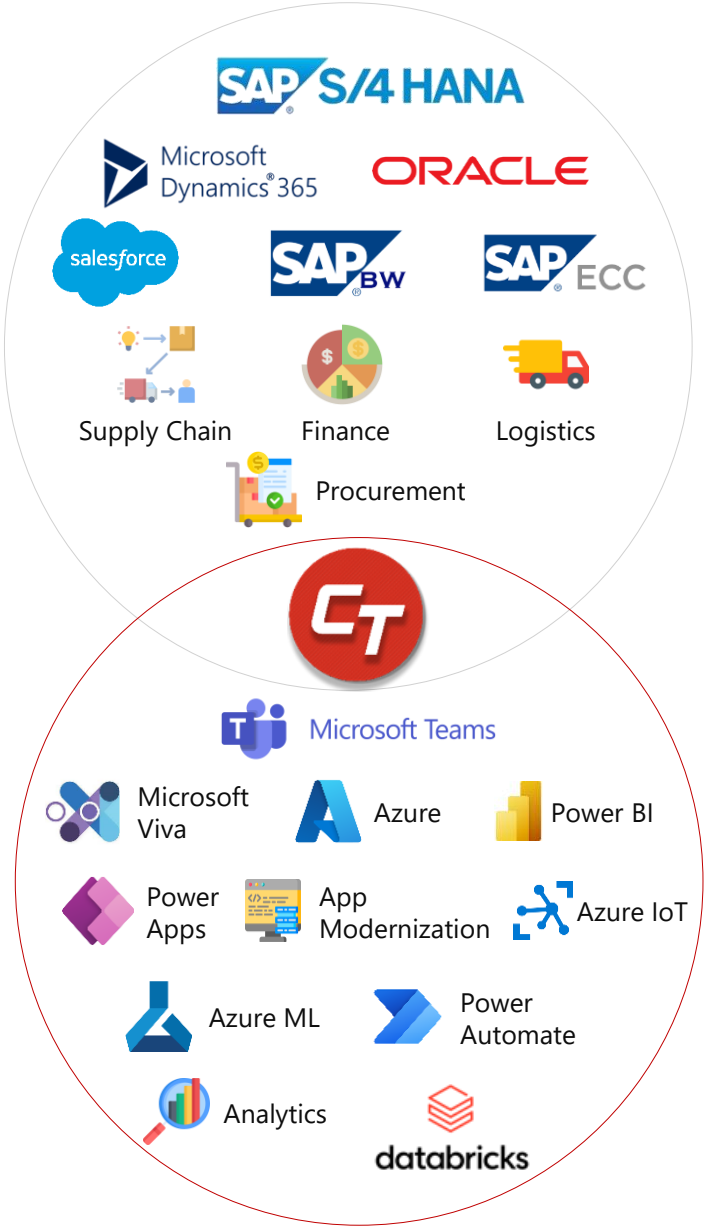
800+ AI experienced professionals

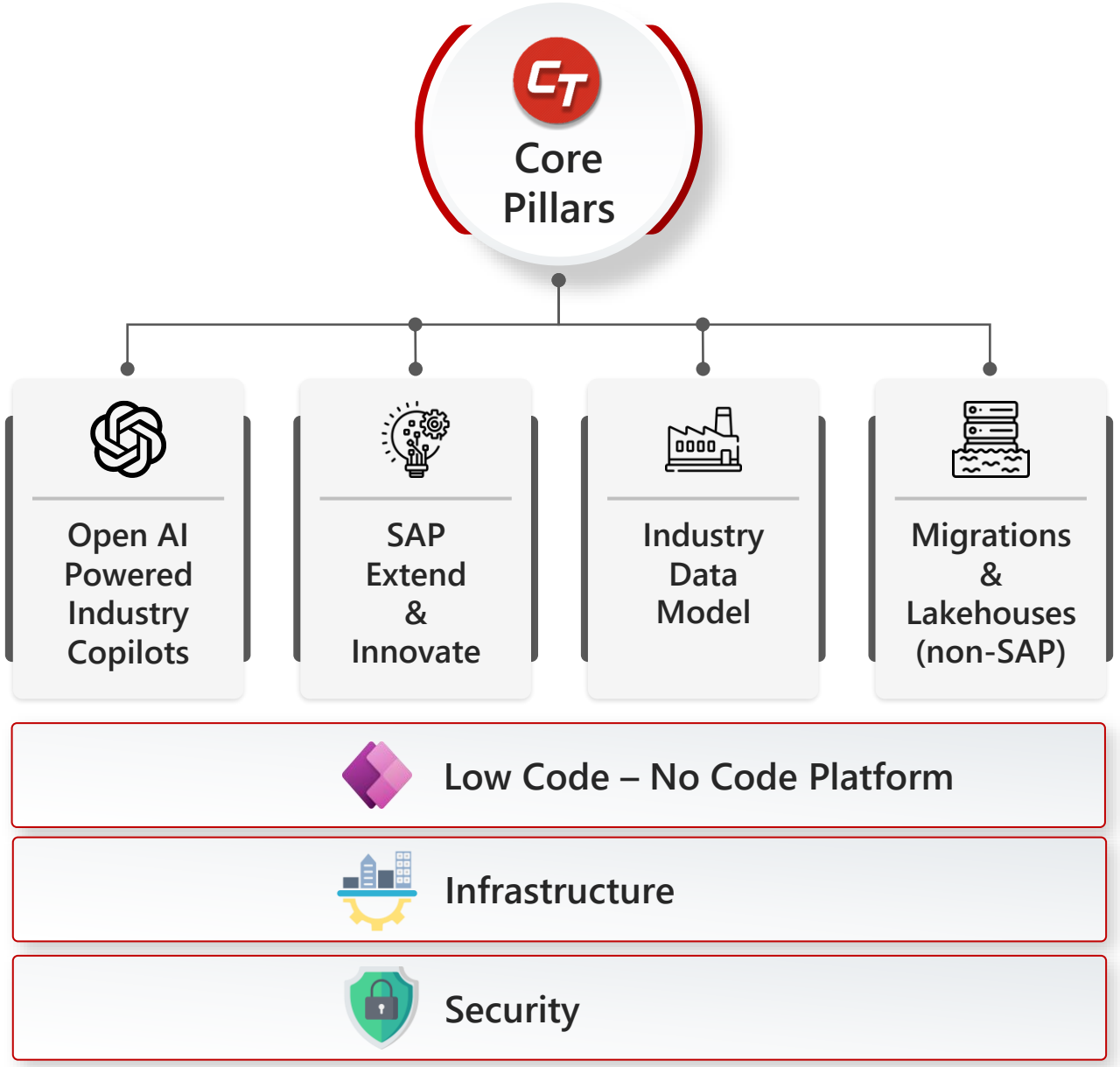
500+ AI Certifications

Industries We Serve

- Manufacturing
- Retail & CPG
- Financial Services
- Energy & Sustainability
- Healthcare & Life Sciences
- Media & Entertainment

Celebal Core Pillars





Corrosion Detection

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1. Brief Description of the Solution:

Enhance energy infrastructure reliability with our AI-powered Corrosion Detection Solution. Leveraging Azure ML, Azure Kubernetes Service, Azure Cosmos DB, Azure Blob Storage, and Azure Container Registry, it delivers real-time analytics and continuous monitoring. Using Azure Custom Vision, SAM (Segment Anything Model), and OpenAI CLIP, it provides pixel-level, contextual corrosion detection. Few-shot learning ensures rapid adaptation to new damage types. Automate inspections, reduce human error, lower maintenance costs, and ensure compliance with proactive alerts and actionable insights—transforming reactive maintenance into intelligent asset management.

2. Business Problem It Solves:

Energy infrastructure operators face significant challenges in maintaining the integrity, safety, and operational efficiency of their assets. Traditional methods of inspection and monitoring are often labor-intensive, reactive, and prone to human error. These limitations can lead to safety incidents, service disruptions, regulatory non-compliance, and increased maintenance costs. The solution addresses these challenges by automating detection processes, providing continuous monitoring, and delivering timely alerts and insights for proactive maintenance and risk mitigation.

3. Value Add for Customer:

- **AI-Powered Detection:** Trained on vast image datasets for accurate damage identification.
- **Insightful Reporting:** Analyzes collected data to deliver clear reports on material condition, risk levels, and recommended actions.
- **Predictive Maintenance:** AI-driven anomaly detection enables early alerts and proactive scheduling, reducing failures and downtime.
- **Safety and Compliance:** Continuous monitoring helps identify risks and maintain alignment with regulatory standards.
- **Scalable and Connected:** Azure-based design supports growing data needs and integrates with existing enterprise systems for quick deployment and minimal disruption.

Few shot Image Segmentation (SAM + CLIP)

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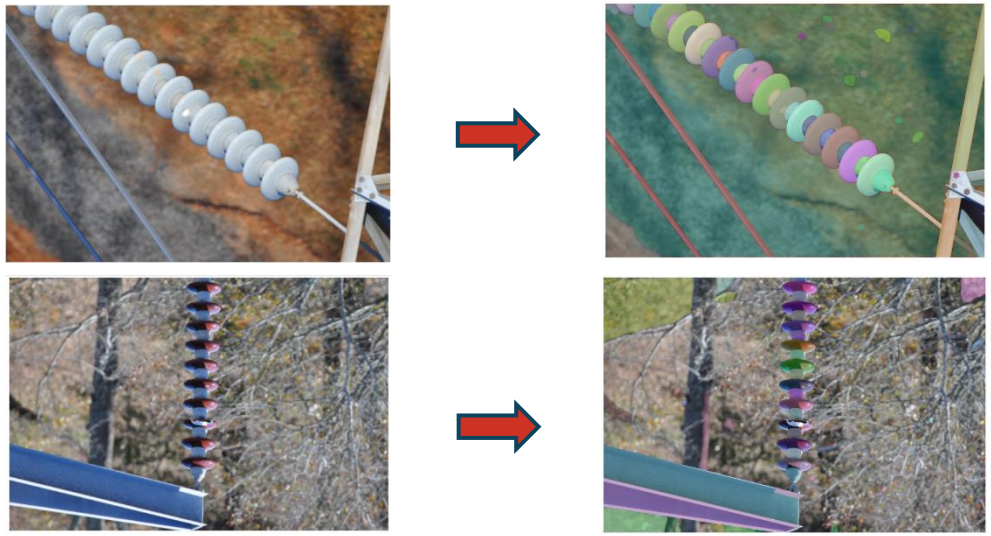
Overview

This approach uses zero-shot learning with FAIR's SAM model for image segmentation with minimal labeled data. CLIP model is used to filter segmented regions based on natural language prompts, enabling rapid development of image segmentation applications with little to no training data.

Object proposals generated by SAM (Zero Shot)



Approach

Get all object proposals generated by SAM

↓

Crop the object regions by bounding boxes

↓

Get cropped images' features and a query feature from CLIP

↓

Infer mask regions based on similarity between image features and the query feature

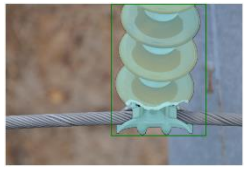
Results

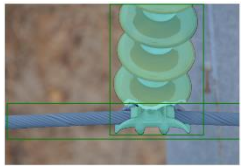
Inputs
Image + prompts

['an insulator']'

['a insulator', 'a metal wire']

Preds
Segmented images





Conclusion

Hence by cropping object regions and extracting visual features with CLIP, we can efficiently perform instance segmentation selectively using natural language prompts by matching images and textual contexts. This approach has a significant impact on applications such as image retrieval and segmentation of various region of interests, where accurate and efficient collection of data is critical for user experience and productivity.

Corroded Insulator Shells Detection

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Overview: Custom Vision based object detection & SAM based instance segmentation that can accurately detect & segment corroded shells of an insulator. This use case has the potential to improve efficiency & reduce maintenance costing.

Data & Domain Knowledge:

Corroded

Non-Corroded

Approach:

- Annotate corroded shells using azure custom vision.
- Train Azure Custom-Visions object detection model using compact version.
- Export the compact version.
- Infer detected regions based on an input image.

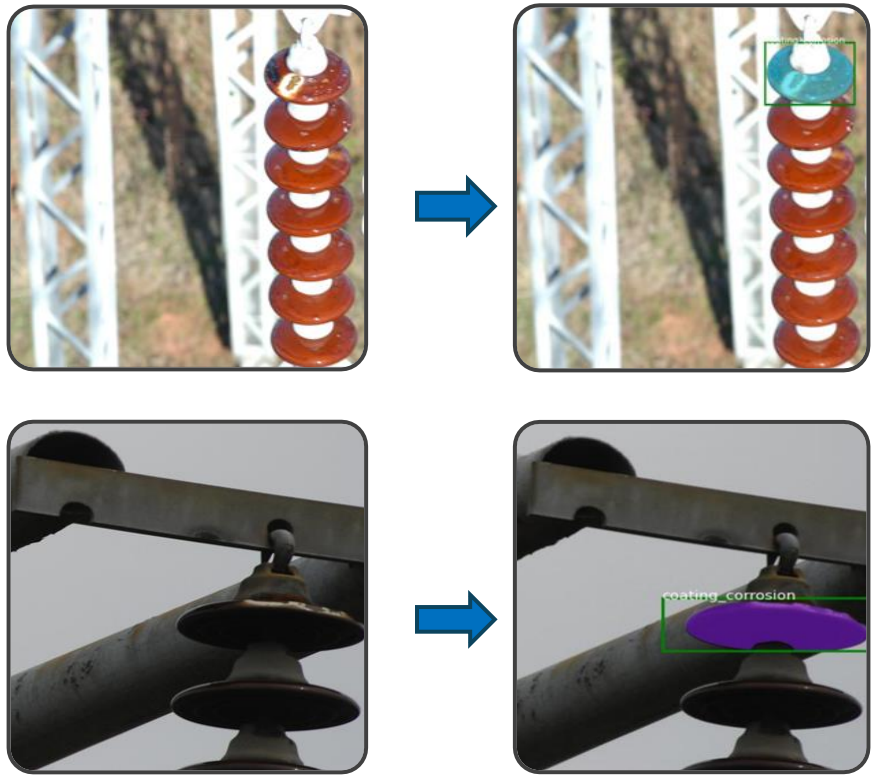
Conclusion: The integration of Azure Custom Vision Model and Segment Anything Model in the development of a corroded insulator shells detection system exhibits high precision and recall. This integrated model demonstrates promising potential in detecting and segmenting corroded parts at an early stage, thereby enabling predictive maintenance measures.

Future Scope

- Predictive Maintenance
- Compliance Monitoring
- Environmental Monitoring

Results

Actual | Predicted



Correct Prediction: 89% (30 Samples)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Thank You