Visual Quality Inspection

Automated Visual Quality Inspection is a computer vision framework that uses deep learning to learn the features, like sharpness, contrast, outline, shape, and many more to identify a defect in product images. We developed a defect detection model for a Big 3 Auto Manufacturer with 99%+ accuracy & generating ~$4M annual savings.

Challenges & Resolutions

Camera & Lighting Conditions
Start with a basic camera setup and collect images such that all variations are captured in the training data.

Lack of Defective Images
Data Augmentation techniques can be used to increase the dataset.

Latency and Network Outages
Build a hybrid solution such that inference happens on prem, model training and storage happens on cloud.

Security and Redundancy
Use Kubernetes and Anthos to ensure high availability, develop a scalable and secure solution.

Assembly and Cosmetic inspection applies to various industries

Automotive
- Press shop inspection (scratch, dents, cracks, staining)
- Foundry engine block inspection (cracks, deformation, anomaly)
- Body shop welding seam inspection
- Paint shop surface inspection

Semiconductors
- Wafer level anomaly and defect localization
- Die crack inspection
- Pre-Place inspection
- SoC packaging inspection
- Board assembly inspection
- PCB missing components (screw, spring, foam, connector, shield, etc.)
- PCB soldering and gluing (insufficient solder, icicle, shift, exceeding tin, etc.)
- Product surface check (glue spill, mesh deformation, scratches, bubbles, etc.)

Electronics
- Packaging and label inspection
- Fabrics inspection (mesh, tear, yarn)
- Metal and plastic welding seam inspection
- Surface inspection

Others / Industrial
Our Visual Inspection Platform UI Functionalities

**Dynamic Inference**
Settings within the model can be changed based on the operator's requirements. The model is designed to be flexible based on the client's requirements.

**Active Learning**
The ML model is constantly learning based on the changes made by the operator. The supervisor can then retrain the model as required.

**Version Control**
The platform has a functionality to reset back to the previous versions of the model. This can be done by the Supervisor.

**Search / Audit**
Check the confidence level of the model and audit if retraining is necessary to develop accuracy.

POC Package

**Approach**
- Requirements Finalization
- Cloud Foundations
- Ingestion & Preprocessing
- ML Model Training
- Publish
- Consume

**OUTCOMES**
- Reduced Manual Effort
- Quicker Inspection
- Improved Quality
- Savings due to reduced rework

**DELIVERABLES**
- Trained VQI Model
- UI for model inference
- Deployment on cloud

**TIMELINE (POC)**
-12 Weeks
-Single subsystem, single model, limited # of dashboards

Quantiphi is an award-winning AI-first digital transformation engineering company driven by the desire to solve transformational problems at the heart of business. Quantiphi solves the toughest and complex business problems by combining deep industry experience, disciplined cloud and data engineering practices, and cutting-edge artificial intelligence research to achieve quantifiable business impact at unprecedented speed. We are passionate about our customers and obsessed with problem-solving to make products smarter, customer experiences frictionless, processes autonomous and businesses safer by detecting risks, threats and anomalies. For more on Quantiphi's capabilities, visit www.quantiphi.com.