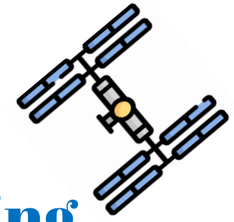
QUBITX

Problem Statement Title :
Synthetic Vision: Robust Object Detection for Space Stations Using AI-Generated Data



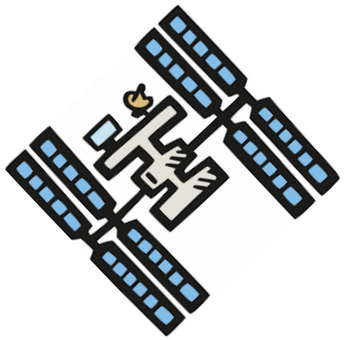
Team Name : Code Offenders

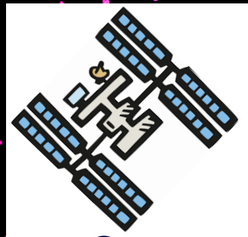
Team Leader Name : Harsh Gupta

College Name : G.L Bajaj Group Of Institute Mathura

Theme : AIML

Track : Duality





Deep Space Vision: AI Securing Space Stations

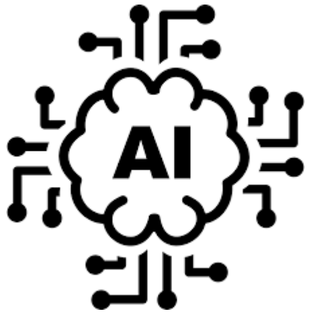
Code Offenders

Our Solution

1. Utilizes YOLOv8s for object detection 🛰️ .
2. Trained on synthetic data from the Falcon environment,simulating space station objects 🧪
3. Detects objects and provides bounding boxes with confidence.
4. Build with PyTorch and can be exported to ONNX ,TorchScript, and engine formats flexible deployment.

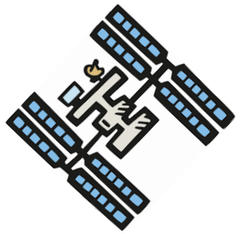
The Innovation Factor

1. Automates critical object identification in space.
2. Enhances safety and operational efficiency 🎯 .
3.Reduces reliance on manual searches.



Standing Out

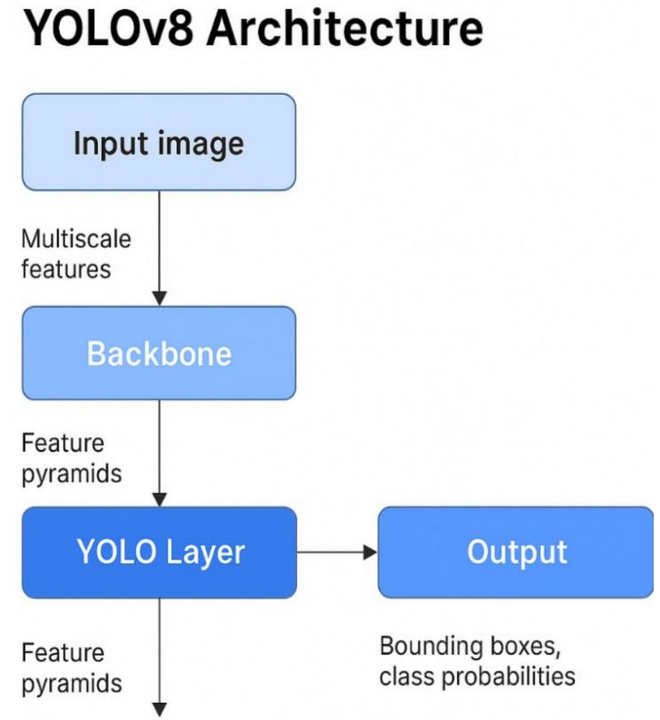
1. Leverages synthetic data for effective training.
2. Achieves high accuracy(95%mAP) at real time speeds.
3. Exportable to various formats(ONNX ,etc) for flexible deployment 🔄 .



TECHNICAL APPROACH

YOLOv8s for object detection.

- PyTorch framework with ONNX export for flexibility.
- Synthetic data generation from **Falcon environment.**
- Google Colab with **Tesla T4 GPU** for training acceleration.



PyTorch

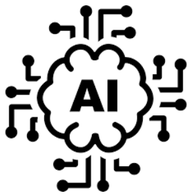
ONNX

AI

IMPACT & BENEFITS

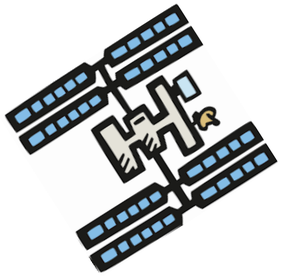
Code Offenders

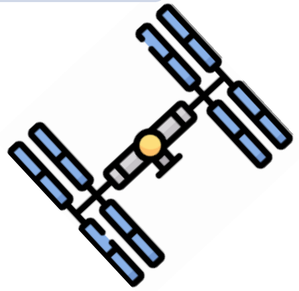
- Enhanced Safety: Real-time detection of critical safety equipment ensures quick access in emergencies and preventing damages.
- Improved Efficiency: Automated identification of toolboxes can streamline workflows, reducing search times
- Situational Awareness: Provides crew members with an immediate visual understanding of the location and status of essential items within their environment.
- Reduced Response Times: Faster identification of critical objects.
- Safety (Social Benefit): Significantly improves the safety and well-being of space station personnel.
- Operational Efficiency (Economics Benefits): Streamlines inventory management and reduce time spent searching for tools.
- Real-time Performance (Technological Benefits): The fast inference speed enables real-time monitoring and alerts.
- Offers real-time object detection, adaptability for future expansion multiple deployment formats.



RESEARCH & REFERENCES

- **Official Documentation:** https://onnx.ai/onnx/ONNX+8
- **Introduction to ONNX:** https://onnx.ai/onnx/intro/
- **ONNX with Python:** https://onnx.ai/onnx/intro/python.html
- **Official Documentation (Latest Stable Version):** https://pytorch.org/docs/stable/index.html
- **PyTorch Main Website:** https://pytorch.org/





Team Members Detail

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