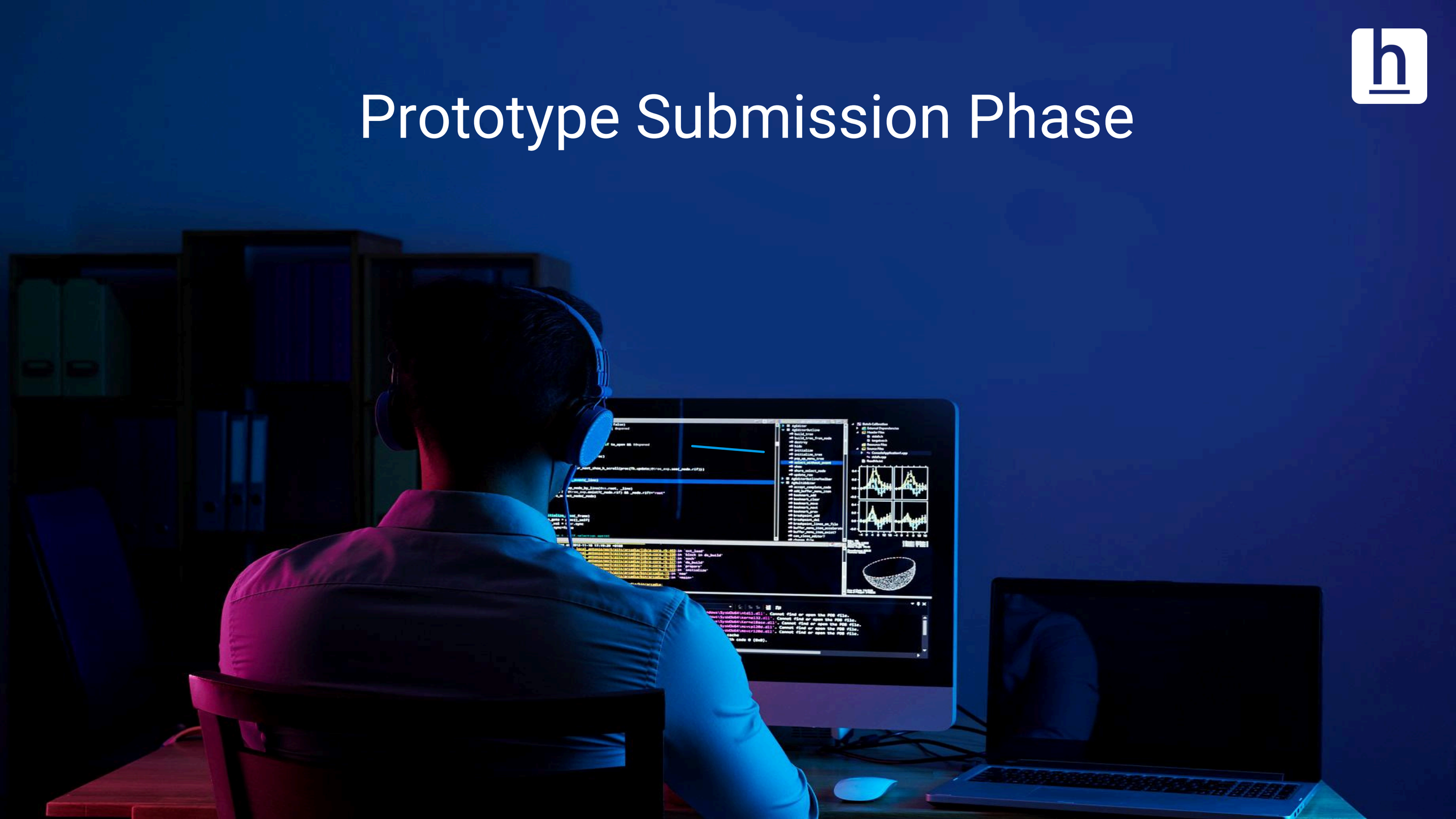
Prototype Submission Phase



E.D.I.T.H

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THEME: *The Dual Risks of Faulty Wiring and Structural Damage in Aircraft*

PROBLEM STATEMENT

The Dual Risks of Faulty Wiring and Structural Damage in Aircraft

Aircraft safety is critical to the aviation industry, requiring continuous monitoring and maintenance to prevent accidents. Faulty wiring and structural damage are significant concerns that can lead to catastrophic failures.Traditional methods of detecting these issues are often inadequate due to the complexity and hidden nature of the problems. There is a pressing need for advanced solutions that can effectively identify and address these risks.

Tech Stack

- **YOLOv8 (You Only Look Once, Version 8)**: A deep learning model for object detection, used to detect structural damage and faulty wiring in aircraft images.
- **Flask**: A micro web framework for Python, used to integrate the ML model with a web application interface.
- **Roboflow**: A platform for managing and augmenting image datasets, used to prepare the dataset for training the YOLOv8 model.
- **Gradio**: An interface library for creating easy-to-use web applications for ML models, used to deploy the API for the detection system.
- **Pillow**: A Python Imaging Library (PIL) used for opening, manipulating, and saving image files.
- **Ultralytics**: A toolkit that includes YOLOv8 and other resources, used for training and testing the ML model.

Methodology

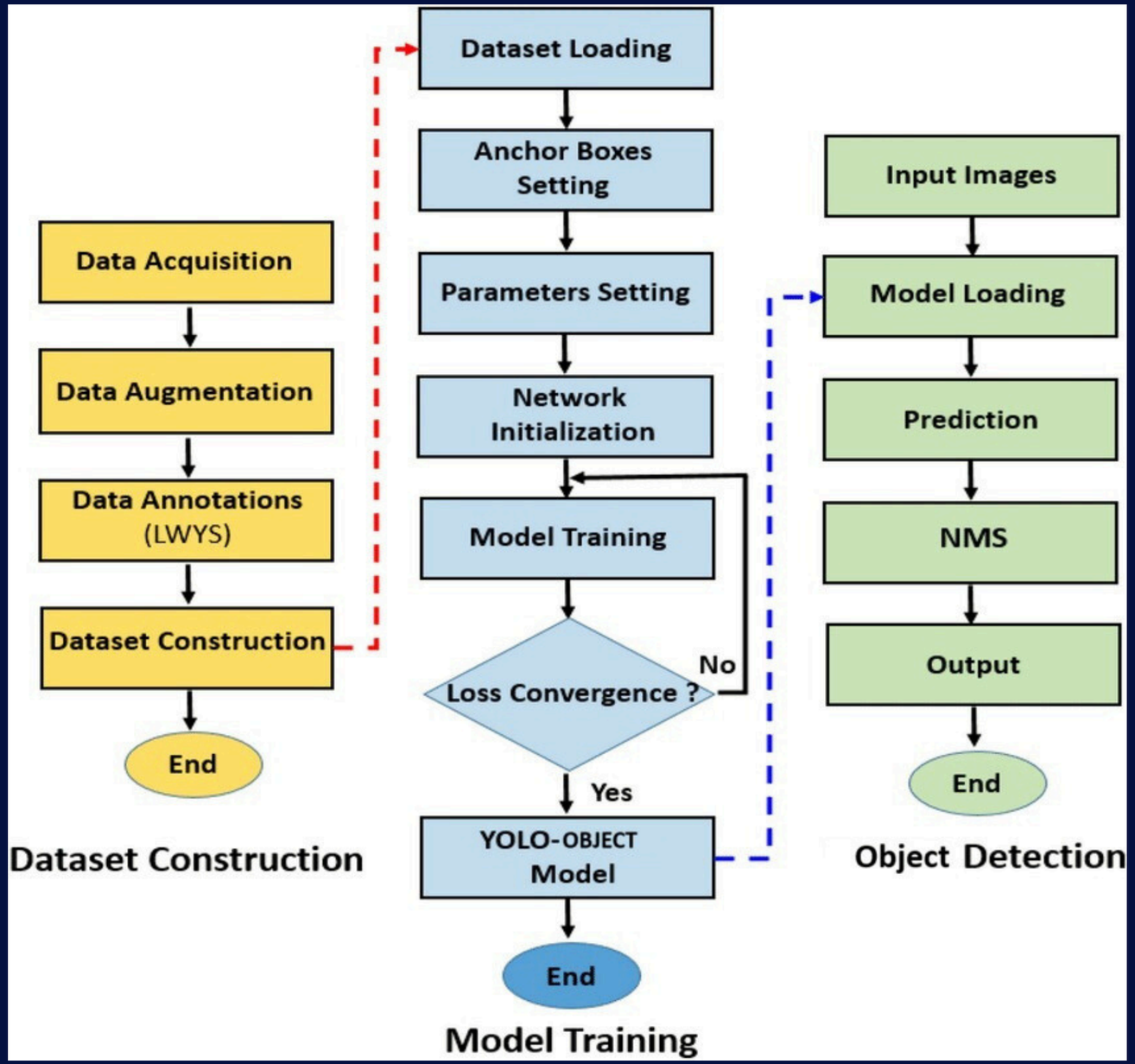
1. Data Collection and Preparation
    - Use Roboflow to manage the dataset and perform necessary augmentations.
    - Export the dataset in a format compatible with YOLOv8.
2. Model Training
    - Train the YOLOv8 model using the Ultralytics library.
    - Validate the model's performance on a test dataset to ensure high accuracy in detecting defects.
3. Develop Flask Application
    - Set up a Flask application to serve the model.
4. Deploy with Gradio
    - Create a Gradio interface for easy interaction

- This methodology outlines the development of an application using a modern tech stack to automate the detection of faulty wiring and structural damage in aircraft.

How the Solution Addresses the Problem Statement

- Accurate Detection: High accuracy in identifying faulty wiring and structural damage using YOLOv8.
- Real-Time Monitoring: Immediate feedback on faults through Gradio, reducing response times.
- Automated and Consistent Inspections: Reducing the reliance on manual inspections improves consistency and reliability.
- Predictive Maintenance: Early identification of potential issues leads to proactive maintenance and reduced downtime.
- Enhanced Safety: Comprehensive detection capabilities improve the overall safety and reliability of aircraft operations.

FLOW CHART


Dataset Loading
Anchor Boxes Setting
Parameters Setting
Network Initialization
Model Training
Loss Convergence ?
No
Yes
YOLO-OBJECT Model
End
Model Training
Data Acquisition
Data Augmentation
Data Annotations (LWYS)
Dataset Construction
End
Dataset Construction
Input Images
Model Loading
Prediction
NMS
Output
End
Object Detection

FLOW CHART

gradio

Gradio helps create an interface for this workflow

Daniel Bourke
@mrdbourke

Machine learning the type of field that uses four names for the same thing:

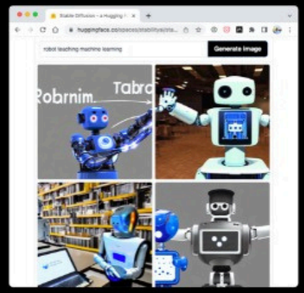
1. Linear layers
2. Dense layers
3. Feedforward layers
4. Fully connected layers

8:49 PM · Aug 4, 2022 · Twitter Web App

```
def predict(input):
  if "machine learning" in input:
    return "Tweet is about ML, okay to read"
  else:
    return "Tweet is not worth reading"
```

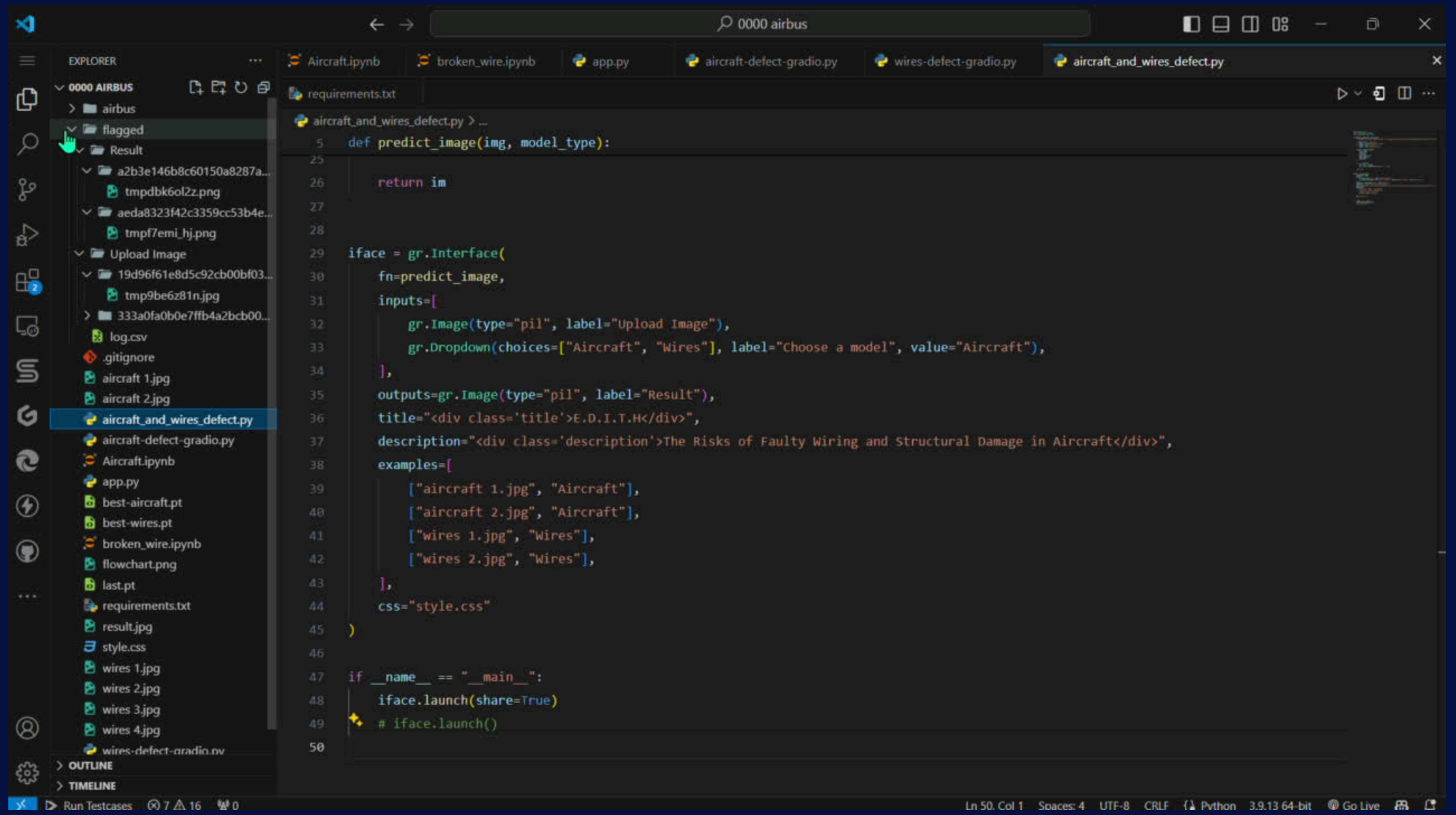
✅ Tweet is about ML, okay to read

"robot teaching machine learning"



Inputs | Model/function | Outputs

WORKING PROTOTYPE



VIDEO DEMO

Attachments

[LINK TO OUR WEBSITE]