ChatGPT

README.md: Marine Eco-AI - Oil Spill Detection Project

🌍 Project Title

Marine Eco-AI: Using Artificial Intelligence to Detect Oil Spills in Satellite Images

Overview

Marine Eco-AI is an AI-powered solution for monitoring ocean pollution — especially oil spills — using satellite imagery and deep learning. It uses computer vision techniques to analyze marine images and detect environmental risks. This helps protect marine biodiversity and supports climate action efforts.

Objectives

- Detect oil spills from satellite images using AI
- Provide a user-friendly app interface for uploading and analyzing images
- Build awareness of environmental impacts in coastal and marine communities
- Offer open-source tools that can be improved by researchers, students, or NGOs

Features

- Image classifier trained on satellite images
- Web interface using Streamlit
- Real-time predictions: "Clean Ocean" or "Oil Spill Detected"
- Simple GitHub deployment for educational and research use

How It Works

1. Loads uploaded image
2. Preprocesses the image into a standard input format
3. Runs prediction with a CNN model trained on oil spill vs clean ocean images
4. Displays result on a clean web interface

Tech Stack

- Python
- TensorFlow / Keras
- OpenCV
- Streamlit
- GitHub

Project Structure

```
marine-eco-ai/
├── data/                # Training images (oil_spill, clean_ocean)
├── models/              # Saved model (.h5)
├── notebooks/           # Jupyter notebooks
├── app/                 # Streamlit app
├── utils/               # Helper scripts (optional)
├── requirements.txt     # Dependencies
└── README.md
```

📸 Sample Image Prediction

⚡ How to Run

1. Clone repo

```
git clone https://github.com/yourusername/marine-eco-ai.git
cd marine-eco-ai
```

1. Install requirements

```
pip install -r requirements.txt
```

1. Run Streamlit app

```
cd app
streamlit run app.py
```

Contribution

- Students interested in marine engineering and AI are encouraged to fork and contribute.
- Share improvements, train new models, or add features like pollution heatmaps or vessel detection.

Pitch Deck: Marine Eco-AI (For Presentation Use)

Slide 1: Title

Marine Eco-AI: Artificial Intelligence for Ocean Pollution Monitoring

Slide 2: The Problem

- Oceans are suffering from increasing pollution
- Oil spills go undetected in many parts of the world
- Traditional monitoring is expensive and slow

Slide 3: Our Solution

- Use satellite images + AI to detect oil spills in real time
- Train an image recognition model to classify ocean surfaces
- Create an easy-to-use web app for predictions

Slide 4: Who It's For

- Coastal communities
- Environmental NGOs
- Government agencies
- Marine researchers and students

Slide 5: Key Benefits

- Fast and cheap detection
- Open-source and expandable
- Works with free satellite data

Slide 6: Technology

- Tools: TensorFlow, OpenCV, Streamlit
- Data: Sentinel-2 / Landsat ocean imagery
- Future: Add vessel tracking, weather overlays

Slide 7: What We Need

- More image data for training
- Collaboration with AI developers or marine institutes
- Support for testing in local communities

Slide 8: Contact & Credits

- Project by: Reward Edet
- Institution: Merchant Seaman Academy
- Advisor: [Name, if available]
- GitHub: [Your Repository Link]

Beginner’s Guide (Non-Coder’s Manual)

What is Marine Eco-AI?

It’s a tool that uses artificial intelligence to look at images of the ocean from space and tell if there is an oil spill. It helps us protect the sea from pollution.

How it Works

1. Satellite takes a picture of the sea
2. You upload the picture to the AI system
3. AI tells you if the sea is clean or if there’s oil

What You Need to Use It

- A laptop
- Internet connection
- Some satellite images (free online)
- This website or app

What Can You Do With It?

- Help save marine life by detecting oil spills
- Learn how AI works in solving environmental problems
- Share the tool with schools, NGOs, or ministries

How to Get Help

- Ask a classmate who knows Python
- Message tech communities on WhatsApp, GitHub, or LinkedIn
- Share your idea with an NGO or tech club

Would you like me to design a **PowerPoint file** or help create the actual **GitHub repository** next?