# AI Pipeline for Image Segmentation & Analysis

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# Objective of this Project

Develop a pipeline to segment, identify, and analyze objects in an image, with a summary table of mapped data.

# Key Components of this Project

01. Image Segmentation

02. Object Extraction

03. Object Identitfication

04. Text Identification and extraction

05. Summarization

06. Data Mapping

# Approach summary

The AI pipeline developed for image segmentation and object analysis is designed to process input images through a series of modular steps, ensuring a comprehensive analysis of each object within the image.

1. **Image Segmentation**: Utilizing the YOLOv8 segmentation model, objects within the image are segmented and saved as individual images with unique IDs, ensuring each object can be tracked and analyzed separately.
2. **Object Detection**: The segmented objects are further analyzed using YOLOv8's object detection capabilities, identifying and classifying each object with confidence scores.
3. **Text Extraction**: EasyOCR is employed to extract any text present within the segmented objects, enabling the identification of textual data for further analysis.
4. **Summarization**: A summarization module compiles the detected objects' attributes, including descriptions and text, into concise summaries for each object.

Each step of the pipeline is modular, allowing for easy integration, testing, and adaptation to different use cases. The final output includes a visual representation of the segmented objects and a detailed summary table mapping all relevant data.

# Project Development Process

## DAY 01

I carefully researched and selected the models best suited for the project, including advanced pre-trained models like YOLO for object detection and Transformers for image analysis.

## DAY 02

I began by developing the individual models required for the project, leveraging pre-trained models such as YOLO and Transformers to accelerate implementation and improve accuracy.

## DAY 03

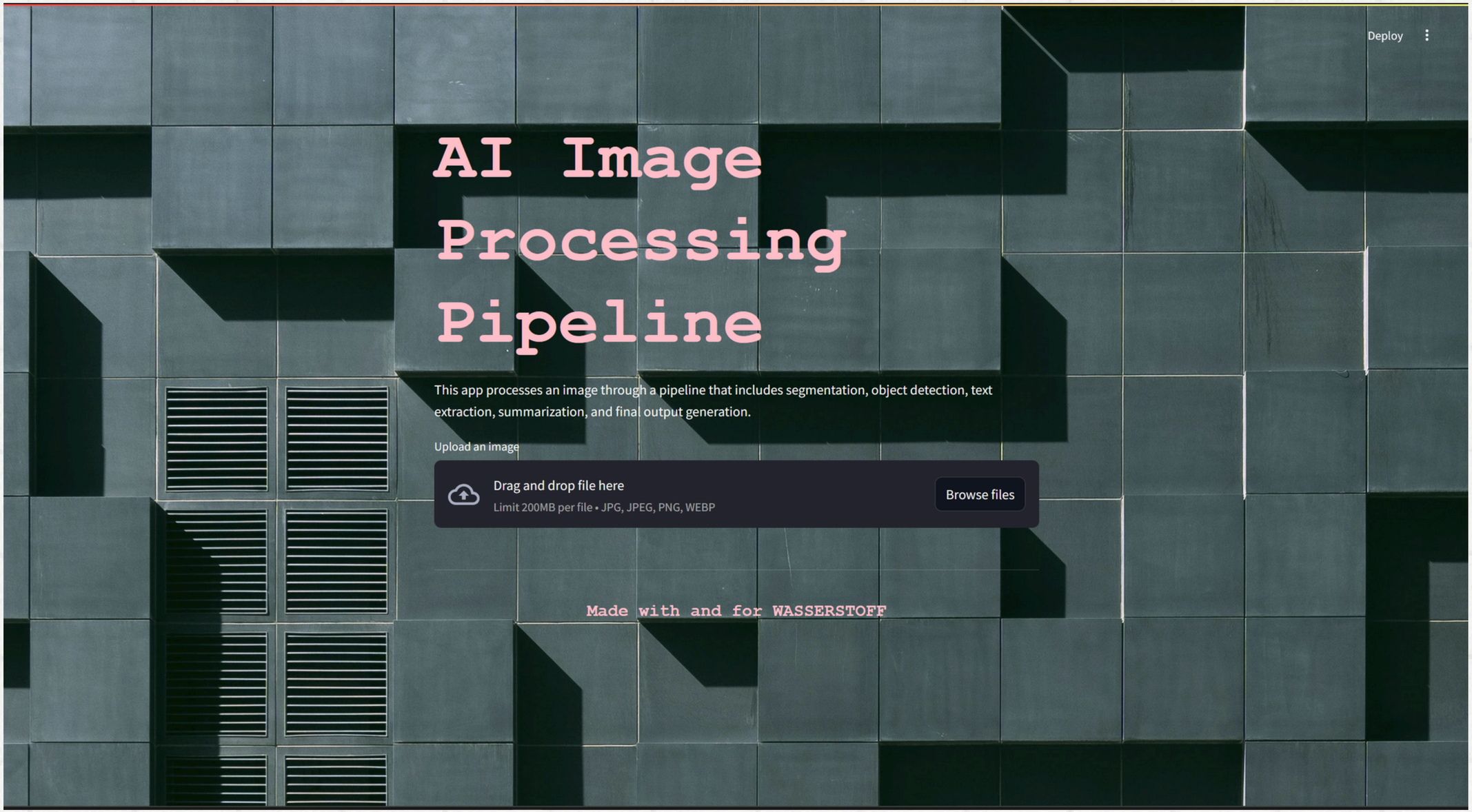
After coding the individual components, I focused on integrating these models into a cohesive pipeline, ensuring seamless interaction and functionality across the project.

## DAY 04

I conducted thorough final code corrections and rigorous testing to validate the pipeline's performance, ensuring that all components functioned correctly and met the project requirements.

# Streamlit UI Implementation

- File Upload: Users can upload input images.
- Segmentation Display: Shows segmented objects on the original image.
- Object Details: Displays object images with IDs, descriptions, extracted text/data, and summaries.
- Final Output: Shows annotated final image and summary table.


Deploy
AI Image Processing Pipeline
This app processes an image through a pipeline that includes segmentation, object detection, text extraction, summarization, and final output generation.
Upload an image
Drag and drop file here
Limit 200MB per file • JPG, JPEG, PNG, WEBP
Browse files
Made with and for WASSERSTOFF

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Success cases

## Weaknesses

- Incomplete Test Coverage: 6 test cases failed, indicating potential issues or gaps in the pipeline that need addressing.
- Integration Complexity: Complex integration of multiple models and components may lead to challenges in maintaining and debugging.

## Threats

- Model Limitations: Pre-trained models may have inherent limitations or biases that could affect performance.
- Scalability Issues: As the pipeline scales to handle larger datasets or more complex tasks, performance or integration issues may arise.

## Strengths

- Advanced Models: Utilized state-of-the-art pre-trained models like YOLO and Transformers for accurate image segmentation and object identification.
- Modular Design: Developed a well-structured pipeline with modular components, ensuring flexibility and ease of integration.

## Opportunities

- Model Improvement: Opportunity to fine-tune models and improve accuracy, especially in areas where test cases failed.
- Enhanced Features: Potential to add new features or improve existing ones, such as better data visualization or additional object analysis capabilities.

# Thank you very much!

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