

MICHIGAN STATE

U N I V E R S I T Y

Beta Presentation

Image Analysis Tool for Biphasic Solutions

The Capstone Experience

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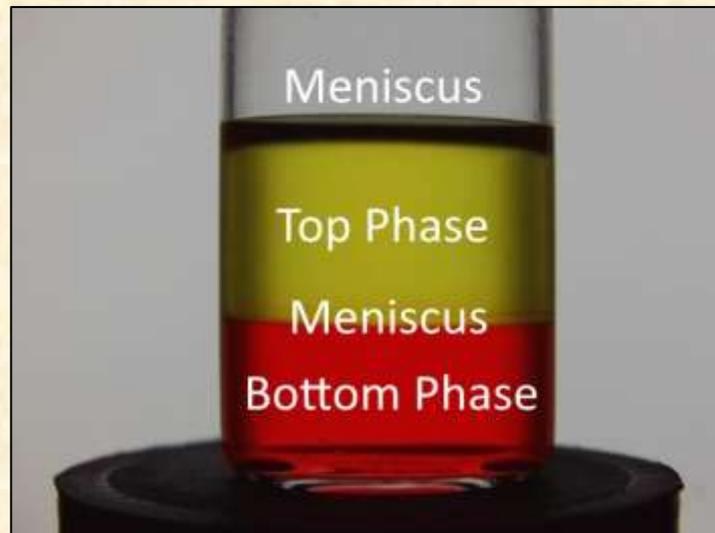
Fall 2024



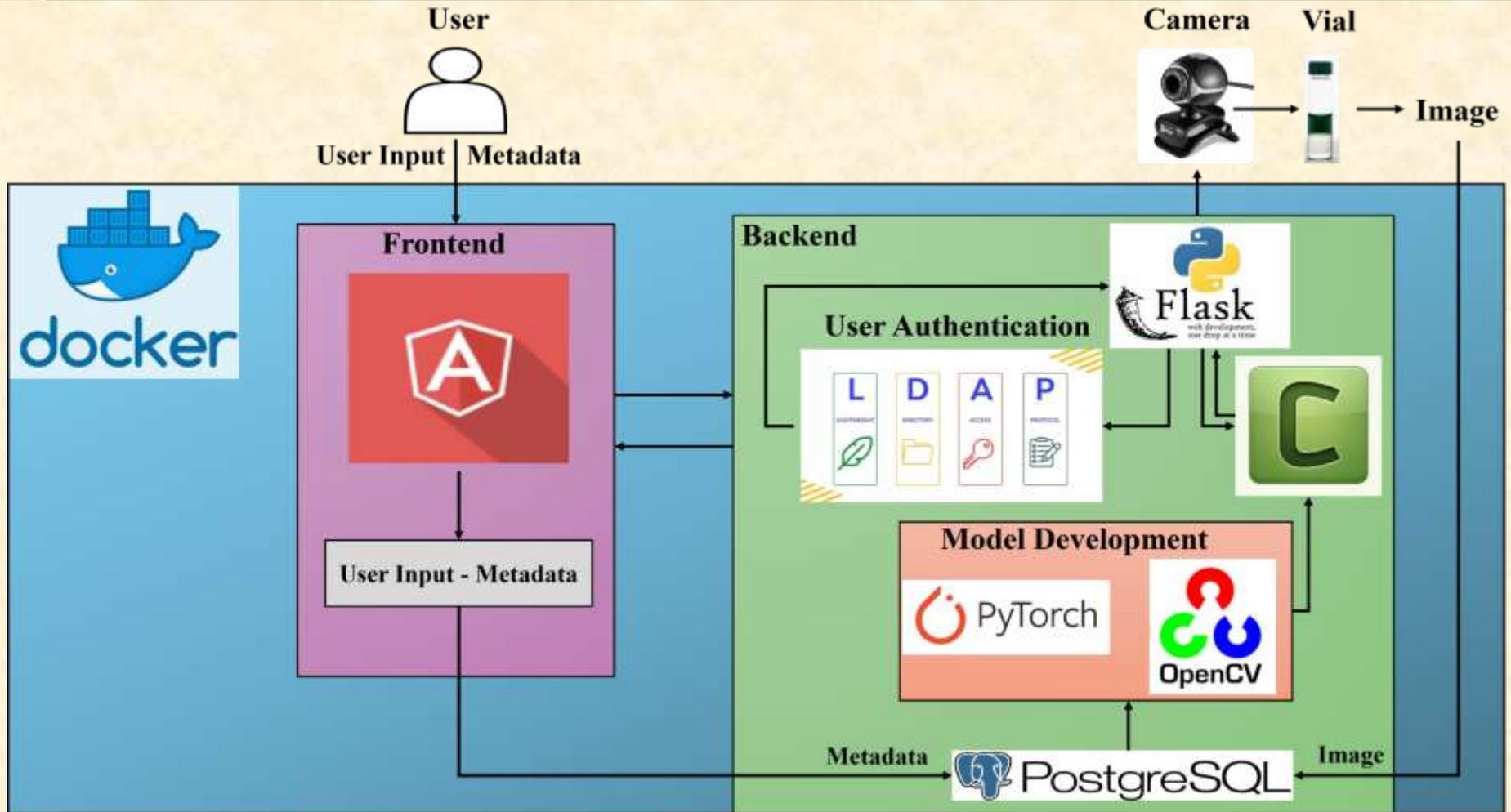
*From Students...
...to Professionals*

Project Overview

- AbbVie, North Chicago, IL – Pharmaceutical Company
- Automation of Manual Analysis via Computer Vision



System Architecture



Analysis Page

The screenshot shows a web browser window with the URL `localhost:4200/analysis`. The application header includes the **abbvie** logo and navigation links for **Analysis**, **Model Training**, **Datasets**, **Config**, and **Logout**.

The main interface is divided into three sections:

- Image View:** Displays a photograph of a vial containing two distinct liquid phases: a red bottom phase and a yellow top phase. Below the image are three buttons: **Take Picture**, **Load Image**, and **Edit**. A **Toggle Boundaries** checkbox is located at the bottom left.
- Results:** Shows the analysis outcome as **Not Emulsified** (indicated by a red dot). It provides the following data:
 - Volume:** Top Phase Volume: 3.15 mL, Bottom Phase Volume: 1.48 mL
 - Turbidity:** Top Turbidity: 169.00 NTU, Bottom Turbidity: 216.00 NTU
 - Training dataset:** A dropdown menu with a **Save to Dataset** button below it.
- Metadata:** A form for recording experimental details:
 - Vial Size:** 2 dram
 - Experiment ID:** 140149014-14919
 - Project Number:** ABBV-190
 - Electronic Lab Number:** 52959
 - Vial Contents:** Ethyl Acetate, Water
 - Database Location:** A dropdown menu with a **Save to Database** button below it.



Retraining Page

The screenshot shows a web browser window with the URL `localhost:4200/training`. The page title is "AbbVie" and the navigation menu includes "Analysis", "Model Training", "Datasets", "Config", and "Logout".

Select Dataset

Dataset: `/dataset/train`

Retrain

Stop Training

Status: Training in progress
0.023474178403755867%

Training Status

Time taken: 0 Hours, 0 Minutes, 8 Seconds
Estimated Time Remaining: 18 Hours, 56 Minutes, 0 Seconds

Loss

Accuracy (%)

Training Info

Progress

Images processed: (0 / 8520)
Epoch: (0 / 15)
Images this epoch: (1 / 568)

Data

Current loss: NaN
Current accuracy: 0



Datasets Page

The screenshot shows a web browser window with the URL `localhost:4200/datasets`. The application header includes the **abbvie** logo and navigation links for **Analysis**, **Model Training**, **Datasets** (active), **Config**, and **Logout**.

The main content area is split into two panels:

- Dataset Selection:** A panel with a search bar labeled "dataset" and three dropdown menu items: "test", "valid", and "train". Each item has a small icon and a plus sign. Below this panel are two buttons: "Import Dataset" and "New Dataset".
- Dataset Viewer:** A panel displaying a 3x3 grid of nine images of vials and test tubes containing various colored liquids (red, yellow, green, grey). Below the grid is an "Upload File" button.



Configuration Page

AbbVie Bi-phasic Image Analysis

localhost:4200/config

abbvie Analysis Model Training Datasets Config Logout

Select Model

Full-V1

Full-Final

Current model: Full-Final

Toggle Dark Mode

Camera Settings

Exposure	1500
Brightness	0
Zoom	1
Sensor Height(cm)	0.48
Sensor Width(cm)	0.64
Focal Length(cm)	1
Distance from Car	9

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What's left to do?

- Final Tasks
 - Presentation to AbbVie
 - Various Bug Fixes
 - Software Testing + Updating Documentation
 - Refactoring Code + Stylistic Edits
 - Turbidity Scaling – Waiting for Turbidity Sensor



Questions?

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Model Statistics

- Emulsification:

- 87.1% Accuracy

- 0.889 F1 Score: $\frac{TP}{TP + \frac{1}{2}(FP + FN)}$

- Volumes:

- 0.447 mL, Average Error: $|actual - expected|$

